

are not good candidates for standard contracts are difficult to be illiquid. Subject to additional regulatory

Modern Financial Sector,” and Global Firms.”

It inhibits the ability of households when the loans have been sliced

Government-Sponsored Enterprises?” to be included, see Chapter 16,

Regarding the securitization of the subprime market of New York staff reports. Working paper. Subprime and adverse selection in the subprime market. Working paper.

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What lies ahead? UBS Lunch

2

How Banks Played the Leverage Game

Viral V. Acharya and Philipp Schnabl

If there is one conclusion that analysts of the financial crisis all agree upon, it is that high bank leverage has made the crisis far worse. But how could excessive leverage be built up in a sector that is so heavily regulated? In this paper we show that banks used *credit risk transfer* mechanisms to get around regulatory requirements. Credit risk transfer mechanisms are supposed to transfer assets off bank balance sheets onto other investors in the economy, but instead banks exploited credit transfer mechanisms for regulatory arbitrage and increased their *effective* leverage and exposure to aggregate risk by availing of such mechanisms. In the process, they exposed themselves to the risk that a significant economy-wide shock would be sufficient to rapidly wipe out their capital base.

The regulatory arbitrage undertaken by banks took two principal forms. First, banks set up off-balance-sheet asset-backed commercial paper (ABCP) conduits, and sister concerns such as structured investment vehicles (SIVs). ABCP conduits held assets the banks would have otherwise held on their books, and banks provided *liquidity enhancement* and *credit enhancement* to these conduits. These enhancements implied that the investors in conduits had recourse to banks in case the quality of the assets deteriorated. Such enhancements were treated as capital-light in existing capital requirements, allowing five times higher leverage ratios off the balance sheet than on the balance sheet.

Second, banks exploited the fact that they could also get capital relief by simply switching away from loans into investments in the form of AAA-rated tranches of CDOs and CLOs, which again had a significantly lower capital charge. As a result, about 50 percent of all AAA asset-backed securities remained *within* the banking system. Indeed, banks that had

greater activity in ABCP conduits and had greater capital-light investments suffered the greatest losses and equity price declines during the crisis.

Can such regulatory arbitrage be prevented in future? There are at least two simple recommendations toward this objective. First, any regulation that focuses narrowly on just one performance metric of banks is easy to game. The current regulatory focus on a single ratio (capital to suitably risk-weighted assets) should be made more robust by expanding it to a more rounded approach that examines bank balance sheets as equity or credit analysts would, relying on several key indicators (such as loans to deposits, insured deposit to assets, holdings of liquid treasuries and OECD government bonds relative to assets, etc.). Second, bank regulation has to focus more on aggregate risk to the economy instead of the risk of failure of individual institutions. The focus on aggregate risk should ensure that credit risk is truly passed to investors outside the banking system rather than transferred between institutions within the banking system.

2.1 CREDIT RISK TRANSFER AND BANK LEVERAGE

If there is one conclusion that analysts of the subprime crisis all agree upon, it is that leverage of financial institutions 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 subprime lending decisions.¹

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

This sequence of events from (apparent) credit risk transfer to the freezing up of markets that had a short-run burst of liquidity prompts the question as to how excessive leverage and aggregate risk could be built up in a financial sector that is so heavily regulated. In particular, how and why did capital adequacy requirements fail in their stated job of limiting bank leverage and risk? The answer is simple: While credit risk transfer may have economic merit as a risk-transfer tool, its dark side is that many of its incarnations may have been clever innovations of the financial sector to arbitrage regulation. Such regulatory arbitrage took two principal forms: first, the setting up of asset-backed commercial paper (ABCP) conduits (and sister concerns such as SIVs) by banks, and, second, the significant retention by banks of AAA-rated asset-backed securities.

On the first front, banks set up off-balance-sheet ABCP conduits where they transferred some of the assets they would have otherwise held on their books; the conduits were funded with a sliver of equity and the rest in rollover finance in the form of asset-backed commercial paper. In addition, banks provided liquidity enhancement and credit enhancement to these conduits. These enhancements implied that the investors in conduits had recourse to banks in case the quality of assets deteriorated. Put simply, investors would return the assets back to the bank once they suffered a loss. Importantly, such enhancements were treated as capital-light in existing Basel rules for calculating risk-weighted capital requirements, most notably that liquidity facilities of less than one year maturity had less than 20 percent of capital requirement compared to the one if assets were on the bank balance sheet. As banks rolled out more and more ABCP conduits, they increased their short-term liabilities but their effective or contingent leverage remained in the shadow banking system. What is more, they got capital freed up to originate more assets, generally of lower quality.

