

The macroeconomic implications of financial 'deleveraging'

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Financial 'deleveraging' is inimical to the health of the world economy. This article examines the theoretical and practical mechanics of deleveraging, surveys the historical record of prior deleveraging phases and describes the circumstances that distinguish the current episode. The macroeconomic implications of deleveraging are then considered.

The conclusion is that the first stage of the deleveraging process, which is driven by the decline in both asset values and lending to borrowers at the riskier end of the spectrum, is currently well advanced. The second phase, where the decline in credit availability begat by the initial phase hurts the value of more prosaic asset classes, and less marginal borrowers, is significantly less advanced. This dynamic will place significant stress on the world economy in 2009. For emerging markets the impact will differ depending upon a number of factors, with the single most important among them being pre-crisis external financing arrangements.

On an optimistic note, policy makers are well aware that the magnitude of the challenge presented demands a forthright global response from the public sphere. The multi-dimensional global policy response provides needed insurance against downside risks to growth next year, and lays the foundation for recovery in the period beyond.

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Introduction

It has often been noted that the finance industry has a remarkable ability to corrupt the use of the English language. Financial innovation is not limited to the creation of financial instruments: it is on constant display in the flow of neologisms emanating from the sector. A quick search of the *Macquarie Dictionary* reveals no matches for the term 'deleveraging'. Idiomatic arguments aside, however, the process it seeks to describe is currently an important feature of the global financial system and is likely to be so for a considerable period of time. In fact, financial deleveraging is a malignant force in the world economy.

The circumstances that can lead an individual financial institution to deleverage its balance sheet are readily understandable. However, the aggregate consequences of such behaviour can be inimical to economic growth. The auto-catalysing and self-perpetuating negative feedback loop between bank balance sheets, asset prices, credit supply and the real economy, once it catches hold, can do significant damage and can be extremely difficult to arrest.

The article proceeds as follows. First, the theoretical and practical mechanics of the deleveraging process are laid out. Second, the avenues whereby financial stresses are transmitted to the real economy are enunciated. Third, the current situation is outlined with reference to historical precedent. This section also addresses the impact of the deleveraging process upon the world economy in the coming period.

The broad conclusion is that the first stage of the deleveraging process, which is driven by the decline in both asset values, and lending to borrowers at the riskier end of the spectrum, is currently well advanced. The second phase, where the decline in credit availability engendered by the initial phase hurts the value of more prosaic asset classes, and less marginal borrowers, is significantly less advanced. This dynamic will place significant stress on the world economy in 2009.

What is financial deleveraging?

In a general sense 'leverage' is the degree to which an individual, firm or financial company (or nation for that matter) has accumulated debt, and is best understood when scaled by a metric relevant to the party concerned. It follows that 'deleveraging' refers to the reversal, or unwinding, of previously accumulated leverage.

To understand the mechanics behind the deleveraging process it is useful to begin with some basic balance sheet accounting. Before looking at the balance sheets of financial institutions, first consider the balance sheet of a representative household. The household owns a house financed by a mortgage (assume that this is the only asset the household owns). The balance sheet looks as follows.

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Assets	Liabilities and net worth
House (\$100,000)	Mortgage (\$90,000)
	Net worth (equity) (\$10,000)

Leverage is defined as the ratio of total assets to net worth, and is given by:

$$100,000 / (100,000 - 90,000) = 10.$$

Now suppose the value of the house falls to \$95,000. The leverage ratio becomes

$$95,000 / (95,000 - 90,000) = 19.$$

As the value of the house declines, the household's net worth also declines and its leverage ratio increases. For most households, such fluctuations in net worth and leverage would not ordinarily solicit a response – in other words households do not actively manage their balance sheet. There are multiple historical examples of households suffering through a phase of 'negative equity' during a house price bust.

Leverage and the bank balance sheet

If banks did not adjust their balance sheets in the face of fluctuating asset prices, then their leverage ratios would also vary inversely with the value of the asset side of their balance sheets. However, banks actively manage their balance sheets to maintain a targeted leverage ratio. They do this for two main reasons.

Firstly, banks manage their key balance sheet ratios in order to maintain their credit rating targets and thus their cost of capital (Adrian and Shin 2008). A bank whose leverage ratio rises significantly above its targeted level – due, for example, to an unanticipated decline in the value of its assets – risks having its credit rating downgraded, which is likely to increase the price at which it is able to access capital.² In such circumstances, the bank must 'deleverage' its balance sheet if it is to return to its target leverage ratio.

Secondly, banks are governed by prudential regulations which set minimum requirements on the amount of equity (or 'capital') they must hold against their assets. These minimum requirements are set with the aim of ensuring that banks have a sufficient capital buffer to absorb unanticipated losses.

² Another way of saying this is that a bank's optimal capital-asset ratio is *implicitly* determined by the market.

Box 1: A simple example of bank balance sheet deleveraging

To understand how financial institutions manage their balance sheets, it is useful to examine the structure of a basic bank balance sheet. A bank balance sheet differs from that of a typical household or firm in important ways. In a financial sense, the primary activity of a bank is to manipulate its balance sheet by 'creating' assets and liabilities, which it does by making loans.

Each loan the bank makes involves the creation of an asset on one side of the balance sheet (the loan) which is balanced by a liability (usually a deposit or funding sourced from wholesale markets). The (simplified) balance sheet looks as follows:

Assets	Liabilities and net worth
Loans	Deposits
Securities	Borrowings
	Net worth (equity capital)

Equality of both sides of the balance sheet is achieved via net worth, which is the difference between the bank's assets and liabilities. Net worth is what is claimed by, or owed to, the owners of the bank. In the case of a bank, net worth is typically referred to as 'equity capital' or, more simply, 'capital'. A widely used measure of a bank's financial health is its capital-to-asset ratio (hereafter CAR) which, in simple terms, is equivalent to the inverse of the leverage ratio described above.

Drawing from Adrian and Shin (2008), consider a bank that actively manages its balance sheet so as to maintain a constant CAR of 10 per cent. Assume the bank has assets of \$100,000 and liabilities of \$90,000. Its initial CAR is:

$$\text{CAR} = (100,000 - 90,000) / 100,000 = 10 \text{ per cent.}$$

Now suppose that the market value of the bank's assets falls by \$1,000. The CAR decreases to:

$$\text{CAR} = (99,000 - 90,000) / 99,000 = 9 \text{ per cent.}$$

The bank targets a CAR of 10, implying that its leverage is now too high. Another way of saying this is that its capital base has become too small relative to its assets. The bank can adjust down its leverage — 'deleverage' — by cutting back on its lending (or by selling securities) and using the proceeds to reduce liabilities by the required amount.

Suppose that it decides to reduce its lending by \$9,000 and use the proceeds to pay down \$9,000 worth of debt. Its CAR would then increase to:

$$\text{CAR} = (90,000 - 81,000) / 90,000 = 10 \text{ per cent.}$$

The key point to note is that because the creation of an asset necessarily involves the creation of a matching liability, the only way for the bank to get back to its targeted CAR in this simplified example is by *shrinking* the size of its balance sheet. Deleveraging reduces the value of the denominator, which increases the CAR.

Highly leveraged financial institutions and pro-cyclicality

The process of deleveraging can also extend beyond the traditional banking system to other financial institutions, such as investment banks and hedge funds. For these highly leveraged financial institutions, the imperative to deleverage during times of financial market stress can be far stronger than is the case for more traditional commercial banks.

