

## EC371 Economic Analysis of Asset Prices

### The Financial Crisis, 2007 and beyond

#### 1. Overview of the Crisis

The crisis that has gathered pace from the 'credit crunch' of mid-2007 to near collapse of the entire financial sector in September 2008 involved:

1. **Collapse of asset prices**, together with an increase in volatility (sudden price changes, mostly abrupt falls). While the collapse originated in housing (real estate) markets, it rapidly spread to other assets, especially securities for which houses were collateral, then more broadly to equities (which were not directly implicated in initiating the crisis).

In this context 'asset prices' should be interpreted as the market value of securities (financial instruments) – essentially financial contracts that could be transferred by purchase or sale from one holder to another. Many of these securities were traded in Over-The-Counter (OTC) markets, i.e., privately between known parties, without regulatory oversight or the safeguards associated with organised exchanges (e.g. New York Stock Exchange, Chicago Mercantile Exchange).

The decline in market values was compounded by problems with:

- (a) *Liquidity* – It became difficult to find anyone with whom to trade: the markets for many securities simply failed: no trades took place at prices that would have been acceptable to both buyers and sellers. While the failure was temporary, it sometimes continued for days or weeks.
  - (b) *Price discovery* – When few, if any, trades occur, it is difficult to identify a consensus market price for the asset, especially in OTC markets where the price is often private to the parties to an agreement, i.e., hidden from public view. Resort has then to be made rules or conventions that determine acceptable valuations, sometimes called 'fair' prices. The process of 'marking to market' – assigning a value to assets – became exceedingly problematical.
  - (c) *Transparency* – Many new derivative securities were created in the years immediately preceding the crisis – 'derivative' in the sense that their payoffs depended on the payoffs on other securities (details below). Often the 'value' – however defined – of these securities was omitted from balance sheets, both for issuers and holders. In such circumstances, the solvency of the issuers of such securities becomes unclear – transparency is lacking.<sup>1</sup>
2. **Default on financial contracts**, and subsequent insolvency of institutions that issued them. Again the crisis originated in real estate, particularly of so-called 'sub-prime' mortgages – essentially risky loans made with houses as collateral.

Default commonly manifests itself as a failure to fulfil a contractual obligation, e.g. failure to pay interest on a debt (coupon on a bond) or repayment on a mortgage. The prospect of default is commonly referred to as *counterparty risk*.

Counterparty risks can result in a cascade of defaults because the liability of one individual or institution is the asset of another. The failure of one institution can trigger contagion (a sequence of debtor-creditor defaults), possibly leading to *systemic failure* – an imprecise term

---

<sup>1</sup>Transparency – and the lack of it – affects financial markets in other ways too, e.g. markets in which it is possible to observe the volume of trade in each security are considered more transparent than those in which trades are not disclosed.

referring to circumstances in which an entire financial system, or large portion of it, ceases to function (in the sense that voluntary asset exchanges are impossible to arrange).

3. *Commodity price decline*<sup>2</sup> Following several years of escalating commodity prices, around mid-2008 the boom went into reverse, with sudden falls in the prices of many commodities, such as oil. The lower and volatile prices continued beyond 2008, probably reflecting falling demand in the world recession that ensued.

Underlying the onset of the crisis was a *collapse of confidence* among asset holders and traders – a collapse that is central to all financial crises. Remember: what matters is decision-makers' *perceptions* of asset values, bearing in mind that 'objective' benchmarks are seldom, if ever, available.

## 2. Assets and financial instruments implicated in the crisis

The securities most closely associated with the onset of the credit crunch share two characteristics: (i) they are instruments with contractual payoffs (bonds and loans) rather than equity (stocks and shares, which provide residual rights of ownership but no contractual payoffs); (ii) the collateral supporting the obligations takes the form of real estate, perhaps at several removes in the sense that the collateral for one bond may be another bond, the collateral for which is another bond, and so on, ultimately the loans being secured on physical property.

1. **Mortgages** – Houses are commonly purchased with funds from a loan in the form of a mortgage, for which the market value of the house is collateral.<sup>3</sup> Mortgages issued by banks and other financial organisations (e.g. building societies) are illiquid in the sense that they are not marketable securities, but, from the late 1990s, mortgages were increasingly bundled together to provide the collateral for more liquid 'asset backed securities'.
2. **Asset Backed Securities (ABSs)** – The commonest ABSs implicated in the crisis were **Collateralised Debt Obligations (CDOs)** and **Collateralised Loan Obligations (CLOs)**. These are promises to make a stream of payments over a specified period of time, funded from the payoffs on the securities (mortgages, or whatever) with which they are backed.