On the second front, banks exploited the fact that they could also get capital relief by simply switching away from loans into investments in the form of AAA-rated tranches of CDOs and CLOs, which again had a significantly lower capital charge. Indeed, about 30 percent of all AAA asset-backed securities remained *within* the banking system, and if one includes ABCP conduits and SIVs as effectively being parts of the banking system, then this fraction rises to 50 percent. While AAA-rated securities should have low absolute risk levels, the fact that newer assets originated by banks were “down the quality curve” was ignored and thus their ratings were overly generous. Even in the absence of such ratings failures, in pursuit of regulatory capital relief banks were taking on significant aggregate risks. For example, an AAA-rated mortgage-backed security would again be significantly capital-light relative to holding mortgages on one’s books. So banks passed their mortgage parcels around in the system. Did banks simply

not understand that AAA-rated tranches on housing assets were “economic catastrophe bonds” (to borrow a recent academic phrase)? While this is possible, the short-run regulatory arbitrage from holding such tranches most likely caused banks to ignore their fundamental economic risk.

Not surprisingly, banks that had greater activity in ABCP conduits and had greater capital-light investments (paradoxically, these were safer banks as per regulatory standards) suffered the greatest losses and equity price declines during the crisis. Can such arbitrage be prevented or its incidence reduced? What policy lessons, if any, are to be learned from the sudden emergence and collapse of the shadow banking system and credit risk transfer activities?

There are at least two simple, and yet novel, lessons. First, any regulation that focuses narrowly on just one performance metric of banks will fall into the box-ticking trap and be easy to game. The current regulatory focus on a single ratio (capital to suitably risk-weighted assets) should be made more robust by expanding it to a more rounded approach that examines bank balance sheets as equity or credit analysts would, relying on several indicators (such as loans to deposits, insured deposit to assets, holdings of liquid treasuries and OECD government bonds relative to assets, etc.) to create an early warning system that raises a flag when further investigation is needed. The second lesson is to understand the aggregate risk component of risk transfer vehicles, and more broadly, of bank balance sheets. Isolated failures of credit intermediaries are not a problem for economies *per se*; but systemic failures of many credit intermediaries are. This intuitive observation suggests that regulation designed to make banks individually safer may encourage excessive credit risk transfer that makes aggregate crises more severe. Bank regulation needs to be reformed and focused more on aggregate risk to the economy rather than a single capital ratio tied to individual bank risks.

The remainder of this paper discusses in more detail how banks used credit risk transfer mechanisms to reduce regulatory capital without shrinking their risk exposure. The first part focuses on ABCP conduits, and the second part analyzes the use of securitization. The paper concludes with specific recommendations on how to reform bank regulation to avoid regulatory arbitrage in the future.

2.2 ASSET-BACKED COMMERCIAL PAPER CONDUITS

Asset-backed commercial paper (ABCP) conduits are one example of how banks used credit risk transfer mechanism to increase leverage. ABCP conduits are shell companies that hold financial assets such as corporate

loans, trade receivables, student loans, credit card receivables, or mortgages. Typically, conduits hold only 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 that sets up 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 prespecified investment guidelines and issues asset-backed commercial paper to finance the conduit assets. Often the administrator invests in assets that have been generated by the administrator itself or assets generated by clients of the administrator.

One of the most important characteristics 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 the 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 backup credit line or commitment to repurchase nondefaulted assets in case a conduit cannot roll over maturing commercial paper (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 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 2.1 explains the overall conduit structure in the context of Solitaire Funding Limited, a conduit set up by HSBC Holdings PLC.