There is a wealth of empirical evidence suggesting that the target leverage ratios of investment banks rise and fall with the business cycle. Adrian and Shin (2008), for example, present evidence that leverage is strongly pro-cyclical for the major US securities dealers and brokers. More specifically, there appears to be a strongly *positive* relationship between changes in total assets and changes in leverage, such that at times when the value of their assets is increasing, investment banks tend to increase their target leverage ratios, and vice versa.³ By implication, the deleveraging process for investment banks when asset prices are decreasing entails sales of assets above and beyond what would be required to keep leverage ratios constant.

The empirical literature points to the existence of a range of factors that explain why leverage tends to be pro-cyclical amongst some financial institutions. The theory of a 'financial accelerator' (Bernanke, Gertler and Gilchrist 1996) suggests that the ease with which financial institutions are able to access finance from external sources is inversely related to their net worth or, more generally, the value of the assets (less liabilities) they are able to offer as collateral.⁴ To the extent that financial institutions' net worth is positively related to the business cycle and asset prices – a reasonable assumption – financial institutions will tend to lever up their balance sheet when economic activity and asset prices are increasing, and vice versa.

Another strand of the literature emphasises the role that limitations in risk perceptions play in explaining the pro-cyclical behaviour of financial system participants. Borio, Furfine and Lowe (2001) argue that inappropriate responses of financial market participants to changes in risk over time provide an additional source of pro-cyclicality over and above what could reasonably be ascribed to financial accelerator-type effects. They argue that these inappropriate responses stem mainly from difficulties in

3 Pro-cyclical leverage is not a term that financial firms are likely to associate themselves with, preferring such terms as balance sheet optimisation. In practice, financial firms take balance sheet decisions based on their value-at-risk (VaR), which defines the required capital to efficiently underscore an asset holding scaled by the appropriate probability of loss.

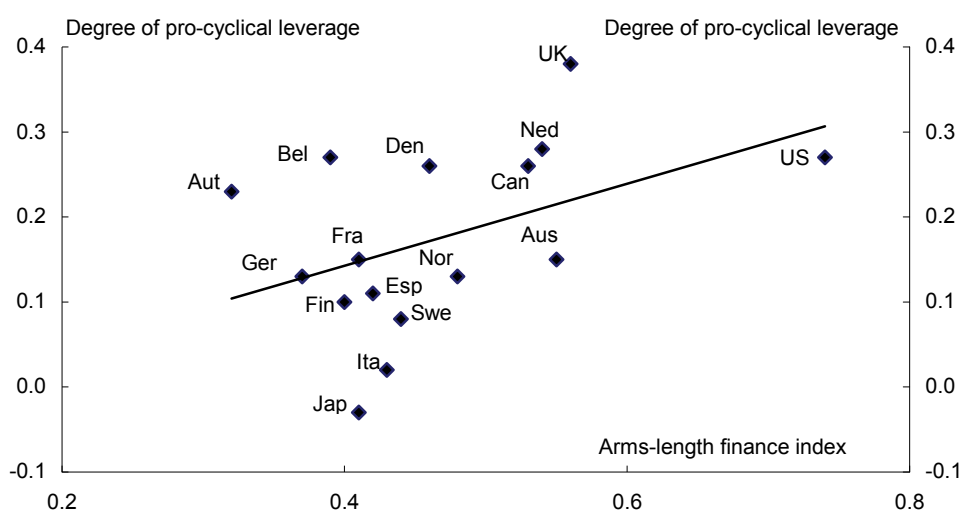
4 This inverse relationship arises because when borrowers have little or no wealth to commit to project financing, the potential divergence of interests between the borrower and the suppliers of external funds is greater – as compensation for the additional risk, lenders will demand a larger premium (or may not be willing to lend to the borrower at all).

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measuring the time dimension of risk, but also from market participants having perverse incentives to react to risk.

There is also evidence that the degree of pro-cyclicality within an individual financial system is strongly related to the importance of disintermediation in the supply of credit. Put another way, the more 'arm's length' are financing arrangements, the greater is the balance sheet dependence of financial firms on the performance of the securities markets. In Chart 1, the IMF's index of arm's length behaviour in financial systems is mapped against its measure of pro-cyclical leverage. There is a clear and far from surprising positive relationship between the two.

Chart 1: Pro-cyclical leverage and arms-length finance



Source: IMF.

Another highly leveraged type of financial firm, the hedge fund, is also extremely susceptible to adverse moves in securities markets.⁵ The pressure to deleverage their balance sheets in a phase of falling asset prices can come via several channels.

Firstly, if the returns on a hedge fund's investment portfolio (its funds under management multiplied by its leverage ratio) fall, it may be issued with margin calls from its creditors and redemption demands from its investors. If these demands exceed the fund's expectations, it will have to liquidate a portion of its portfolio to

5 Hedge funds are a heterogeneous group that can be broadly classified by investment strategy into 'long only' or 'macro'; 'long-short'; 'relative value'; 'event driven'; and mixed strategies. A good summary of the relative size of the different fund types is available in Blundell-Wignall (2007). Note that the predominance of strategies that are non-directional implies that hedge funds do not necessarily need to deleverage just because conventional returns in the major asset classes are falling.

accommodate them. A hedge fund's creditors may also require it to significantly increase the cash collateral (colloquially, 'the haircut') that it must deposit as a capital buffer against the possibility that it encounters difficulties and is unable to repay its loans.

Hedge funds typically establish lock-in periods of a year or more with investors, in addition to defining specific redemption windows. This gives the funds flexibility to pursue slow-maturing investments or positions in illiquid asset classes, but it also enables them to predict and allow for redemption demands on a known timetable. Under normal circumstances these rules imposed on investors are sufficient to prevent large bouts of forced selling due to unanticipated cash demands around redemption windows.

In recent history though, hedge funds have been under significant stress. Redemptions and margin calls have been occurring en masse as the industry's performance has been underwhelming and investors eschew risk. Amplifying the difficulties of dealing with these issues has been the failure of key 'prime brokers' – the underwriters of hedge funds – in Bear Stearns and Lehman Brothers, and the deleveraging imperative at other embattled investment banks.

As lending to hedge funds is a material element in the overall exposures of the banking system, particularly for investment banks (Blundell-Wignall 2008, tables 6 and 7), the accelerator effects of the failure of hedge funds on the one hand and prime brokers on the other might reasonably be expected to be substantial. The spike in volatility post the Lehman Brothers failure is a stark illustration of this.

Hedge funds have become a major source of liquidity across a number of asset classes (Blundell-Wignall 2007). As a group, hedge funds reportedly comprised between 30 and 60 per cent of turnover in a number of important securities markets at the end of 2007 despite a relatively small share of total assets under management.⁶ Ergo, if hedge funds deleverage as a group, formerly liquid markets – credit derivatives, non-deliverable foreign exchange forwards and emerging market debt spring to mind – could become seriously disjointed.

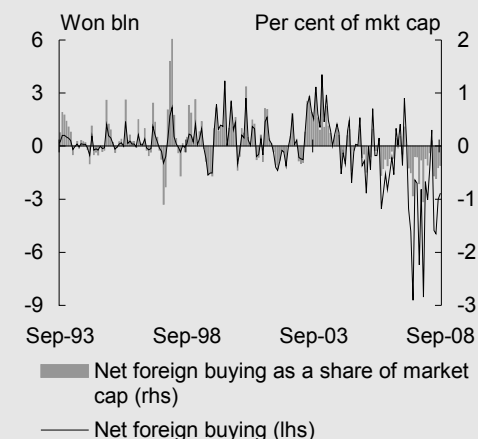
⁶ Hedge funds reportedly managed just US\$1.9 trillion globally at the end of 2007 versus approximately US\$29 trillion in pension funds and US\$27 trillion in mutual funds (Aizenman and Glick 2008).

