How banks played the leverage "game"?

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Credit risk transfer and bank leverage

If there is one conclusion that analysts of the sub-prime crisis all agree upon, it is that – Leverage matters! The period from 2003 to 2007 was characterized by loose monetary policy and readily available liquidity in the developed countries (partly due to the savings glut in other parts of the world). During this period, banks built up significantly high levels of leverage and lent "down the quality curve". There is now robust academic evidence suggesting that it was the ability to securitize assets that led to the deterioration of sub-prime lending decisions.[1]

Taken literally, *credit risk transfer* mechanisms such as securitization should simply transfer assets off bank balance-sheets on to other investors in the economy, and not necessarily lead to increased bank leverage. Nevertheless, it appears that banks increased leverage precisely by availing of credit risk transfer mechanisms. In the process, they exposed themselves to the risk that any significant asset price shock, e.g., to house prices, would be sufficient to wipe out their capital base. Indeed, this risk materialized starting with increase in delinquencies on sub-prime mortgages in 2006 and 2007. A painful process of deleveraging ensued, rendering illiquid those assets and markets (such as, asset-backed securities, rollover debt finance and credit derivatives) which had appeared reasonably liquid just a year before and deemed especially suitable for risk-transfer purposes within the financial system.

This sequence of (apparent) credit risk transfer, building of excessive leverage, then deleveraging, and finally, the freezing up of markets that had a short-run burst of liquidity, begs the question as to how such excessive leverage could have been built up in a sector that is so heavily regulated, especially in terms of explicit capital adequacy requirements aimed precisely at limiting bank leverage. In this report, we focus on the

[1] See, for example, Keys, Benjamin J., Mukherjee, Tanmoy K., Seru, Amit and Vig, Vikrant, "Did Securitization Lead to Lax Screening? Evidence from Subprime Loans", (April 2008), Working Paper, Chicago-Booth.

"dark" side of credit risk transfer, explaining how banks deployed such transfer to engage in regulatory arbitrage and play the leverage "game". In fact, we will argue that most likely banks got lulled into believing that short-term profits from regulatory arbitrage were signs of sustainable economic profitability, which further exacerbated the extent of their risk exposures.

To start with, we document certain sharp trends witnessed in size of bank balance-sheets relative to their *regulatory* leverage and in the nature of assets on balance-sheets. This will highlight the role played by the so-called shadow banking sector in the leveraging process. Next, we show that a crude measure of the extent of regulatory arbitrage – the ratio of total assts to (regulatory) risk-weighted assets – explains the cross-section of losses and share price declines incurred by banks, illustrating that banks had engaged in regulatory arbitrage that turned out ex post to be economically unviable. Then, we provide a primer on asset-backed commercial paper (ABCP) market, the primary structure employed by banks to take on more effective leverage than that permitted by capital requirements. In the process, we explain certain nuances of ABCP structures, specifically the "recourse" feature that transfers losses back from the ABCP vehicle back to the sponsoring bank. Finally, we present our policy recommendations: the first is to broaden the current regulatory focus on a single ratio (capital to suitably risk-weighted assets) to a more rounded approach that would make regulation more robust to being gamed by banks; and, the second is to understand the aggregate risk component of risk transfer vehicles (and more broadly, of bank balance sheets) and "tax" this aggregate risk component rather than charging for overall risk as the current Basel capital requirements do [REFERENCE TO OTHER WHITE PAPER(S)].

Trends in bank assets, their nature and regulatory leverage

Figure 1, left box shows the trend in size of assets of top 10 publicly traded banks, and importantly, also in the size of their *risk-weighted assets* where the risk weights are based on those employed by the Basel capital requirements. Briefly, most banks in the United States employ Basel I weights to comply with capital adequacy requirements, whereas European banks employ Basel II schemes. While the distinction between the two will become clearer later on, for now risk-weighted assets can simply be understood as regulatory assessment of the risk of bank assets. What this left box shows is that while bank balance-sheets grew twofold between 2004 and 2007 Q2, the regulatory assessment of risk-weighted assets grew at a far sluggish pace. Put another way, banks were deemed by regulatory assessment to have been investing in relatively safer assets over this period.

Figure 1, right box shows over the past decade the loans to assets, deposits to assets and investments to assets ratio for these large banks. The picture that emerges is clear.