From the perspective of a commercial paper investor—the creditor of the conduit—the structure provides three separate lines of defense against nonrepayment. 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

BOX 2.1 SOLITAIRE FUNDING LIMITED

Solitaire Funding Limited is a conduit founded and administered by HSBC Holdings. In January 2007, Solitaire had assets worth US\$20.5 billion. US\$9.8 billion (48 percent) of conduit assets were in asset-backed residential mortgages, US\$3.0 billion (15 percent) in asset-backed commercial mortgages, US\$2.8 billion (15 percent) in asset-backed student loans, and the remainder in CDOs and other asset-backed securities. US\$14.1 billion (69 percent) of conduit assets were backed by assets in the United States, US\$4.9 billion (24 percent) backed by assets in the United Kingdom, and the remainder by assets in other countries. About 98 percent of the assets in the portfolio were rated Aaa and the remainder was not rated.

On the liabilities side, Solitaire issued asset-backed commercial paper (ABCP) worth US\$20.8 billion. US\$14.1 billion (68%) of commercial paper was issued in the United States and the remaining US\$6.7 billion (32%) was issued in Europe. The maturity structure and yield of the commercial paper is not available, but market data suggests that commercial paper has a median maturity of 30 days and the average yield is a few basis points above the federal funds rate. The conduit does not publish data on equity, but for a conduit of its size the estimated equity is US\$62 million, 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 nondefaulted assets if Solitaire fails to roll over commercial paper (liquidity enhancement). 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\$185 million (credit enhancement). 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.

draw on credit enhancement to cover credit losses. In addition, commercial paper 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 nonrepayment increases, they simply do not roll over maturing commercial paper. 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 does the conduit default, and CP investors then 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 has 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 recent 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 downgrades otherwise. As discussed later, 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 8 percent of asset values as equity capital, the exact capital required being based on the assets' risk weight. From the bank's perspective, equity capital is costly to issue and also lowers effective leverage and risk taking, and thus banks pursue a variety of strategies to reduce regulatory capital requirements. Conduits are one way to economize on 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 2.1 plots total asset-backed commercial paper outstanding from January 2006 to December 2008. Before the recent crisis, total commercial paper issued in the United States grew from US\$866 billion in January 2006 to US\$1,222 billion in August 2007. On August 9, 2007, BNP Paribas suspended the calculation of the net asset value of three money market funds that had invested in asset-backed commercial paper. The effect on the markets was catastrophic. It caused the asset-backed commercial paper market to effectively freeze. The resulting rollover risk that was imposed on a

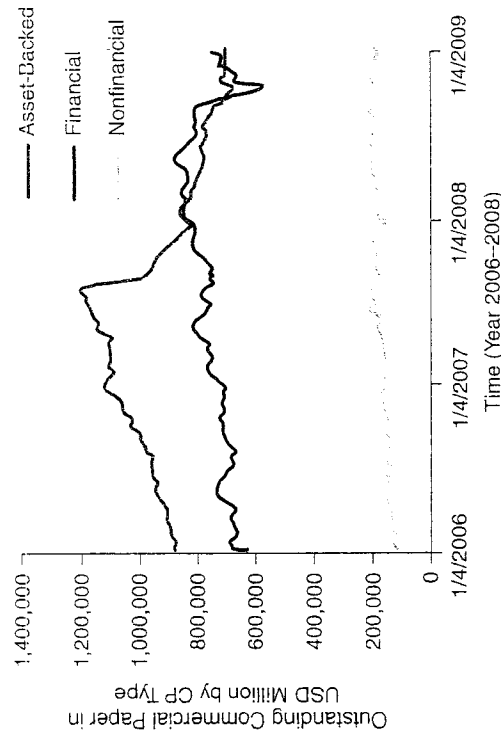


FIGURE 2.1 Decline in Asset-Backed Commercial Paper

Note: Data does not include euro ABCP; includes ABCP issued by CDOs.