Each ABS thus comprises essentially a 'bundle' of the securities, e.g. mortgages, that form its collateral. The process of *securitisation* that results in the ABS is usually undertaken by a bank, or other financial institution, that charges a fee for its services, and may itself hold some of the resulting ABS.

3. **Structured Investment Vehicles (SIVs)** – These are special-purpose 'shell' companies, known as *conduits*, set up exclusively to hold designated types of assets, funded by the issue of ABSs. In many cases, they are purely notional legal entities, without employees or physical premises, often administered (for a fee) by the originating company – typically a bank, or other large financial organisation – that established them.

An SIV might hold, as assets, a collection of mortgages purchased from the originating company, and funded by the issue of several 'tranches' of ABSs, each tranche having different priority to receive income from the returns generated by the assets – i.e. the 'senior' tranches with higher priority are more secure than the 'junior' or 'subordinated' tranches. Often the originating company itself retains ownership of some of the most junior (risky) ABSs. Also, or alternatively, the administering company insures the ABS holders against the contingency that the SIV's assets default – sometimes this insurance is known

---

<sup>2</sup>Many commodities (e.g. oil, wheat, cotton, aluminium, gold) are traded as financial assets, typically via futures markets.

<sup>3</sup>Real estate (e.g. a family house) is different from many other financial assets in several respects: (i) *heterogeneity* – very few houses are identical; (ii) *services of ownership* – the 'payoff' on the asset is largely implicit in providing shelter, etc.; (iii) *leveraged* – houses are typically financed with borrowed funds in the form of mortgages; (iv) *tax treatment* – in most jurisdictions the payoffs from house ownership enjoy favourable tax treatment.

as 'liquidity enhancement'. The nature and extent of such protection depends on the terms of the SIV's founding charter, crucially the extent to which financial organisations retain a residual obligation to guarantee the viability of the SIVs that they originate.

One type of SIV is **Asset Backed Commercial Paper** (ABCP): the assets of ABCP conduits, as their name suggests, comprise commercial paper, i.e. corporate debt with a short maturity, typically less than six months.

4. **Derivatives** – Being OTC contracts, the derivatives can take the form of any contingent claim agreed between the parties to the contract. In the context of the credit crisis, the most common are **Credit Default Swaps** (CDSs), in which one party, *A*, agrees to make a sequence of payments to a counterparty, *B*, conditional on the non-default of a 'bond' issued by *C*. In the event that the *C*-bond defaults, *B* compensates *A* with a lump sum payment. Essentially, the CDS is an insurance contract, such that *B* insures *A* against the default of *C*.

Note that *C* is not a party to the CDS, and that the 'bond' could be an Asset Backed Security. The CDS may be easiest to interpret if *A* holds some of the 'bond' but this is not necessary – it's nothing more than a 'bet' between *A* and *B*, i.e., a gamble by *B* that the *C* bond won't default.

### 3. Evolution of the crisis (so far)

1. During 2007 it became clear that house-owners were increasingly failing to make their contractual repayments on mortgages. Worst affected were sub-prime mortgages, commonly imposing obligations on borrowers (mortgagees) with low credit ratings and for whom the mortgage principal was a high proportion (often more than 100%) of the house valuation (even when house-prices were high).
2. Foreclosure on defaulting mortgages – eviction of the mortgagee and subsequent sale of the house – tended to drive down house prices (house prices in the US had started to fall sometime in the first half of 2006, about a year later in the UK).
3. Mortgage lenders that held as assets a high proportion of risky mortgages, began to incur losses, even themselves becoming insolvent, or at least under suspicion that they might be insolvent (e.g. Northern Rock, which experienced a classic 'bank run' in September 2007 as depositors sought to withdraw their deposits).
4. ABSs backed by defaulting mortgages began to default, likewise signalling the insolvency of their issuing SIVs. Financial institutions holding defaulting ABSs, or with residual obligations for SIVs incurred losses and some lurched towards insolvency (e.g. Northern Rock, again).
5. By 2008, derivative securities with payoffs contingent on ABSs began to default, and the institutions that issued them approached insolvency. Bear Stearns, an investment bank based in New York, avoided bankruptcy only by being taken over in March 2008 by JP Morgan, which paid a low 'fire-sale' price for Bear Stearns' stock.

Many of the derivatives were 'Credit Default Swaps' (CDSs) – essentially insurance contracts against the default of ABSs. When ABSs defaulted, the insurers (issuers of CDSs) should have compensated the insured (holders of ABSs) but not all were able to do so, e.g., the large American insurer AIG (which was rescued in September 2008 at great expense to the Federal government). The so-called 'monoline insurers' – essentially companies that specialise in selling guarantees that bonds issued by third parties will not default – lost heavily, when they were required to compensate holders who had purchased insurance (CDSs) against the default of ABSs.