Bank balance-sheets apparently stabilized in the post-2001 period if measured through loans to deposit ratios, which fell to around one for most of 2002-2005, picking up again after then; more importantly, over the entire period, bank balance-sheets looked increasingly making investments rather than loans; finally, banks funded more of their balance-sheet expansion (in investments, since loans to deposits ratio stayed around one since 2002) with the help of *non-deposit* funding. These trends capture well the advent of credit risk transfer mechanisms: Banks made more loans but did not retain them on balance-sheets; they transferred them into off-balance-sheet vehicles maintaining an investment in many of them (whereby balance sheet concentration on loans switched to that in investments); and, relied on short-term rollover debt, such as asset-backed and unsecured financial commercial paper, as a form of finance. The outcome of this shift was the tremendous growth in securitization vehicles – collateralized debt obligations (CDOs) and asset-backed commercial paper (ABCP) "conduits" and structured investment vehicles (SIV's).

How do we know that these trends reflected regulatory arbitrage? This is based on evidence in Figure 2. Consider ranking banks by their ratio of total assets to risk-weighted assets. Risk weights are close to one for the relatively risky assets like corporate loans and close to zero for "safer" holdings such as government mortgages and mortgage-backed assets, short-term lines of credit provided for liquidity enhancement to firms and other borrowers (including banks' own conduits and SIV's, as we will see shortly). Thus, a *high* ratio of total assets to risk-weighted assets should signal the bank as being relatively *safe.* Importantly, this is true only providing that the risk weights are in fact suitable for the true risk of different investments. Figure 2 plots the share price reaction of different banks during the period July 2007 to March 2008 as a function of the ratio of total assts to risk-weighted assets. Alas, somewhat disturbingly for Basel capital requirements, the relationship is sharply negative. Banks such as JPMorgan Chase, Bank of America, Santander and Wells Fargo that emerged ex post to be the stronger banks had the ratio close to one, whereas banks that have performed the worst (most notably UBS) had the highest ratio.

What explains this surprising relationship? One explanation is that this was simply a bad draw and that relatively safer assets turned out to suffer the biggest losses. In this view of the world, JPMorgan and the like were indeed the riskier banks but ex post turned out to be "lucky". The second explanation, the one that we find is favored by our weight of evidence below, is that the Basel capital requirements were simply "gamed" by banks that had high ratio of total assets to risk-weighted assets. They were indeed much more unsafe then what their capital requirements showed them to be, ended up holding less capital than was suitable for their true risk profile, and therefore, suffered the most during the crisis. Consistent with this second explanation, UBS's losses were in fact mostly concentrated in their AAA-rated investments in risk transfer vehicles, which incurred close to zero capital requirement charge.

Let us elaborate by providing a detailed explanation of an important class of risk transfer vehicles.

Asset-backed Commercial Paper (ABCP) markets

Asset-backed commercial paper conduits ("conduits") are one example of off-balance sheet commitments *with recourse* to bank balance sheets. Conduits are shell companies that hold financial assets such as corporate loans, trade receivables, student loans, credit card receivables, or mortgages. Typically conduits only hold AAA-rated securities or unrated assets of similar quality. Conduits have no employees or headquarters and the conduit management is outsourced to an administrator, typically a commercial bank which set ups the conduit in the first place. The administrator runs the conduit's day-to-day activities which consist of managing the asset portfolio according to pre-specified investment guidelines and issues asset-backed commercial paper (CP) to finance the conduit assets. Often the administrator invests in assets which have been generated by the administrator itself or assets generated by clients of the administrator.

One of the most important characteristic of conduits is the extensive *recourse* to bank balance sheets. This characteristic distinguishes conduits from other shell companies that hold financial assets but have *no recourse* to bank balance sheets (e.g. Collateralized Debt Obligations). What does *recourse* mean? In its simplest form, recourse is the institutional arrangement through which risks of the conduit get transferred back to the commercial bank setting up the conduit; thus, under the scenario of losses to conduits' assets, assets that were off-balance-sheet for the commercial bank effectively become on-balance-sheet again, undoing the credit risk transfer that resulted in setting up of the conduit. Such recourse to balance sheets is based on two separate arrangements between conduits and large commercial banks or other large financial institutions.

First, conduits contract with banks to insure against liquidity risk. This insurance is called liquidity enhancement and provides a back-up credit line or commitment to repurchase non-defaulted assets in case a conduit cannot roll over maturing CP.[2] In most cases, liquidity enhancement is provided by the conduit administrator itself. Second, conduits contract with large financial institutions to insure against credit losses. This credit insurance is called credit enhancement and covers credit losses on conduit assets. Typically credit insurance is provided by the conduit administrator alone or

[2] Liquidity enhancement is similar to back-up credit lines provided to corporations that issue unsecured CP.

jointly with other financial institutions. In addition, conduits are structured as bankruptcy-remote companies in the sense that their legal charter prevents them from declaring bankruptcy without drawing upon available liquidity and credit enhancement. Box 1 explains the overall conduit structure in context of Solitaire Funding Limited, a conduit set up by HSBC.