Source: Federal Reserve Board.

large number of ABCP conduits and SIVs, which now would have had to be taken back on bank balance sheets due to recourse, caused interbank lending rates to skyrocket as well. There were two aspects that led to such a sharp effect: first, the large extent to which banks had parked such contingent liabilities in the shadow banking world of conduits and SIVs, and second, the opaqueness of these structures, which meant banks were themselves unsure of who would be hit by what kind of losses if the ABCP market experienced permanent rollover risk. As a result of the crisis, asset-backed commercial paper dropped to US\$797 billion by January 2008 and only stabilized after banks increased explicit recourse to bank balance sheets by providing further credit enhancement. On September 17, Lehman went bankrupt and as a result many conduits again experienced difficulties issuing commercial paper. The Federal Reserve devised several policies in response to stabilize the market. On September 18, the Federal Reserve guaranteed investment in money market mutual funds, which are the main investors in asset-backed commercial paper. On October 27, the Federal Reserve started a new liquidity facility that directly purchases asset-backed commercial paper.

The impact on banks of this decline in asset-backed commercial paper 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 commercial paper outstanding and credit enhancement that covers all assets in the conduit. Hence, fully supported conduits have *full recourse* to the bank balance sheet. In January 2007, there were 79 fully supported conduits with total commercial paper outstanding of US\$245 billion or 19.9 percent of total ABCP. To the best of our knowledge, there has not been a single fully supported conduit that has declared bankruptcy throughout the economic crisis. Either fully supported conduits have continued to issue commercial paper or administrators have taken back their assets on the bank balance sheets.

The second type is *partially supported* conduits, which have liquidity enhancement that covers the entire commercial paper outstanding and partial credit enhancement that covers a fixed proportion of the assets. The extent of partial credit enhancement depends on the underlying assets and averages about 7 to 10 percent of total assets. In addition, many assets have asset-specific credit enhancement in the form of either 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 commercial paper investors. In January 2007, there were 234 partially supported programs with total commercial paper outstanding of US\$889 billion or 72.4 percent of total ABCP. To the best of our knowledge, only four partially supported conduits have declared bankruptcy throughout the economic crisis and were unable to fully repay their investors. Instead, conduit administrators of partially supported conduits usually either take back assets onto 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 2.2 illustrates this point through the recourse implementation on Grampian Funding, a large conduit set up by Bank of Scotland (HBOS).

The third type is *structured investment vehicles (SIVs)*, 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 assets. Commercial paper investors have recourse to bank balance sheets 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 (MTNs) and subordinated capital notes. The amount of CP is usually roughly equivalent to the amount of liquidity enhancement. In January 2007, there were 55 SIVs with total commercial paper outstanding of US\$93 billion or 7.4 percent of total asset-backed commercial paper. In contrast to other conduits, CP outstanding is significantly smaller than total conduit assets

BOX 2.2 GRAMPPIAN FUNDING

Grampian Funding is a large conduit administered by the Bank of Scotland (HBOS) with total commercial paper outstanding of US\$27 billion in January 2007. HBOS provides liquidity support for 100 percent of CP outstanding. In February 2008, Grampian announced that it had added Repo Facilities with HBOS to provide further liquidity support. In June 2008, Grampian announced that HBOS increased credit enhancement from US\$1.2 billion to US\$4 billion. 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, HBOS is required to provide liquidity support, which means that throughout the crisis CP investors had full recourse to the balance sheet of HBOS. However, the average credit quality of conduit assets deteriorated over time and Grampian had to reduce its asset holdings. It is likely that Grampian had difficulties issuing CP and HBOS 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 were effectively sufficient such that CP investors had full recourse to the balance sheet of HBOS throughout the crisis.

because of other liabilities such as MTNs and subordinated capital notes. In January 2007, total conduit assets were about US\$400 billion.

SIVs were heavily affected by the economic crisis. By June 2008, either SIVs had 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 had only partial enhancement, the vast majority of assets in SIVs were taken back on the bank balance sheets. 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 that were structured to limit the impact on banks effectively provided recourse to bank balance sheets (a prime example being over \$50 billion of such investments taken back by Citigroup on its balance sheet during the crisis).

