Credit Crises: The Excess Capital Hypothesis

By Bruce G. Stevenson

Eruptions in loan losses are the result of excess lending that drives capital to increasingly risky borrowers.

As the U.S. financial system works itself out of the worst financial crisis since the Great Depression, there is debate about the causes of this debacle, particularly in light of the collapse of the U.S. mortgage market, which is unprecedented since World War II.

Yet, credit crises are relatively common.[1] The last such crises took place in 2001 with the collapse of the dot-com bubble and at the end of the 1980s and the early 1990s when the U.S. commercial real estate (CRE) market collapsed. Previously, the failure of real estate led to the collapse of the real estate investment trust (REIT) market in the mid-1970s.

Surprisingly, in light of debate over the social consequences of these crises, there are relatively few formal studies on their causes. For example, Stevenson and Fadil[2] argued that credit crises occur due to the risk characteristics of banking customers. The more credit banks extend to non–investment-grade borrowers, the more likely those borrowers are to default and default *en masse.* For example, a portfolio of BB-rated borrowers will experience a default rate of at least five percent once every 11.5 years. Subprime mortgage borrowers are, by definition, non–investment-grade.

This article examines, and attempts to explain, these periodic credit crises. The central idea is that eruptions in loan losses are the result of excess lending that drives capital to increasingly risky borrowers, who default and generate losses, and the contraction of that lending once these risky borrowers default. This idea is called the "excess capital hypothesis."

Cyclical Patterns in Loan Losses for Commercial Banks

Although commercial banks are not the only lenders in the U.S. capital markets, this article focuses on banks for three reasons:

(1) The credit crises of the past four decades have concerned commercial banks (and investment banks in the most recent crisis).

(2) These crises have posed significant risks to the insurance fund of the Federal Deposit Insurance Corporation and to the soundness of the U.S. financial system.

(3) Given the long-standing regulatory framework for banks, there is a rich set of data on bank performance to analyze.

Exhibit 1 demonstrates the pattern of loan losses for the U.S. commercial banking industry since 1970. Four periods of increased losses can be seen. The first wave of losses occurred in the mid-1970s in the aforementioned REIT crisis. The second appears as a prolonged increase over the 1980s that culminated in the collapse of the CRE markets at the end of that decade and the beginning of the 1990s. The third wave occurred with the collapse of the dot-com bubble at the beginning of the 2000s, and the last is the now infamous collapse of the global credit markets that began with the failure of the U.S. subprime mortgage market. This latter crisis