From the perspective of a CP investor – the creditor of the conduit, the structure provides three separate lines of defense against non-repayment. First, conduits own highly-rated assets to satisfy investor claims. Second, if the assets in the conduit have not defaulted but the assets are insufficient to cover investor claims, conduits can draw on liquidity enhancement to repay investors. Third, if assets are defaulted, conduits can draw on credit enhancement to cover credit losses. In addition, CP has very short maturities such that CP investors can react relatively quickly to changes in the value of conduit assets. If CP investors believe that the risk of non-repayment increases, they simply do not roll over maturing CP. In this case, the conduit typically either draws on its liquidity and credit enhancement (i.e. banks take assets on their balance sheet) or contracts additional liquidity or credit enhancement from banks. Only if both options fail, the conduit defaults and CP investor satisfy their claims from the proceeds of selling conduit assets.

In monitoring conduits, CP investors often rely on rating agencies. Almost all CP issued by conduits have the highest Prime 1 rating by at least two rating agencies. When a conduit is set up, rating agencies work with the conduit administrator to ensure that the conduit has enough liquidity and credit enhancement to satisfy the criteria for the highest rating. As market conditions worsened throughout the crisis and CP investors became unwilling to roll over maturing CP, ratings agencies put pressure on conduits to increase liquidity and credit enhancement or face downgrade otherwise. As discussed below, the conduits most under pressure were the ones with the least amount of liquidity and credit enhancement.

The economic rationale for setting up conduits has always been to reduce capital requirements imposed by bank regulation, constituting a classic example of financial innovation that is pioneered by banks to unwind a constraining regulation. If high-quality assets are held on balance sheets, Basel I capital regulation requires banks to hold up to eight percent of asset values as equity capital, the exact capital required being based on the assets' risk-weight (as explained before). From the bank's perspective, equity capital is costly – to issue and it also lowers effective leverage and risk-taking – and thus, banks pursue variety of strategies to reduce regulatory capital requirements. Conduits are one way to economize equity capital because banks are not required to hold equity capital for conduit assets but instead need to hold equity against liquidity and credit enhancement provided to conduits. However, capital requirements for liquidity enhancement are only 0.8 percent of asset value, that is, in

the best case just *one-tenth* of the requirement. Capital requirements for credit enhancement are somewhat larger but sufficiently low such that banks have lower total capital requirements for financing high-quality assets via conduits relative to holding them on bank balance sheets. The recent Basel II capital regulation reduces some of the difference in capital requirements between on-balance sheet and off-balance sheet financing but does not completely eliminate it.

As a result of this capital regulation, many commercial banks have set up conduits. Figure 3 plots total asset-backed commercial paper (CP) outstanding from January 2006 to October 2008. Before the crisis, total CP issued in the United States grew from US$866bn in January 2006 to US$1,222bn in August 2007. After the start of the crisis, asset-backed CP dropped to US$797bn by January 2008 and stabilized thereafter until September 2008. On September 17th, Lehman went bankrupt and as a result many conduits again experienced difficulties issuing CP. The Federal Reserve devised several policies in response to stabilize the market. On September 18th, the Federal Reserve guaranteed investment in money market mutual funds which are the main investors in asset-backed CP. On October 27th, the Federal Reserve started a new liquidity facility that directly purchases asset-backed CP.

The impact of this decline in asset-backed commercial paper on banks depends on the structure of the liquidity and credit enhancement provided to conduits. On this front, there are broadly speaking three types of conduits to consider. The first type is fully-supported conduits which have liquidity enhancement that covers the entire amount of CP outstanding and credit enhancement that covers all assets in the conduit. Hence, fully-supported conduits have *full recourse* to bank balance sheet. In January 2007, there were 79 fully-supported conduits with total commercial paper outstanding of US$245bn or 19.9 percent of total asset-backed CP. To the best of our knowledge, there has not been a single fully-supported conduit that has declared bankruptcy throughout the economic crisis. Fully-supported conduits have either continued to issue CP or administrators have taken back their assets on bank balance sheet (a prime example being over $50 billion of such investments taken back by Citigroup on its balance-sheet during the crisis).