In short, effectively all conduits have recourse to the bank balance sheet. Importantly, limitations on liquidity and credit enhancement were largely ineffective in the sense that across all conduit structures banks were forced

TABLE 2.1 Ten Largest Conduit Administrators by Size (\$ Amounts in Billions)

	Conduits			Administrator		
	#	CP	Assets	Equity	CP/Asset	CP/Equity
Citibank	23	\$93	\$1,884	\$120	4.9%	77.4%
ABN Amro	9	69	1,000	34	5.3	201.1
Bank of America	12	46	1,464	136	3.1	33.7
HBOS	2	44	1,160	42	3.8	105.6
JPMorgan Chase	9	42	1,352	116	3.1	36.1
HSBC	6	39	1,861	123	2.1	32.1
Société Générale	7	39	1,260	44	3.1	87.2
Deutsche Bank	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 nonbanks and corporates.

to take back assets or to extend more recourse to bank balance sheets by strengthening credit enhancement. Either way, commercial paper investors benefited from extensive recourse to bank balance sheets.

To assess the impact of bank balance sheet recourse on banks, Table 2.1 provides statistics on conduit administrators. The identity of the conduit administrator is a good proxy for the financial institution that 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 conduit administrators that are banks, because nonbank administrators lack the financial strength to support a conduit and purchase liquidity and credit enhancement from banks (in January 2007, 8 out of the 10 largest administrators were banks).

As shown in Figure 2.2, banks with more exposure to ABCP conduits prior to August 2007 experienced larger declines in share prices after the crisis. ABCP exposure is measured as the ratio of total ABCP of bank-administered conduits relative to total bank equity prior to August 2007. For example, this ratio is less than 40 percent on average for JPMorgan Chase, Bank of America, and HSBC (banks that have weathered the crisis substantially better than most), compared to moderately high ratios for ING Bank, Barclays, and KBC Bank and very high ratios for Citigroup, HBOS, and Fortis. Put simply, these latter banks had effectively taken on substantial

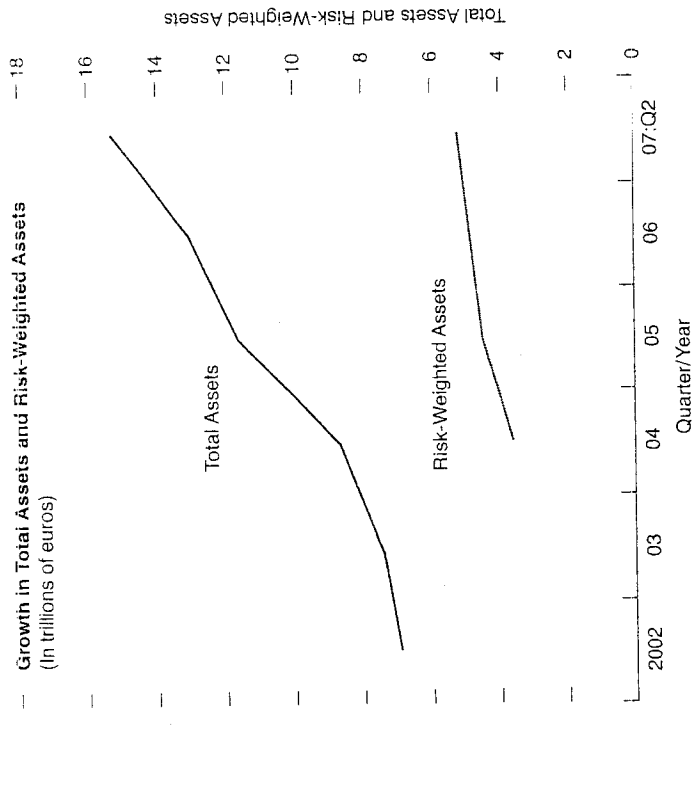


FIGURE 2.3 Trends in Bank Assets, Nature of Assets, and Leverage
 Source: International Monetary Fund (2008).

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 a regulatory assessment of the risk of bank assets. What Figure 2.3 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 more sluggish pace. Put another way, banks were deemed by regulatory assessment to have been investing in relatively safer assets over this period.

The widening gap between total assets and risk-weighted assets reflects the expansion of the share of assets that carried low risk weights according to the Basel bank regulation. Two key factors contributed to the widening gap. First, banks increased their trading and investment activities (e.g., asset-backed securities, hedging) over this period. The capital weights of these instruments were typically lower than loans because the instruments were typically highly rated by a rating agency.