6. The magnitude of the crisis became clear in early September 2008 when Fannie Mae and Freddie Mac, two large holders of American mortgages and ABSs, were taken into 'conservatorship' – essentially temporary nationalisation. Shortly afterwards Lehman Brothers, another investment bank, lurched dramatically into bankruptcy.<sup>4</sup>
7. As financial institutions approached insolvency confidence evaporated, leading to abrupt declines in asset values, including share prices. The impact of the crisis soon spread beyond the financial system: households reduced consumption expenditures; firms cut investment in inventories and capital goods; commodity prices (oil and other raw materials) fell abruptly (though most stabilised shortly thereafter). The consequent fall in corporate profits thus reinforced, and thence justified, the deteriorating confidence in the value of their equities.
8. Government (including Central Bank) intervention, which had begun at an early stage – e.g. the effective nationalisation of Northern Rock in September 2007 – intensified with:
  - (a) Measures ('bailouts') to *rescue financial institutions* that would have otherwise have failed. The measures included: purchase of banks' 'toxic' assets at above-market prices; guarantee of some banks' assets; injections of capital, typically by the purchase of preferred shares (effectively nationalisation).
  - (b) Expansionary *monetary policies* to alleviate the impact on the 'real' economy: interest rates were reduced to historically low levels and central banks engaged in 'quantitative easing' (open market operations to purchase securities, mostly government debt, from banks).
  - (c) *Regulatory measures* to influence the governance of financial institutions, e.g. attempts to limit executive bonuses; restrictions on the short selling of stocks and shares.
9. Through 2009 and 2010, attention switched to:
  - (a) *Fiscal policies* to restrain, and ultimately to reverse, the growth of governments' budget deficits.
  - (b) *Regulatory reforms* to render financial institutions less prone to insolvency – or, more importantly, to allow individual banks to fail without jeopardising the stability of the entire financial system.
  - (c) *Beggar-thy-neighbour* government action – such as officially induced exchange rate depreciations and tariffs on trade – intended to protect domestic employment at the expense of foreigners.

#### 4. Institutions and their strategies

The institutions directly affected by – and arguably *causes of* – the crisis are *financial intermediaries*, commonly **banks**, the assets and/or liabilities of which included securities the payoffs on which were exposed to fluctuations in real estate (house) prices. They were affected either because they held assets (e.g. mortgage lending, or ABSs) that declined in value, or because their liabilities included obligations in the event of SIVs' insolvency or the default on ABSs. For example, the bank may have established an SIV for which it retained (as an asset) some amount of a risky ABS issued by the SIV – when the assets backing the ABS defaulted, the ABS itself also became vulnerable to default: hence, the genesis of 'toxic' assets that forced their holders towards insolvency.

Similarly (as was common), suppose that a bank had undertaken to provide 'liquidity enhancement' for an ABCP conduit: if any assets held by the ABCP defaulted, the bank would be

---

<sup>4</sup>For an engrossing blow-by-blow account of the Lehman failure, see Andrew Ross Sorkin *To Big to Fail*, Allen Lane, 2009. Beware, this book is a work of journalistic reportage, not economic analysis.

obliged to compensate ABCP (this is the liquidity enhancement) to fulfill its obligation. By providing liquidity enhancement, the bank acquired a *contingent liability* – very often (depending on accounting regulations) such liabilities need not appear on banks' balance sheets.

As a second example, suppose that an institution had issued – 'written' – a Credit Default Swap (CDS) such that it received a sequence of payments so long as a specified 'bond' did not default. Again this is a contingent liability in the sense that unless the specified 'bond' defaults, the CDS writer pays nothing. But in the event of default, the obligation is substantial – typically that the CDS writer pays the bond's face value (its 'principal') to the CDS holder.

Financial intermediaries "lend long and borrow short". They make their profits by holding assets that are less liquid than their liabilities, typically with assets (e.g. loans or bonds) with a longer time to maturity than their liabilities (e.g. deposits). This mismatch creates risk that regulators seek to control in a variety of ways, one of which is to stipulate the minimum amount of capital that the intermediary's owners (equity holders) must provide.

Minimum capital requirements differ according to the rating of the assets: less capital for more secure assets. Capital is costly.<sup>5</sup> Hence, other things equal, there is an incentive to hold safer assets. As loans – such as mortgages – attract a high capital requirement, the lender has an incentive to shift these assets 'off balance sheet', e.g. into an SIV, which the intermediary creates as a conduit to 'securitise' the loans. Even if the originating intermediary retains a portion of the SIV's ABSs, these may be more highly rated (deemed less risky) than the assets that were shifted into the SIV.<sup>6</sup> Such strategies have been dubbed 'regulatory arbitrage' because they are said to be motivated, at least in part, by the intention to circumvent regulation-imposed capital requirements.