The second type is *partially-supported* conduits which have liquidity enhancement that covers the entire CP outstanding and partial credit enhancement that covers a fixed proportion of the assets. The extent of partial credit insurance depends on the underlying assets and averages about 7 to 10 percent of total assets. In addition, many assets have asset-specific credit insurance, either in form of overcollateralization or credit insurance. Hence, if conduit assets experience a sudden decline in credit losses exceeding total credit enhancement, it is possible that the conduit does not have enough resources to repay CP investors. In January 2007, there were 234 partially-supported programs with total commercial paper outstanding of US$889bn or 72.4

percent of total asset-backed CP. To the best of our knowledge, only one partially-supported conduit has declared bankruptcy throughout the economic crisis and was unable to fully repay its investors. Instead, conduit administrators of partially-supported conduits usually either take back assets on bank balance sheets or extend balance sheet recourse by strengthening credit enhancement. Either way, the partially-supported conduits effectively have close to full recourse to bank balance sheets. Box 2 illustrates this point through the recourse implementation on Grampian Funding, a large conduit set up by Bank of Scotland (BOS).

The third type of conduit is *Structured Investment Vehicles (SIV),* which have only partial liquidity and credit enhancement. The extent of liquidity and credit enhancement varies depending on the underlying assets and averages about a quarter of CP outstanding. CP investors therefore have recourse to bank balance sheet up to the amount of partial enhancement. In order to offset the lower amount of liquidity and credit enhancement, SIVs typically issue other liabilities such as medium-term notes (MTN) and subordinated capital notes (CP). The amount of CP is usually roughly equivalent to the amount of liquidity enhancement. In January 2007, there were 55 SIVs fully-supported program with total commercial paper outstanding of US$ 93bn or 7.4 percent of total asset-backed CP. In contrast to other conduits, CP outstanding is significantly smaller than total conduits assets because of other liabilities such as MTN and CP. In January 2007, total conduit assets were about $400bn.

SIVs were heavily affected by the economic crisis. By June 2008, SIVs had either defaulted, the administrator had taken assets back on the balance sheet, or the administrator was in the process of restructuring the assets. Importantly, even though SIVs only had partial enhancement the vast majority of assets in SIVs were taken back on bank balance sheet. This result is striking since the partial enhancement was structured in order to limit bank exposure to liquidity and credit risk. Instead, it appears that partial enhancement was sufficient to force banks to take back conduit assets. Hence, even SIVs which were structured to limit the impact on banks effectively provided recourse to bank balance sheets.

In short, effectively all conduits have recourse to bank balance sheet. Importantly, limitations on liquidity and credit enhancement was largely ineffective in the sense that across all conduit structures banks were forced to take back assets or to extend more recourse to bank balance sheet by strengthening credit enhancement. Either way, CP investors benefited from extensive recourse to bank balance sheet.

To assess the impact of bank balance sheet recourse on banks, Table 1 provides statistics on conduits administrators. The identity of the conduit administrators is a good proxy for the financial institution which provides liquidity and credit enhancement to the conduit. The table lists the identity of the 10 largest conduit administrators measured by total CP outstanding as of January 2007. The list is restricted to conduits administrators

that are banks, because non-bank administrators lack the financial strength to support a conduit and contract out liquidity and credit risk insurance to banks (in January 2007, 8 out of the 10 largest administrators were banks). The size of the conduits compared to administrator size is substantial. The commitment for liquidity and credit support varies between 1.7 percent and 8 percent of banks assets, or 62 percent and 336 percent of bank equity.

Bank performance and off-balance-sheet leverage

Table 1 also provides indirect evidence that is consistent with that we saw in Figure 2. The health of the conduit, and the triggering of the recourse which would put the assets back on to sponsoring bank's balance-sheet, depend upon the leverage ratio for the conduit, measured by the commercial paper to equity ratio. This ratio is less than 40% on average for conduits of JPMorgan Chase, Bank of America and HSBC, banks that have weathered the crisis substantially better, compared to moderately high ratios for Barclays, Societe Generale and Deutsche Bank, and the extremely high ratios for conduits of Citigroup, HBOS and WestLB. Put simply, these latter banks had effectively taken on substantial economic leverage through these conduits, as the contingency that would trigger a recourse to their balance-sheet was far more likely given the CP/Equity ratio of their conduits; this leverage was however *not* reflected in their regulatory leverage or risk-weighted assets since the conduits were highly rated and recourse features or capital structure of conduits had not received careful attention until the crisis.

[ADD: correlation between exposure to conduits, recourse feature, and bank share prices]

Was it just about regulatory arbitrage?