Box 2: Emerging markets and global deleveraging

The emerging markets have seen extremely large withdrawals of foreign capital as the global deleveraging process has accelerated in the second half of 2008. That is despite the fact that emerging market balance sheets are sound on the whole, as proxied by the extraordinary accumulation of foreign reserves over the course of the current decade. The stock of foreign investment in the emerging markets rose substantially in the easy credit era. This was evident in a narrowing of bond spreads, an appreciation of exchange rates and a sharp rise in equity market valuations.

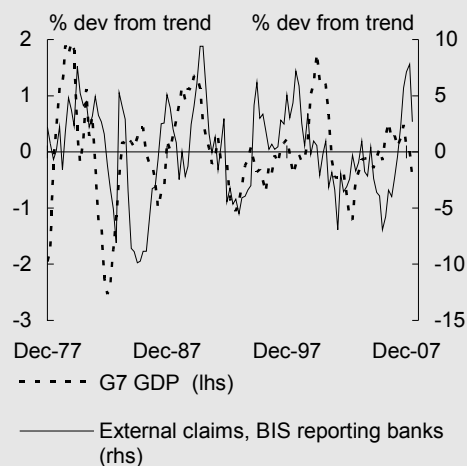
The liquidation and repatriation of a material portion of this stock as part of the deleveraging process saw an abrupt reversal of fortunes for emerging market asset prices. This impact was most pronounced in countries where portfolio capital flows are substantially liberalised, such as Korea (Chart 2). The pro-cyclical nature of cross-border lending activities is illustrated by Chart 3. Note that it is conditions in the home economies of financial firms with global operations that informs their decisions: hence the choice to map external banking claims against G7 activity rather than a measure of emerging market activity.

Chart 2: Foreign activity in the Korean equity market



Source: CEIC, Westpac Economics.

Chart 3: Pro-cyclical nature of cross-border claims^{(a)(b)}



(a) Trend and seasonal adjustment calculations by the authors.

(b) Correlation coefficient between the two series is 0.2.

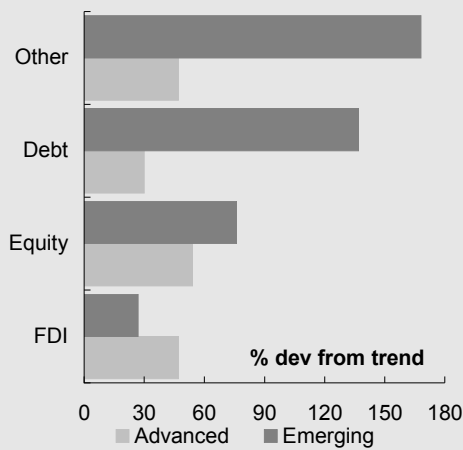
Source: BIS, Treasury calculations.

The wealth effect from asset prices to consumption is less pronounced in emerging markets than in advanced countries (International Monetary Fund 2008b: chapter 4). The relevance of the wealth effect will vary based upon the relative importance of equities as a share of overall financial assets, and the breadth and sectoral breakdown of this holding. In some cases banks and non-financial firms have significant holdings of direct equity, indicating that a wealth effect on investment could emerge, in tandem with an impact on consumption. It is worth noting that the most volatile segments of emerging market capital inflow are debt and bank lending, while equity and direct investment are more stable. That indicates that the structure of emerging market capital flows is precisely opposite to that of the developed economies (Chart 4).

Box 2: Emerging markets and global deleveraging (continued)

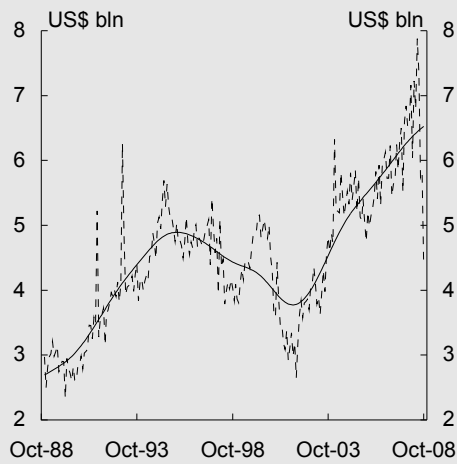
The direct trade channel, with export volumes to the major advanced economies in decline as their economies contract, is a serious concern for many emerging markets, particularly in Asia. Anecdotal evidence suggests that a lack of trade finance is leading to the cancellation of existing orders as well as preventing new business from being conducted. While timely data on the provision of trade credit is not available for a broad sample of countries, evidence from global business surveys and trade finance data where available indicates that international trade was severely curtailed in October (Chart 5).

Chart 4: Volatility of capital flow by type



Source: McKinsey Global Institute.

Chart 5: Letters of credit for trade extended in Taiwan (sa)^(a)



(a) Trend and seasonal adjustment calculations by the authors.
Source: CEIC, Westpac.

A further avenue whereby deleveraging is impacting the emerging market economies is through commodity prices. Professional investors initially sold their commodity holdings to raise cash and meet redemptions. That imperative has given way to a fundamental decision that with world growth deteriorating, commodities are not an attractive asset class. This affects the various regions in differential fashion due to diverse resource endowments. Most simply, it will redistribute income away from the resource-rich (Latin America, Russia, Middle East, Africa) and towards the resource-poor (Asia).

One area that warrants particularly careful watching is the withdrawal of bank capital from regions where loans are a major form of external financing. The economies of emerging Europe look particularly vulnerable on this score. There is evidence that emerging Europe has benefited from the recycling of petrodollars through the European banking system, driving domestic credit booms and rapid asset price appreciation. The reversal of this flow as European financials deleverage and oil revenues slow could be extremely damaging for growth in emerging Europe.

Deleveraging of the financial system as a whole

From the point of view of an individual financial institution the motivations for deleveraging are readily understandable. However, there are aggregate consequences of such behaviour for the financial system as a whole that are not taken into consideration by individual financial institutions. In a way, this is a further illustration of David Hume's 'tragedy of the commons', where the incentive of the individual is out of sympathy with the encompassing interest. This issue is generally illustrated in terms of the provision of public goods (Olson 1965). Where deleveraging is concerned, the issue at hand is the avoidance of a public 'bad'.

The deleveraging of one financial institution can lead to pressures for other financial institutions to do likewise. Forced asset sales, particularly during periods of market illiquidity, establish new benchmark prices to which remaining assets are marked down, potentially affecting large portions of the financial system and reinforcing the need to deleverage. The use of 'fair value accounting', that requires banks to value tradable assets on their balance sheet at a price at which they might reasonably expect to transact, amplifies the pro-cyclicality of the deleveraging imperative (International Monetary Fund 2008, chapter 3). Moreover, a common shock to bank capital, which forces a large proportion of banks to deleverage at the same time, will have self-reinforcing effects. These pressures can be particularly intense amongst highly leveraged institutions for whom leverage tends to be most pro-cyclical, such as investment banks.

Suppose, for example, that an investment bank suffers a decline in the value of its securities holdings which leads it to lower its target leverage. As discussed above, this entails sales of assets that are larger than those required for leverage to remain constant. All else being equal, this puts downward pressure on the value of those assets, potentially leading other institutions to deleverage.