Possible remedies (some of which remain under discussion):

1. **Capital requirements** – the so-called 'Basel III' arrangements will, if adopted, have the effect of raising the proportion of a bank's total assets that must be backed with the bank's equity capital.
2. **Clearing houses** – a greater range of financial contracts, especially CDS's, could be subject to margin requirements imposed by a 'central clearing party' (CCP, or clearing house). Essentially, this means that the parties to such contracts would need to hold collateral with the CCP to guard against counterparty risk, i.e. that one of the parties may otherwise default.
3. **Too Big To Fail** – attempts may be made to limit the size of financial institutions. So-called 'universal banks' could be separated into 'commercial banks' that invest deposits in liquid assets, and 'investment banks' that make deals with their own capital. Another possible route is to limit the overall size of each commercial bank relative to the size of the market for deposits, that is, to invoke anti-trust laws or to apply 'competition policy'.
4. **Corporate governance** – attempts have been made to limit (or tax) executive bonuses. Mostly likely this will be achieved – if at all – via legislation that makes executives more responsive to shareholders' wishes.

## The Role of Rating Agencies

Bond credit rating agencies have been severely criticised since many of the securities that they rated as safe – e.g. AAA = "credit risk almost zero" – defaulted in the crisis. Notice the adjective *almost*

<sup>5</sup>The 'cost of capital' is essentially the rate of return paid on a company's equity, or from the perspective of raising new capital, the price at which new shares can be sold to investors.

<sup>6</sup>The ABSs may be less risky partly because (i) diversification of the SIV's asset portfolio reduces overall risk, and (ii) some tranches of the ABSs have a prior claim on the SIV's assets in the event of default. But note that such risk reduction is a possibility, not a necessity: diversification may not be effective among assets the payoffs on which are correlated (as turned out to be the case for mortgages). Also, the originating institutions tended to hold the *more* risky tranches of ABSs (a sales ploy to persuade outside investors to purchase the SIV's ABSs).

modifying 'zero': the rating is not a guarantee that contractual obligations will be fulfilled. Even so, complaints were voiced – probably with good reason – that many ratings were too optimistic.

Not only do bond credit ratings provide signals to investors, they also have a regulatory role.<sup>7</sup> For example, institutions must hold bonds with a minimum credit rating to satisfy certain reserve requirements. In addition, a downward revision of credit ratings can have a major impact on the cost at which companies (including banks) can borrow, because it increases the interest rate that must be paid to persuade investors to buy new issues of bonds.

Given that rating agencies generate income from fees paid by bond issuers, it is often complained that a *conflict of interest* results in overly optimistic bond ratings – issuers prefer high ratings because market interest rates reflect investors' perceptions of the riskiness of bonds; consequently an issuer is more likely to employ an agency that issues favourable ratings for its bonds.

Although the criticism of rating agencies is persuasive, estimation of the riskiness of complicated securities is highly problematical: there is ample scope for legitimate disagreement. A more compelling criticism of credit ratings is of a financial sector places too much weight on them, overlooking that *any* estimate of the future value of an asset is always prone to error.

## The Role of Hedge Funds

Although hedge funds were not directly implicated in the origin of the crisis, their strategies included trading in securities that *were* directly implicated. Also, at times of tension in financial markets, the highly leveraged, opaque and risky actions of hedge funds tends to attract criticism.

The main criticism levelled at hedge funds during the crisis has been that in *short-selling* the stocks of vulnerable companies – especially banks exposed to housing-related securities – they exacerbated the crisis, or worse, that the collapse of share prices was more acute than otherwise. In this context, regulatory authorities in the US (Securities and Exchange Commission) and UK (Financial Services Authority) temporarily banned the short-selling financial companies' shares.

It may seem obvious that short-selling amplifies the decline in the value of an asset that is being short-sold – because short-selling tends to increase at a time when prices are likely to be falling as a consequence of expectations of further declines and low demand. But such condemnation is superficial: short-selling can aid *price discovery*. Short-selling can be a route to guide prices towards values consistent with investors' expectations about the worth of assets, i.e., to balance the demand to hold assets with the available supply. Suppression of short-selling could thus result in a form of 'market failure' in the sense that investors are unable to trade at quoted prices.

\*\*\*\*\*

---

<sup>7</sup>In the US the ratings issued by NRSROs (Nationally Recognised Statistical Rating Organizations of which Moody's, Standard & Poor's, and Fitch are most well known) are used in fulfilling regulatory requirements. The NRSROs are themselves regulated by the US Securities and Exchange Commission.