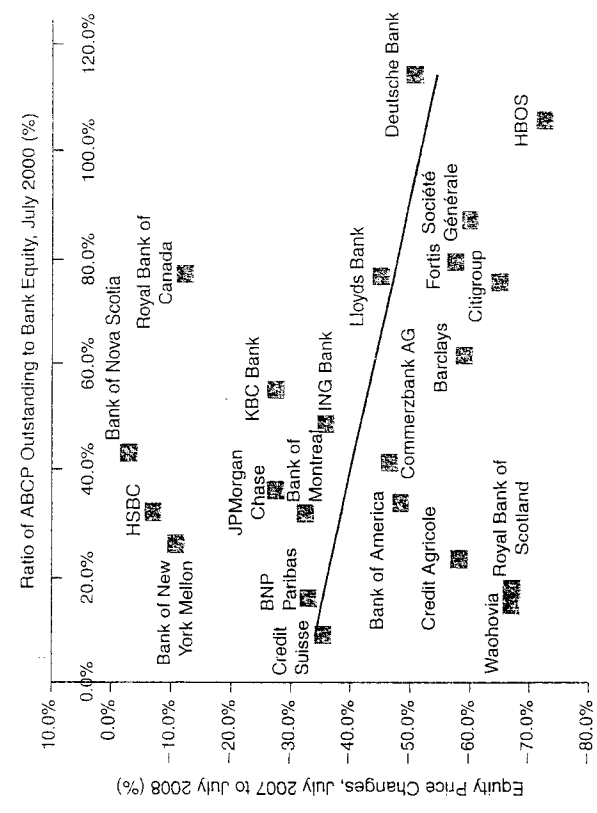


FIGURE 2.2 Bank Equity Price Change and Exposure to ABCP Conduits

Source: Authors' own calculations based on Moody's, Bankscope, and Bloomberg data. Sample is restricted to 35 largest bank administrators of ABCP conduits for which share price and balance sheet data are available. Exposure is measured as the ratio of total bank-sponsored ABCP over bank equity; banks with exposure of more than 200 percent are excluded (those are almost all German Landesbanken). Change in share prices is measured as the relative change from July 2007 to July 2008.

economic leverage through these conduits, as the contingency that would trigger a recourse to their balance sheets 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.

2.3 BANK BALANCE SHEETS AND RISK-WEIGHTED ASSETS

Figure 2.3 shows the trend in size of assets of the top 10 publicly traded banks relative to the trend in the size of their risk-weighted assets where the risk weights are based on those employed by the Basel capital requirements.

Second, under the International Financial Reporting Standards (IFRS) some banks started to consolidate a portion of their exposure to asset-backed commercial paper conduits. Since banks continued to compute capital requirements as if the assets were off-balance-sheet, the consolidation resulted in a much larger increase in total assets relative to risk-weighted assets. Overall, the regulatory requirements under both Basel I and Basel II regulation did not constrain this asset growth. In fact, according to standard bank capital ratios most banks appeared well-capitalized. The banks showed on average a Tier 1 capital to risk-weighted assets ratio of 7 to 9 percent, which is about twice as large as the regulatory minimum of 4 percent (International Monetary Fund 2008).

How do we know that these trends reflected regulatory arbitrage? This is based on evidence in Figure 2.4. 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, and short-term lines of credit provided for liquidity enhancement to firms and other borrowers (including banks' own conduits and SIVs, 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 2.4 plots the share price reaction of different banks during the period July 2007 to March 2008 as a function of the ratio of total assets to

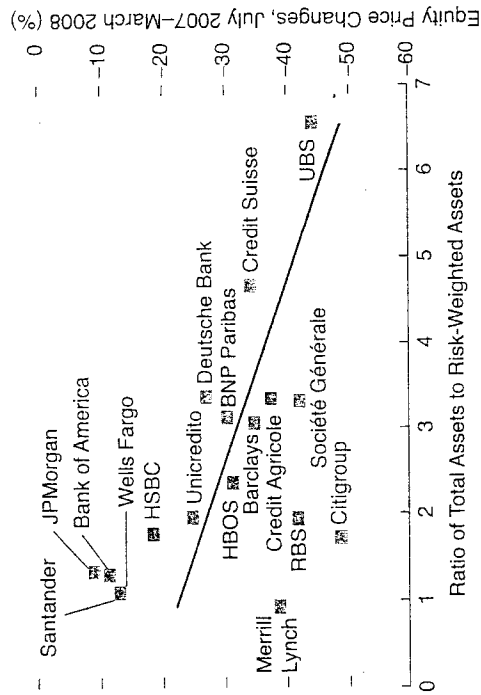


FIGURE 2.4 Bank Stock Performance and Regulatory Leverage

Source: International Monetary Fund (2008).