In the presence of such feedback effects, the adjustment of leverage and price changes will tend to reinforce each other in an amplification of the system-wide deleveraging process (Adrian and Shin 2008).

Even in the absence of forced selling, the process of writing down asset values on balance sheets has system-wide repercussions. In markets that are not transacting, the announcement of a writedown of securities essentially sets the new mark-to-market valuation benchmark. For instance, if all banks have written down their sub-prime mortgage-linked securities to 40 cents in the dollar in a particular earnings round, and the first reporting institution in the subsequent round writes its holding down to 20 cents, there is pressure for all other firms to do the same.

The incentives of individual executives come into play in the writedown process. A new executive has the incentive to 'slash and burn' early in their tenure, with all immediate losses (and declines in the share price) attributable to the previous administration. These losses also establish flattering base effects for achieving strong earnings growth in the future. An incumbent executive has the reverse incentive. They are more likely to be conservative with their decisions on writedowns in the hope that they can smooth earnings in the short run.

How can financial deleveraging affect economic growth?

The means by which financial institutions choose to reduce their leverage ratio can have quite different implications for the financial system, and the economy as a whole. In practice, a bank whose capital base falls below its targeted level or regulatory minimums can:

- raise new capital from investors, usually by issuing new shares in order to restore its capital base⁷;
- retain earnings and reduce dividend payouts, so that capital is rebuilt internally; or
- reduce the size of its balance sheet by cutting back on lending, calling in existing loans or selling other assets, so that the smaller capital base is consistent with asset size and capital requirements.⁸

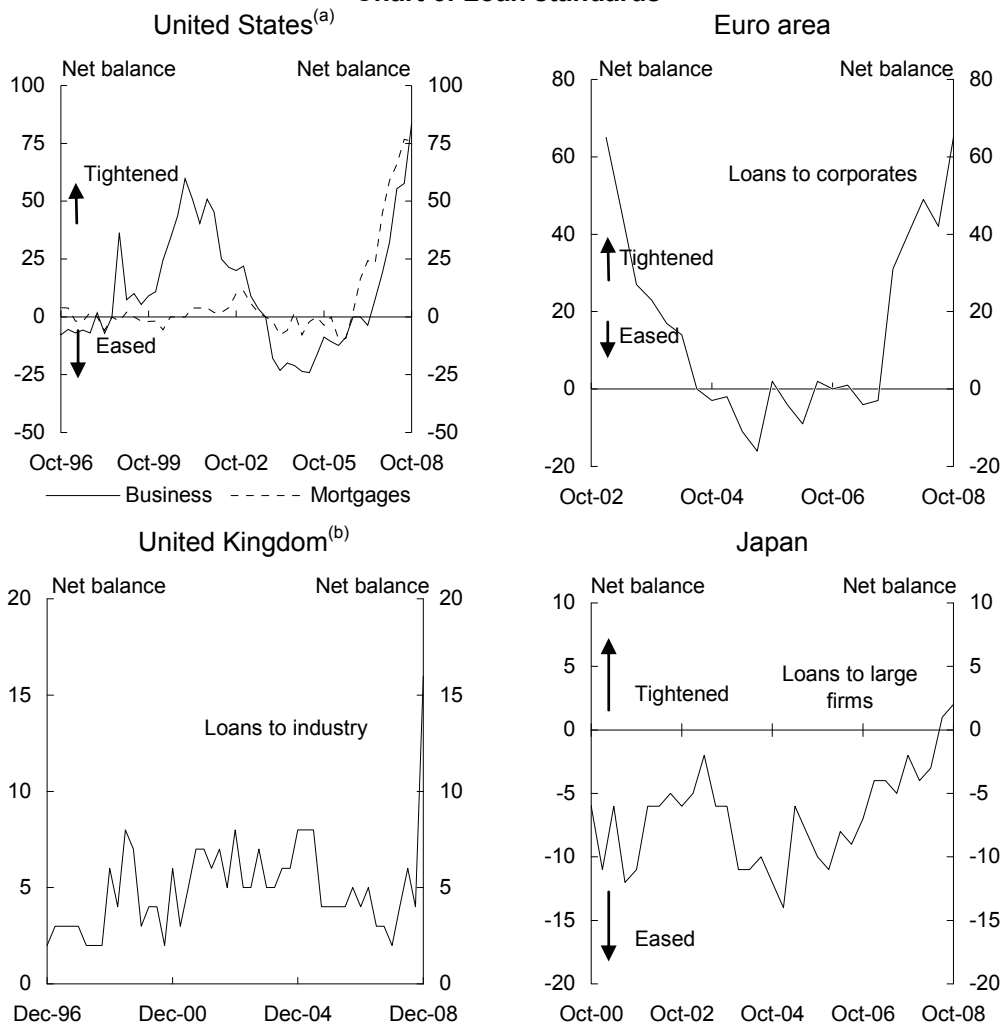
The aggregate consequences of deleveraging via raising new capital, or reducing dividend payouts, are generally small. Raising new capital from investors, while likely to dilute the value of existing shareholders, can allow a bank to quickly restore its CAR with little or no disruption to its normal operations of providing credit to businesses and households. However, at times of extreme risk aversion, or investor dissatisfaction with the financial system itself in the case of a uniform shock to capital, attracting new external funds can be difficult and prohibitively costly for existing shareholders.

Similarly, rebuilding capital by retaining more earnings and cutting dividend payouts is likely to result in little disruption to a bank's normal operations, but this process can take considerable time – a luxury that banks may not have at times of financial stress.

7 In practice, rather than diluting the ownership rights of the existing shareholders, an issue of preference shares (dividend-attracting but without voting rights) is often pursued to replenish capital.

8 Another way for a bank to increase its (risk-weighted) capital-asset ratio is to substitute relatively safe securities – which have a smaller risk weighting – for riskier assets such as business loans.

Chart 6: Loan standards



(a) The series of lending standards on mortgages to individuals for the US is a weighted composite of standards on prime, sub-prime and non-traditional mortgages.

(b) Series is the net balance of surveyed firms citing the inability to raise external finance as a factor likely to limit capital expenditure (12-month forecast).

Source: Thomson Reuters, CEIC, US Federal Reserve, European Central Bank, Confederation of British Industry, Bank of Japan.

When credit availability falls, there is a direct effect on consumption and investment expenditure within an economy and asset prices come under pressure. In turn, a reduction in consumption and investment spending and asset prices leads to a reduction in incomes (household income, GDP and business profits) through standard economic multiplier effects and wealth effects.¹⁰ These negative impacts then rebound

¹⁰ Moreover, to the extent that declining asset prices signal slower growth of future real incomes, this can also have a deleterious impact on consumption spending.

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upon loan quality, leading to further losses for the banking system, and sparking a further round of deleveraging. Thus, the final effect of a negative shock to bank CARs on aggregate economic activity can be significantly larger than the initial direct effect. This is the negative feedback loop of dubious renown.

These negative feedback effects are closely related to the theory of a 'financial accelerator' raised earlier, which can similarly explain the process by which a shock that affects the creditworthiness of borrowers more generally reduces the willingness of the financial system to provide credit to the economy and thus amplifies the effect of the initial shock on the economy.¹¹ The precipitous declines in asset prices commonly associated with major deleveraging episodes – by reducing collateral values – can also reduce the willingness of the financial sector to provide credit to the economy.