Our discussion thus far might suggest that all of credit risk transfer was just regulatory arbitrage. This is not the case. The situation was in fact far perverse. Table 2 shows that of all the AAA-rated asset-backed securities created in the process of risk-transfer, as much as 30% was simply parceled by banks to each other; about 20% was sitting in conduits and SIV's (but given the recourse features, this belonged to banks for most part as well); and the rest was distributed among other market participants, mainly money-market funds, hedge funds and credit funds. The picture that emerges is thus the following: what started as pure regulatory arbitrage and gave banks substantial regulatory capital relief became over time banks' preferred investment strategy. As long as asset prices (mainly, house prices) kept rising, the equity cushion of risk transfer

vehicles remained un-eroded or even expanded, and banks, whose capital budgeting has become increasingly short-term in nature [REFERENCE TO GOVERNANCE WP], kept generating additional profits with the freed-up capital. The true risk of this business strategy manifested itself when housing bubble burst and the rest is well known.

Why did such risk-taking remain unfettered? While there are multiple reasons, two of them are more critical than others. First, as explained above, there was a regulatory failure in that Basel capital requirements were effectively gamed and the gravity of this arbitrage activity was simply not recognized by policymakers. This is important because in a world with deposit guarantees and other implicit subsidies, market discipline imposed by bank runs is effectively outsourced to regulatory supervision and intelligence. When that fails, levered institutions can undertake value-destroying risky strategies.

Second, in our opinion, regulatory assessment of risks requires a conceptual reorientation. Thus far, Basel requirements have aimed for charging a "tax" for total risk of an asset. A moment of reflection reveals that what regulators ought to care about is the aggregate risk contribution of an asset (or bank balance-sheet, more broadly). The AAA-rated risk transfer assets and vehicles were a way of betting on aggregate risk. In academic parlance, these are now referred to as "economic catastrophe bonds" [3]: they are low in risk overall, but their entire nature of risk is aggregate in nature, in fact, it arises in aggregate crashes. It is attractive for banks to undertake such assets since during aggregate or systemic stress when their risks materialize, banks are explicitly or implicitly guaranteed: there are "too big to fail" guarantees in place, and even if they are not explicit, it is difficult for reasons of political economy as well as efficiency not to bail out the banking sector in such times.

Ways to counter regulatory arbitrage and aggregate risk-shifting

We discuss elsewhere in this series of white papers [REFERENCE TO AGGREGAT E RISK PIECE] how banks should be charged for the aggregate risk they take on based on their aggregate risk exposure which would depend on their size, leverage as well as concentration of exposures. Before we conclude, we list our policy recommendations that would help minimize the risk of regulatory arbitrage.

The overall principle is simple: Regulation should not be narrowly focused on a single ratio of bank balance-sheet such as capital requirement. An analyst, investing private money, would rarely assess the health of an institution based on just one number of the

[3] Coval, Joshua; Jurek, Jakub, and Stafford, Erik, "Economic Catastrophe Bonds" *American Economic Review, forthcoming.*

balance-sheet. It would be more prudent for regulators to regularly assess individual and collective bank health based on a variety of different aspects of their balance-sheets, and indeed based on market indicators. Additional ratios to examine would be loans to deposits ratio, deposit to assets ratio, liquidity (measured only through stress-time liquidity, that is, treasuries and OECD government bonds) to assets ratio, and so on. As we illustrated earlier, the recent regulatory arbitrage produced reductions in risk-weights but also reductions in deposit to assets ratios and relative flat loans to deposits ratios. This combination flags a "warning signal" that warrants further scrutiny of activities that lead to it. In terms of market indicators, the recent evidence has shown that credit default swap fees for financials as well as financial commercial paper spread had been experiencing a steady rise through most of early 2007. These are valuable market indicators that depositors, in absence of government insurance, would rely on to impose discipline on banks. Regulators need to effectively play the role of such market discipline and thus avoid its narrow, box-ticking implementation. Banks clearly played well the leverage "game", at significant costs to economies and in some cases even to themselves. It is time for policy to rethink and reinvent.

Box 1: Solitaire Funding Limited

Solitaire Funding Limited ("Solitaire") is a conduit founded and administered by HSBC. In January 2007, as shown in Figure 1, Solitaire has assets worth US$20.5bn. US$9.8bn (48%) of conduit assets are in asset-backed residential mortgages, US$3.0bn (15%) in asset-backed commercial mortgages, US$2.8bn (15%) in asset-backed student loans and the remainder in CDOs and other asset-backed securities. US$14.1bn (69%) of conduit assets are backed by assets in the United States, US$4.9 (24%) are backed by assets in the UK, and the remainder by assets in other countries. 98% of the assets in the portfolio are rated 'Aaa' and the remainder is not rated.

On the liabilities side, Solitaire issues asset-backed issued commercial paper (CP) worth US$20.8bn. US$14.1 (68%) of CP is issued in the United States and the remaining US$6.7 (32%) is issued in Europe. The maturity structure and yield of the Commercial Paper is not available but market data suggests that CP has a median maturity of 30 days and the average yield is a few basis points above Fed Funds Rate. The conduit does not publish data on equity but for a conduit of its size the estimated equity is US$62m, which equals 0.3 percent of total conduit assets.