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Exhibit 1. U.S. Commercial Banking Industry Net Charge-offs/Total Loans and Leases 1970–2009
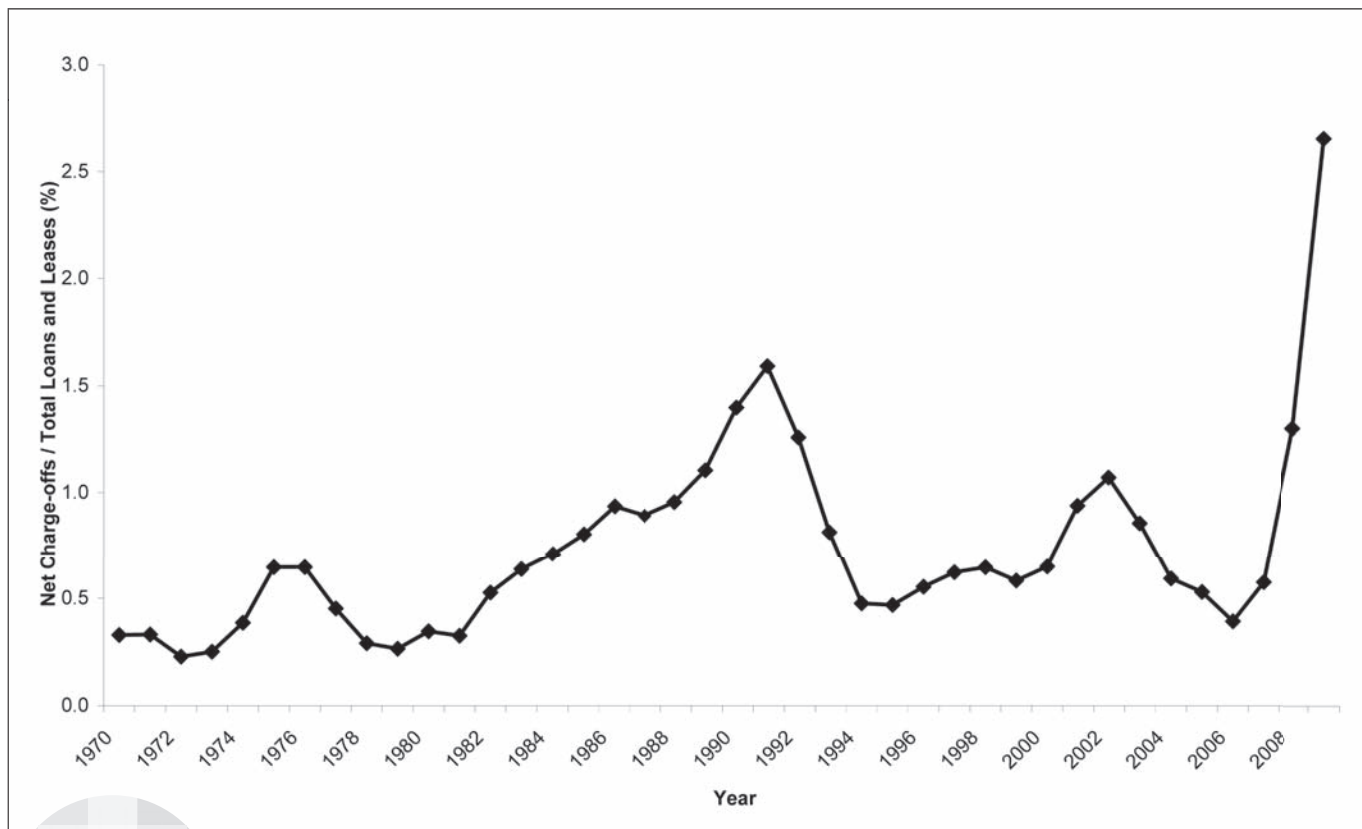
Sources: Federal Deposit Insurance Corporation (FDIC) and Bureau of Economic Analysis (BEA)

raised the banking industry's level of charge-offs to unprecedented levels (2.65 percent of total loans and leases in 2009).

There is a cyclical nature to this pattern, coupled with a slight upward trend in the long-run average for charge-offs (Exhibit 1). First, the crisis periods have relatively short duration: The spikes in loan losses appear and disappear relatively rapidly, with the highest levels lasting only three years. In general, defaults on loans occur in discrete waves and banks charge off those defaulted loans quickly.

Second, banks have taken more credit risk in the three decades since 1970. Specifically, in the noncrisis years of the 1970s, net charge-offs were less than 40 basis points (bps) of total loans and leases. By the

> *The failure of the U.S. subprime mortgage market … raised the banking industry's level of charge-offs to unprecedented levels (2.65 percent of total loans and leases in 2009).*

1990s, these "benign" levels of charges had risen to 60 bps. Consistent with Stevenson and Fadil,[3] credit crises have become more frequent as banks have taken on more non–investment-grade customers.

So, what causes this cyclical pattern of credit crises and spikes in industry-level charge-offs? A close examination suggests a modest correlation with the performance of the U.S. economy. Economic recessions often occur with these increases in loan losses, but not always. For example, losses increase significantly in the recessions of 1974 to 1975, 1990 to 1991, 2001 and 2008 to 2010, though loan losses typically increase at the end of the recession and continue into the economic recovery.