Equally, significant asset price declines can affect the strength of business investment. Investment spending on plant and equipment, for example, is likely to be negatively affected by a decline in equity prices, which increase the cost of equity capital, thus reducing the incentive to expand productive capacity.¹²

Fluctuations in asset prices can also provide entrepreneurs with information about market expectations of future demand, thus potentially influencing investment decisions. Empirical studies have found that private fixed investment spending is well explained by expected future output growth – to the extent that movements in asset prices (particularly equity prices) contain information about the strength and direction of future GDP growth, they will thus influence current and planned investment (see, for example, Barro 1990).

11 See, for example: Bernanke, Gertler and Gilchrist (1996); Bernanke and Gertler (1995); and Kiyotaki and Moore (1997).

12 The cost of equity finance is the real rate of return required by shareholders, typically measured by the ratio of corporate earnings (dividends plus retained profits) to equity prices. A fall in equity prices without a corresponding decline in earnings reflects a higher required rate of return, a higher cost of finance and, hence, a higher cost of capital.

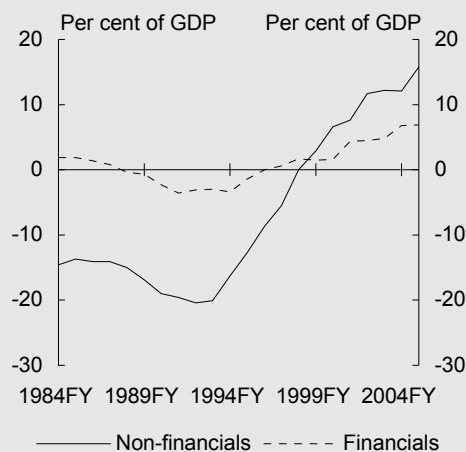
Box 3: The Japanese experience of deleveraging

Japan's economy suffered from an extremely protracted period of deleveraging that extended for most of the 1990s and deep into the current decade. The *ex ante* imbalances that begat the period of deleveraging were most visible in the extraordinary rise in asset prices observed across the economy.

A favourite media sound bite of the time was that the Imperial Palace gardens in Tokyo had a market value exceeding that of the state of California. Pro-cyclical credit extension, driven by ever-rising collateral values, accommodative bankers and acquisitive corporations, was in full evidence.

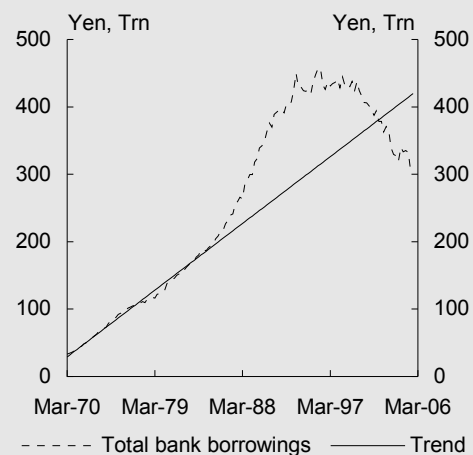
The Japanese deleveraging phase is best seen using a flow of funds framework. Both the financial and non-financial sector spent the duration of the 1990s reducing leverage ratios in line with the ongoing collapse in asset prices. This resulted in both sectors transitioning from large net borrowers in the early 1990s to large net lenders by the late 1990s (Charts 7 and 8).

Chart 7: Net lending by sector



Source: Nomura, BoJ, Cabinet Office, Westpac Economics. Data smoothed. Japanese fiscal years begin on April 1.

Chart 8: Bank credit to incorporated non-financial firms^{(a)(b)}



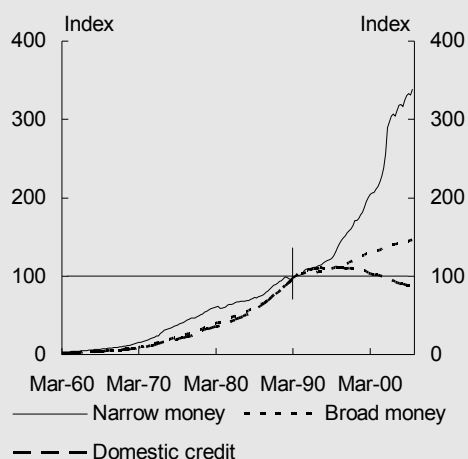
(a) Bank borrowing of non-financial corporations as reported in the Financial Statement Statistics of Corporations by Industry.

(b) Linear trend estimated for 1970 to 1985 period. Source: Japanese Ministry of Finance, Westpac.

Monetary policy became truly impotent in this environment. Banks were reducing their asset bases and firms were not demanding finance. Despite the Bank of Japan's eventual move to a zero per cent overnight policy interest rate and a quantitative easing policy that produced steep increases in base money, credit outstanding continued to contract (Chart 9). Further, the futility of monetary policy was amplified by the combination of the zero nominal interest rate bound and deflation of the overall price level. This combination resulted in positive real rates — an inappropriate stance to say the least.

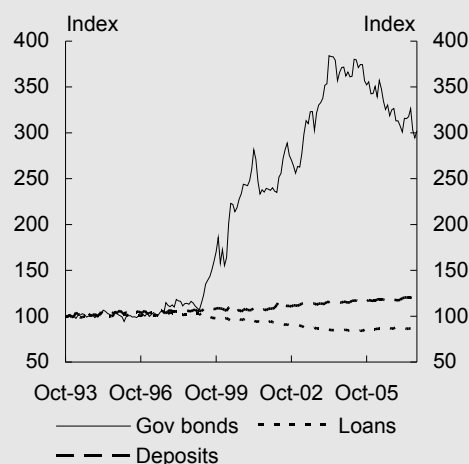
Box 3: The Japanese experience of deleveraging (continued)

Chart 9: Japanese monetary policy rendered impotent^(a)



(a) Raw data is indexed to the average balances for calendar year 1990.
Source: OECD, Westpac Economics, Nomura Research Institute.

Chart 10: Under 0% regime: Government bond holdings up, loans down^(a)



(a) Balance sheet holdings of domestically licensed banks. Indices based at 1993 Q4.
Source: Bank of Japan, CEIC, Westpac Economics.

Indeed, the banking system spent much of the zero interest rate era borrowing cheap overnight funds and purchasing Japanese government bonds with the proceeds: essentially shuffling money from the Bank of Japan to the Finance Ministry and back again (Chart 10).

In contrast to the current situation in the US, at the time Japanese banks valued assets on their balance sheet at acquisition cost. If they had been forced to mark-to-market, writedowns would have been early and vicious and they would have been forced to deleverage in dramatic fashion. As it was, they deleveraged in slow motion over a decade and a half and non-financial corporations did the same. Japan suffered through three separate downturns in the 1990s and another in 2001. The extreme fragility of bank and corporate balance sheets left the economy unable to resist adverse cyclical developments.

A crucial lesson from the Japanese experience is that decisive policy action to recapitalise banks at an early stage is vital to repair the functioning of monetary policy. Furthermore, leaving bad assets on bank balance sheets and hoping to grow out of the problem is fraught with danger.

However, neither policy addresses the fundamental issue of asset price deflation. Any agent in the process of deleveraging is a forced seller, and forced sellers are poison for asset prices. Declining collateral values trigger the fearsome non-linear dynamics of the financial accelerator, a powerful deflationary force.

The real effects of deleveraging — empirical estimates

A number of recent empirical studies have attempted to quantify the real economic effects of shocks to bank capital and a reduction in credit provision. Such exercises are inherently subject to great uncertainty, although they provide some foundation upon which to gauge the real effects of financial deleveraging.