The main risks associated with Solitaire remain with HSBC and other financial institutions. HSBC provides a liquidity guarantee to repurchase non-defaulted assets if Solitaire fails to roll over CP (liquidity risk). The definition of default is not available but the industry standard is that assets are considered defaulted if they are downgraded below investment grade. With respect to the value of the assets, the conduit is insured against credit losses of up to US$185m (credit risk). The identity of the insurers is not available but accompanying documentation suggests that the credit insurance was provided jointly by HSBC and bond insurer AMBAC.

Box 2: Grampian Funding

Grampian Funding is a large conduit administered by the Bank of Scotland (BOS) with total CP outstanding of US$27bn in January 2007. BOS provides liquidity support for 100 percent of CP outstanding. In February 2008, Grampian announced that it added Repo Facilities with BOS to provide further liquidity support. In June 2008, Grampian announced that BOS increased credit enhancement from US$1.2bn to US$4bn. Importantly, throughout the crises at least 98.6 percent of assets held by Grampian were rated A3 or higher. As long as assets are rated above investment grade, Grampian is required to provide liquidity support, which means that throughout the crisis CP investors had full recourse to the balance sheet of BOS. However, average credit quality of conduit assets deteriorated over time and Grampian had to reduce its asset holdings. It is likely, that Grampian had difficulties to issue CP and BOS therefore decided to take some assets back on its balance sheet, while extending more credit enhancement for the remaining assets in the conduit. Hence, Grampian's liquidity and credit enhancement was effectively sufficient such that CP investors had full recourse to the balance sheet of BOS throughout the crisis.

Figure 1: Trends in bank assets, nature of assets and leverage (Source: International Monetary Fund)