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 ratios close to one, whereas banks that have performed the worst (most notably UBS) had the highest ratios.

What explains the relationship between the decline in share price and the extent of regulatory arbitrage via ABCP exposure or investments in highly rated securities? 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 supported by the evidence presented so far, is that the Basel capital requirements were simply gamed by banks that had high ratios of total assets to risk-weighted assets. They were indeed much less safe than 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.

In fact, from the perspective of the aggregate risk of the banking system, there was little risk transfer to investors outside the banking system. Table 2.2 shows that of all the AAA-rated asset-backed securities created in the process of risk transfer, as much as 30 percent was simply parceled out by banks to each other; about 20 percent was sitting in conduits and SIVs (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'

TABLE 2.2 Asset-Backed Securities' Exposure Concentrations

Type of Institution	% Buyer of AAA ABS
Banks	30%
Conduits	12
SIVs	8
Hedge Funds	2
Money Market Funds	26
Credit Funds	17
Others	5

Source: Financial Times, July 1, 2008.

preferred investment strategy. As long as asset prices (mainly house prices) kept rising, the equity cushion of risk transfer vehicles remained uneroded or even expanded, and banks, whose capital budgeting has become increasingly short-term in nature,³ kept generating additional profits with the freed-up capital. The true risk of this business strategy manifested itself when the 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 earlier, 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 policy makers. 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 the 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.”⁴ They are low in risk overall, but their risk is aggregate in nature; in fact, it arises only 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.

2.4 WAYS TO COUNTER REGULATORY ARBITRAGE AND AGGREGATE RISK SHIFTING

We discuss elsewhere in this book⁵ 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 from the 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 from the 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, deposits-to-assets ratio, liquidity-to-assets ratio (measured only through stress-time liquidity, that is, Treasuries and OECD government bonds), and so on. As we illustrated earlier, the recent regulatory arbitrage produced reductions not only in risk weights but also in deposits-to-assets ratios and gave rise to relatively flat loans-to-deposits ratios. This combination flags a warning signal that warrants further scrutiny of activities that led 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 spreads had been experiencing a steady rise through most of early 2007. These are valuable market indicators that depositors, in the 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 the leverage game well, at significant costs to the economy and in some cases even to themselves. It is time for policy to rethink and reinvent.

NOTES

1. For empirical evidence on the decrease in asset quality during credit booms, see Dell’Ariccia, Igan, and Laeven (2008); Keys, Mukherjee, Seru, and Vig (2008); Mian and Sufi (forthcoming); and Demyanyk and Van Hemert (forthcoming).
2. Liquidity enhancement is similar to backup credit lines provided to corporations that issue unsecured commercial paper.
3. See Chapter 7, “Corporate Governance in the Modern Financial Sector.”
4. See the discussions in Chapter 1, “Mortgage Origination and Securitization in the Financial Crisis”; Chapter 8, “Rethinking Compensation in Financial Firms”; and Coval, Jurek, and Stafford (forthcoming).
5. See Chapter 13, “Regulating Systemic Risk.”

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3.1 BACKGROUND

The three major credit rating agencies, Standard & Poor's, Moody's, and Fitch IBCA, and then in the subsequent years the sale of the mortgage-backed securities and other financial products crucially on these agencies' ratings. As mortgage prices ceased rising and mortgage prices fell, the excessively optimistic market conditions of 2005 and 2006—the U.S. financial crisis—ended. The central role, a significant role, of the rating agencies in the financial crisis behavior in the future.

Credit rating agencies' judgment of the creditworthiness of the mortgage-backed securities issued by various issuers (most recently, the U.S. government) whose judgments were often flawed. The best-known credit rating agencies (Standard & Poor's, Moody's, and Fitch IBCA), as well as the lenders, were often unable to ascertain the true creditworthiness of the mortgage-backed securities.