Using a macro model to account for potential feedback effects from the real economy to banks' capital and credit, Bayoumi and Melander (2008) analyse the effects on the United States economy of a negative shock to banks' capital asset ratios of 1 percentage point. They find that this leads to a fall in overall credit provision of 2.5 per cent of GDP and a peak reduction in the level of GDP of 1.4 per cent relative to baseline after three years. The level of GDP remains constrained for around six years, suggesting that the effects of the initial capital shock can prove quite protracted.

In a regression-based analysis Swiston (2008) finds strong evidence of a causal relationship between credit availability and economic activity, and discredits the notion that lending standards merely tighten as a precaution when an economic slowdown is foreseen. Using the US Federal Reserve's senior loan officer survey to proxy for credit availability, he finds that a net tightening in lending standards to business of 20 percentage points is associated with a decline in GDP of $\frac{3}{4}$ per cent over one year and $1\frac{1}{4}$ per cent over two years (again, relative to baseline).

In its April 2008 *Global Financial Stability Report*, the International Monetary Fund (IMF) presents a simple vector autoregression model to gauge the impact of a negative shock to lending growth on US GDP growth. Two scenarios for lending growth are modelled: a 'credit squeeze', in which annual lending growth slows from around 8 per cent of the total stock of US private sector debt to 4 per cent; and a 'credit crunch', in which annual lending growth slows to just 1 per cent of total debt outstanding. A credit squeeze and a credit crunch, spread evenly over three quarters, are found to reduce annual GDP growth by around 0.8 and 1.4 percentage points respectively, assuming no other shocks to the system.

It is worth noting that all such studies are necessarily conducted on an 'all else being equal' basis and can only model the 'average' response of financial institutions to a negative capital shock. They do not, for instance, take into account any monetary or fiscal policy response that could ordinarily be expected in the face of significant financial shocks.

A significant easing in monetary policy can directly strengthen bank balance sheets in important ways: by lowering interest costs on their outstanding short-term debt; by steepening the yield curve, thereby creating a profitable opportunity for banks to 'borrow short and lend long' (Blundell-Wignall 2008); and, since declining interest

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rates are typically associated with rising asset values, by increasing the value of the bank's assets.

Similarly, a more determined effort by banks to shrink their balance sheets through the sale of non-core assets could significantly alter the aggregate consequences of a negative capital shock. A greater-than-usual willingness among investors to subscribe to fresh capital for banks might allow more assets to be rolled over rather than to mature, and, thus, limit the associated impact on credit provision. Direct injections of public capital into distressed banks could also reduce pressures on banks to preserve capital by reducing their lending (International Monetary Fund 2008b).

Deleveraging and the economic outlook

The direct macroeconomic impacts of the current financial crisis are beginning to intensify. When the first signs of financial disruption began in August 2007, the initial prognoses of both public and private sector analysts were generally sanguine about the flow-on effects to the real economy.

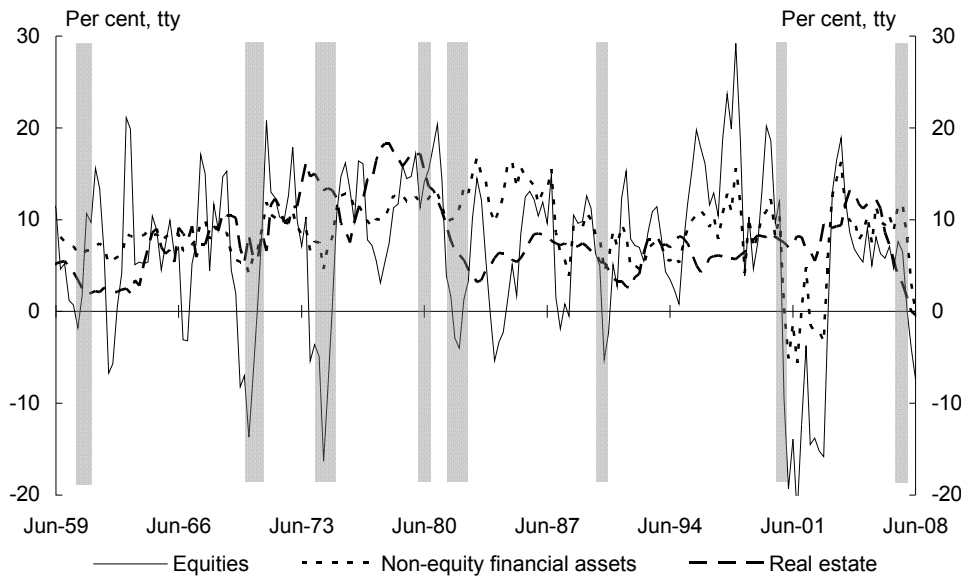
Indeed, outside the United States, world growth continued to out-strip forecasters' expectations right up until the March quarter of 2008. The IMF, for instance, revised up its world growth forecasts for 2008 *and* 2009 in July, reflecting resilient March quarter growth in a broad range of jurisdictions, plus a firmer June quarter in the United States due to the tax rebate package.

The forecasting community has been in downgrade mode ever since, with growth prospects weakening seemingly by the day through the final months of 2008.

The epicentre of the original negative impulse, the US housing market, is still exhibiting wretched fundamentals. The wealth of US households is under attack from all sides. According to the flow of funds accounts, the value of all three major asset classes on household balance sheets – real estate, equities and non-equity financial assets – fell below year-ago levels in the June quarter of 2008 (Chart 11). This is the first instance in the history of this report – going back to the 1950s – that all asset classes have been in simultaneous retreat. It is also the first ever recorded decline in the value of the housing stock.¹³ In an environment of rising unemployment, these factors are placing unprecedented stress on household balance sheets.

13 This concept of housing wealth precludes a decline in all but the most diabolical of circumstances. Even if measured house prices are falling, increases in the dwelling stock usually allow aggregate housing wealth to grow.

Chart 11: US household assets are declining in value^(a)



(a) Shaded bars represent US recessions, as defined by the US National Bureau of Economic Research. Note that the recent pronouncement is included, even though the full period of contraction is yet to be defined.

Source: Factset, Westpac, NBER, US Flow of Funds account.

With household balance sheets stretched to extremes, delinquency rates on prime loans seem certain to rise above current levels. This is generally expected to result in a further round of provisioning, writedowns on asset valuations and, predictably, another round of deleveraging. The propagation of writedowns from sub-prime to prime loans is the second phase in the pernicious process of a financial system-led downturn. The delinquency rate of 2007-vintage prime mortgages has risen notably in comparison to the 2006 vintage.