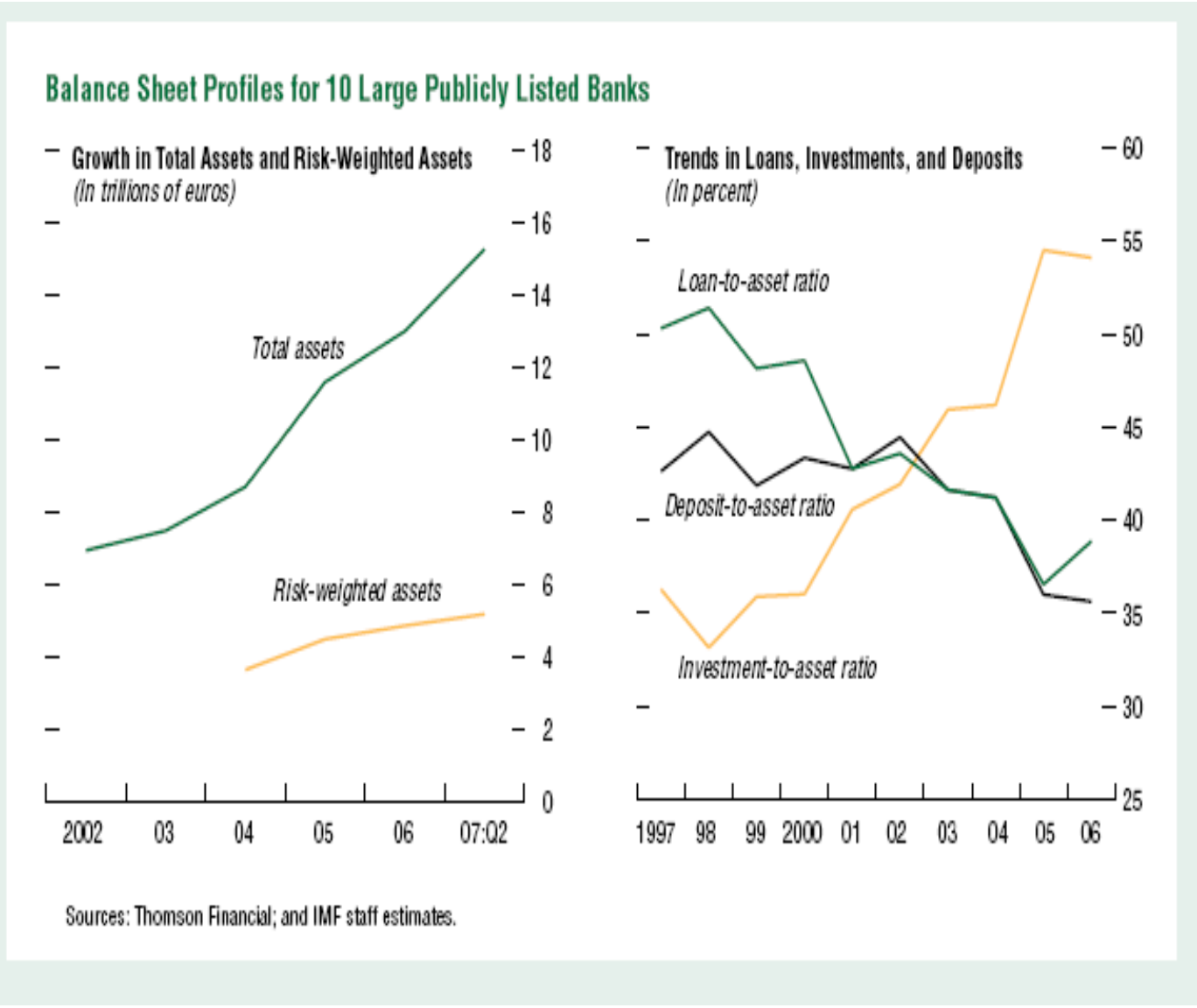
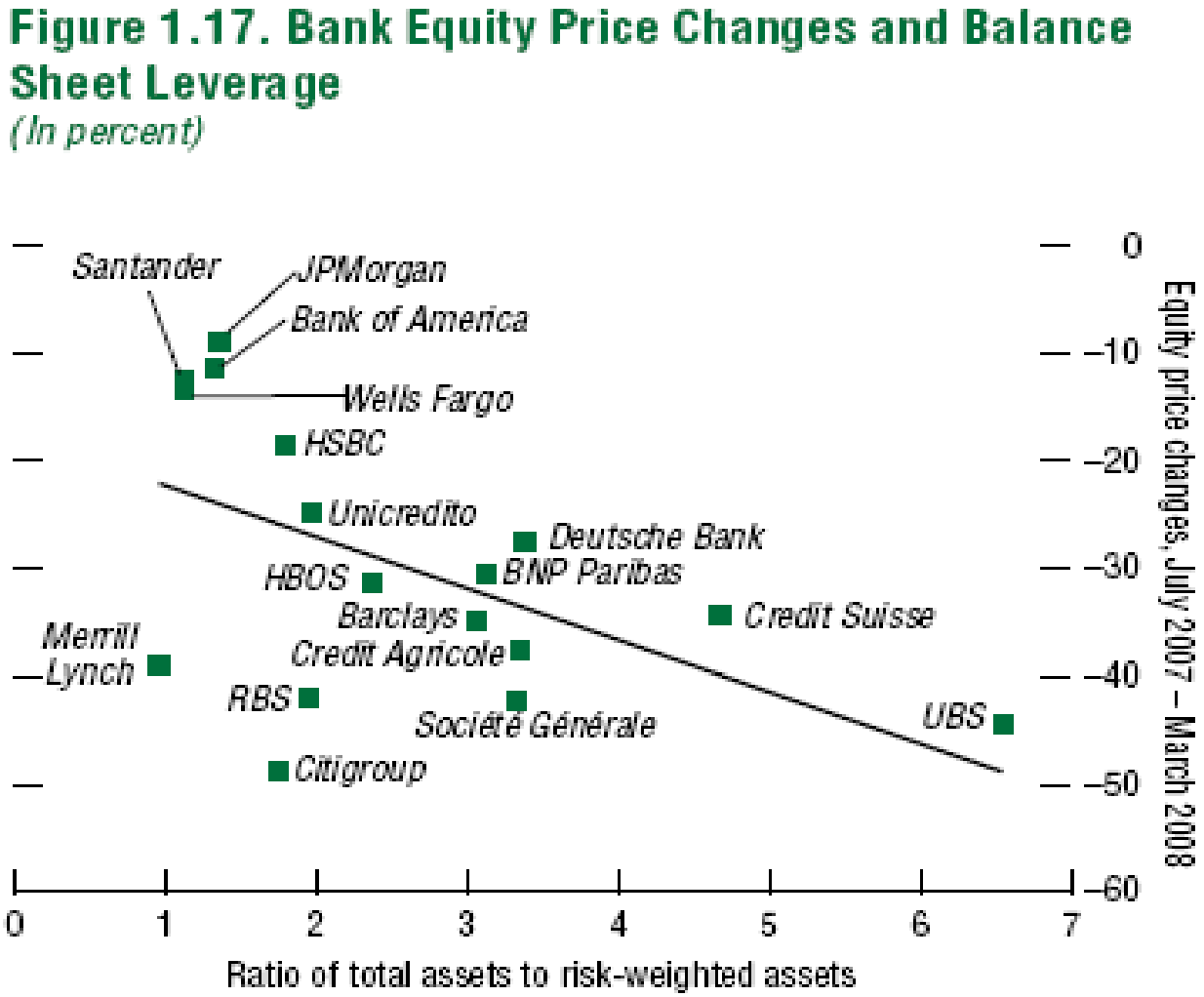
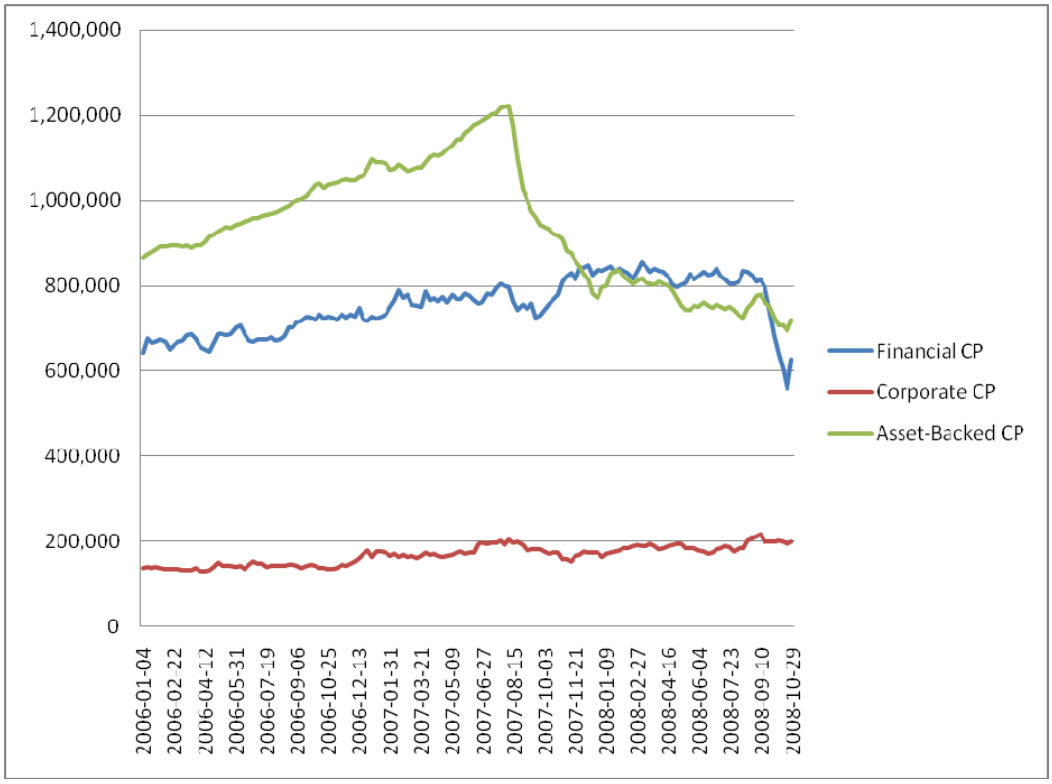