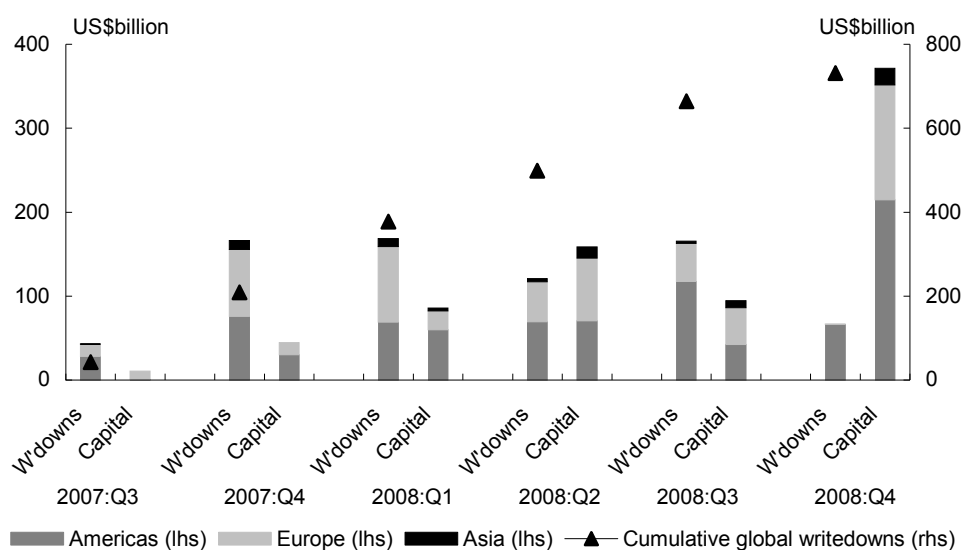
It is difficult to avoid the conclusion that the US economy will contract in the coming year. Elsewhere, while the situation is not as extreme, it is likely that the majority of countries in the OECD will experience negative domestic demand growth in at least one quarter in the period ahead. Almost half of the 30 member nations have already done so, including all of the G7.

The month of October saw an apparently synchronised decline in global business activity. Survey respondents reported sharp rises in the difficulty of accessing credit to the extent that securing letters of credit for international trade was not assured; consumer and business sentiment took a further adverse turn and real activity indicators, leading, lagging and coincident, were unambiguously weak. Commodity prices and freight indices fell precipitately. Financial market volatility measures spiked to spectacular levels. Reflecting this dramatic confluence of events, the IMF downgraded its world growth forecast for 2009 before it was a month old.

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The concerted transmission of financial distress to the real economy comes at a time when the writedowns emanating directly from sub-prime related securities are slowing and public capital injections have reached a significant scale. The balance between writedowns and capital raisings is depicted in Chart 12. The current sources of balance sheet deterioration are more varied, including bringing special investment vehicles back onto balance sheets at impaired values, exposures to failed firms, valuation impacts on prime loans, rising costs of capital and higher provisioning.

Chart 12: Global bank writedowns and capital raised^{(a)(b)}



(a) Note, a significant proportion of the capital raised in the fourth quarter of 2008 comprises injections of capital from public authorities.

(b) Data for fourth quarter are as at 1 December 2008.

Source: IMF and Bloomberg LP.

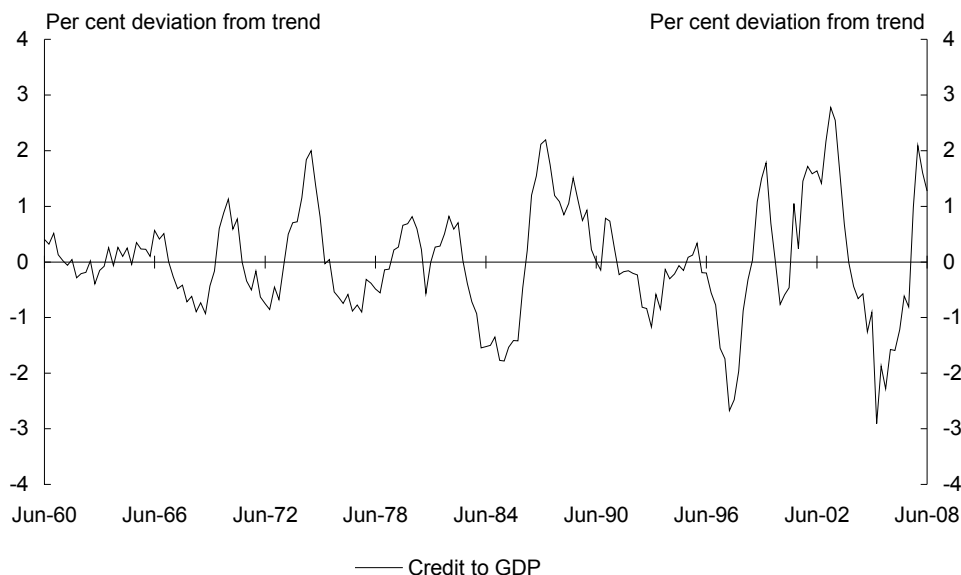
Providing some offset to this tide of depressing news is the fiscal and monetary policy responses that have emerged over the course of the crisis. Importantly, governments have been relatively quick to realise that the recapitalisation of the banking system is integral to any solution. As argued above, deleveraging is one possible response to an adverse change in the CAR of a financial firm. A relatively benign alternative is the raising of fresh capital. In practice financial firms undertake a combination of measures.

Recapitalisation is crucial to not only maintain prudential ratios: it is central to the dynamics of recovery. If a financial system is short of capital, balance sheets must contract. But to fund the recovery, and act as the transmission mechanism for monetary policy easing, they must expand their balance sheets. A deleveraging financial system may be willing to pass on cuts in policy rates only in conjunction with a quantum adjustment in the amount of new business they write. Therefore it is

important that policy makers monitor both price and non-price elements of pass through. In the extreme situation, where neither price nor lending standards are eased in response to policy changes, monetary policy can be rendered impotent (see Box 3). In the US and the UK, monetary easing has been relatively ineffective in bringing down the lending rates faced by households and businesses and loan standards are becoming increasingly restrictive (Chart 6).

Although there are some aspects of this financial crisis that are without precedent, historical experience suggests that the current deleveraging cycle could continue for some time. As a crude approximation of US leverage cycles, Chart 13 below plots the deviation from trend of the ratio of US bank credit outstanding to nominal GDP.

Chart 13: Leverage cycles of the US financial system^(a)



(a) Series is the ratio of bank assets to nominal GDP, relative to its trend rate, calculated using a Hodrick Prescott (HP) filter. End point problems with this filtering technique infer that the results for the current cycle should be treated with some caution.
Source: Thomson Reuters, US Flow of Funds Accounts.

US leverage cycles have clearly become more pronounced over the past two decades. Chart 13 would also seem to suggest that the current deleveraging cycle to date has been mild relative to previous episodes, and that the cycle may only be in its early stages. However, much of the leverage that built up in the years prior to this episode occurred off balance sheet and outside of the regulated banking system. As such, it is very difficult to gauge the degree to which leverage built up over the preceding years and the degree to which leverage will need to be, and has already been, unwound. An effort to benchmark the current situation against a historical sample of bank-centred crises is presented in Box 4.

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Producing a precise estimate of the potential scale and duration of the required deleveraging process is a seemingly impossible task. However, it is possible to define a range of outcomes under differing assumption sets and methodologies, to inform an educated discussion on the matter by circumscribing a frontier of possibilities. Two such exercises deserve attention.

The IMF (2008b chapter 1) has estimated that financial sector mark-to-market losses on US-originated and -securitised debt instruments will rise to US\$1.4 trillion. At the time of publication, public writedowns were only 55 per cent of this estimate. Taking these estimates as a starting point and using models driven by macroeconomic fundamentals (taken from the forecasts finalised in October), survey information on bank lending standards, known tax changes and a set of exogenous assumptions on desired future CARs, capital raising, asset sales and maturities and dividend payouts, the IMF estimates that the deleveraging process could continue into the next decade. Under this scenario, world GDP growth would remain below its 2003 to 2007 average of 4.7 per cent until 2011. Of course, there is the problem of circularity with this process, and we know that the macroeconomic baseline has since been revised lower.

The OECD (Blundell-Wignall 2008) focuses on ultimate losses (rather than writedowns) while rejecting a mark-to-market based framework for estimating them. This methodology requires an additional set of assumptions on ultimate cash recovery rates. The OECD's fundamental model is admirably parsimonious and free of autoregressive componentry. Even so, as is to be expected, the final results on deleveraging and prospects for recapitalising from within are extremely sensitive to the exogeneous assumptions. The range of outcomes presented in the OECD study are wide, both in terms of time and scale, reflecting the difficulties of reaching strong conclusions when conducting such complex forward-looking exercises.

Both of these exercises are informative and valuable. There is no reason to elevate one over the other. It is sufficient to say that the research indicates that it is most unlikely that a short-term resolution or 'circuit breaker' will emerge from the private sphere to cleanse financial system balance sheets, calm asset markets and restore risk appetite.

With that as a fundamental working assumption, it follows that the 2009 global downturn will certainly be more protracted than the 2001 experience and will possibly exceed the duration of the 1991 global recession. The Business Cycle Dating Committee of the National Bureau of Economic Research (2008) recently determined that the US economy hit a cycle peak in December of 2007 and has been in recession since. While the committee is yet to define a trough, given that activity has been in an accelerated

decline in the second half of 2008, the duration of the current contraction should comfortably exceed the post-1945 average of ten months.¹⁴

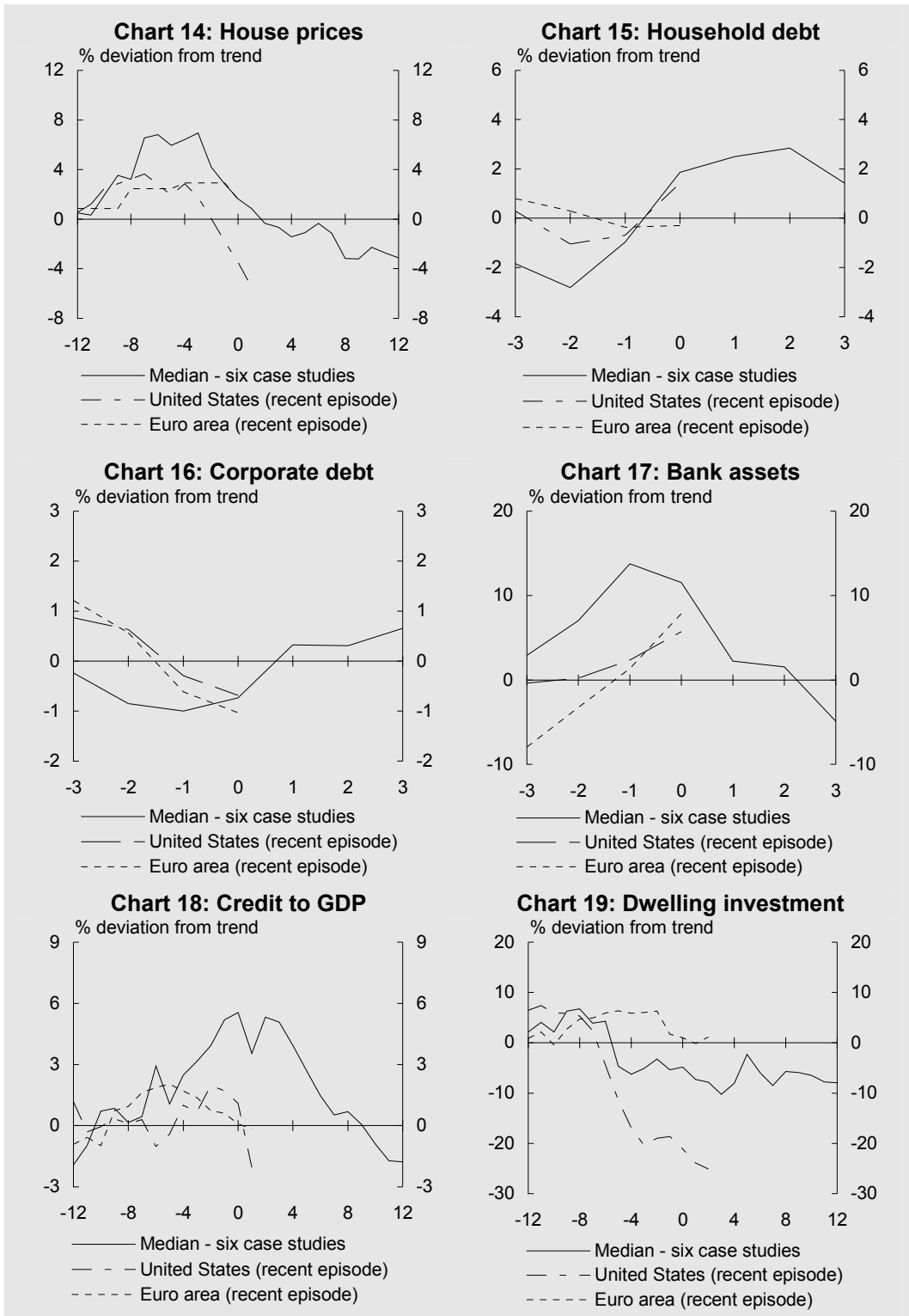
Box 4: Bank-centred financial crises — now and in history

A recent IMF study (2008c chapter 4) consolidated information from six relatively recent historical episodes where a bank-centred financial crisis drove a major downturn in the real economy. The episodes come from Japan (see Box 3), the UK, the US (its savings and loan crisis) and three Scandinavian countries. The median of these episodes is mapped against the current experience of the US and the EU, with the zero year or quarter on the horizontal axes marking the onset of financial stress. A number of observations spring from the comparative analysis.

1. The US housing market stands out as particularly weak so early in the downturn. In the case studies, house prices did not begin to fall below trend until some quarters after the onset of financial stress, whereas prices are already significantly below trend in the US. As for dwelling investment, the US experience looks extraordinarily brutal.
2. The expansion of bank assets relative to trend was greater in the case studies. However, the decline in the credit-to-GDP ratio is already well advanced in the US. The cautionary note here is that the expansion of bank assets will not capture the full extent of leverage across the financial system in the current episode, with the growth of unregulated financial firms such as hedge funds playing a larger role.
3. Non-financial corporate balance sheets in the US are reasonably lean, while household balance sheets are in a very similar position to the case studies (as measured by household debt relative to trend). This point is noteworthy as historical episodes of financial stress that do not evolve into downturns have all been characterised by resilient consumption expenditures.
4. The Euro area is in a significantly less extended position than the US entering the prospective deleveraging phase.

14 This average is calculated by the NBER and is available from www.nber.org.

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Source: IMF.

Concluding remarks

Financial deleveraging is inimical to the health of the world economy. This article has examined the theoretical and practical mechanics of deleveraging, drawn on relevant aspects of the historical record and placed the current episode in context. The broad conclusion is that the first stage of the deleveraging process, which is driven by the decline in both asset values and lending to borrowers at the riskier end of the spectrum, is currently well advanced. The second phase, where the decline in credit availability engendered by the initial phase hurts the value of more prosaic asset classes, and less marginal borrowers, is significantly less advanced. This dynamic will place significant stress on the world economy in 2009.

On a more optimistic note, policy makers are well aware that the magnitude of the challenge presented demands a forthright global public policy response. The mistakes of previous cycles, such as delaying bank recapitalisation, have been duly noted in word and deed. Furthermore, the global fiscal and monetary policy responses provide needed insurance against downside risks to growth next year, and lay the foundation for recovery in the period beyond.

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