Figure 2: Bank stock performance and regulatory leverage (Source: International Monetary Fund)



Sources: Bloomberg L.P.; and IMF staff estimates.

Figure 3: Outstanding US Commercial Paper



Note: does not include EURO ABCP, includes ABCP issued by CDOs

Table 1: Largest Conduit Administrators by Size

	Conduits		Administrator			
	#	CP (in bn)	Assets	Equity	CP/Asset	CP/Equity
Citibank	23	93	1,884	120	4.9%	77.4%
Bank of America	14	46	1,464	136	3.1%	33.7%
HBOS	4	44	1,160	42	3.8%	105.6%
JPMorgan Chase	9	44	1,352	116	3.2%	37.9%
HSBC	7	39	1,861	123	2.1%	32.1%
Societe Generale	9	39	1,260	44	3.1%	87.2%
Deutsche	14	38	1,483	44	2.6%	87.8%
Barclays	3	33	1,957	54	1.7%	61.5%
WestLB	8	30	376	9	8.0%	336.6%

Notes: January 2007, Administrator merged for all subsidiaries associated with bank administrator not necessarily liquidity/credit risk provider, Bank variables from Bankscope, selected largest bank with banking groups (usually bank holding company), dropped non-banks and corporates

Table 2: Asset-backed securities' exposure concentrations (Source: Financial Times, 1 July 2008)

Type of institution	% Buyer of AAA ABS
Banks	30
Conduits	12
SIVs	8
Hedge funds	2
MM funds	26
Credit funds	17
Others	5