This result matches expectations. Economic recessions typically lead to reduced corporate operating

profits; lower operating profits mean less income for repayment of debt. Higher levels of default result from borrowers' diminished profits and banks suffer loan losses accordingly.

However, the pattern in the 1980 to 1982 recession is quite different. Instead of a sharp rise in loan losses in, or at the end of, the recession, loan losses remained relatively flat in this significant economic contraction. Only after the economy began its recovery in 1983 did loan losses increase, and the increase continued largely unabated through the end of the decade. In this case, loan losses actually increased in a period of economic expansion and the hypothesis that loan losses occur with recessions did not hold. An alternative explanation is required.

Default rates in the U.S. corporate bond markets show a broadly similar pattern. Emery *et al.*[4] show significant peaks in bond market defaults (both count of defaulting issuers and amount of defaulting bonds) in three periods: (1) the early 1990s, (2) from 1998 to 2001, and (3) in 2008. No such increases occurred in the REIT crisis of the mid-1970s since that event was restricted to the REIT asset class and the banking lending that supported it. Further, there was only a slight increase in bond market defaults in 1982, late in the recession of the early 1980s.

The Excess Capital Hypothesis

Stevenson[5] argued that excess capital is the alternative explanation to the episodic pattern of loan losses. Specifically, in periods of economic expansion banks lend to meet demand by creditworthy borrowers. However, once the latent demand of those borrowers is met, banks continue to lend seeking to maintain levels of interest income in their loan portfolios. To do so, lenders offer credit to weaker borrowers. Late in a lending cycle, credit standards are compromised and returns on loans fall as banks reduce the price of loans to induce demand. The shift from creditworthy borrowers to less-than-creditworthy borrowers produces an exponential increase in the risk of default, since non–investment-grade corporate borrowers have geometrically higher rates of default than investment-grade borrowers[6] and subprime retail borrowers have geometrically higher default rates than prime borrowers.[7] This

explanation of lending, overlending and defaults is the excess capital hypothesis.

Stevenson[8] demonstrated that loan losses among U.S. commercial banks (net charge-offs as a percentage of total loans and leases) exhibited a strong relationship with the amount of loans made by those banks (measured as total loans and leases issued by commercial banks divided by gross domestic product [GDP]), albeit with a one- to two-year lag. That is, as the amount of loans increased relative to GDP, the percentage of loan losses increased one to two years later. This relationship was incorporated into a regression model that showed a high level of predictive accuracy through a forecast horizon that ended in 1992.

In fact, this lagged relationship holds even through 2008. Exhibit 2 shows the relationship of loan losses (net charge-offs to loans and leases) to the levels of loans divided by GDP (loans to GDP). The cycles of loan losses are preceded by similar cycles in the relative level of indebtedness. Three examples are worth noting:

- The rise in loan losses in the mid-1970s is preceded by a rise in the level of loans to GDP in the early 1970s. Loan losses began declining in 1977 following a similar decline in loans to GDP that began in 1975.
- The steady rise in losses that began in 1981 and peaked in 1992 tracked relatively closely a similar rise in indebtedness that began in 1978 and continued through 1986. A decline in loans to GDP begun in 1987 and continuing through 1992 was followed by a sharp decline in loan losses from 1992 to 1994.
- Loans to GDP increased significantly from 1993 to 2008, reaching unprecedented levels starting in 2004. Loan losses tracked the first half of this increase, rising from 1996 through 2002, and continued in dramatic fashion from 2007 to 2009 (the subprime mortgage crisis).

Importantly, the period 2003 through 2007 reveals a decline in net charge-offs to unexpectedly low levels even though loans to GDP continue to increase. This result is inconsistent with the excess capital hypothesis so, as a potential anomaly, this decline requires explanation (see below).

Stevenson[9] determined that net charge-offs to total loans and leases could be modeled in a time-series regression using loans to GDP (loan volume or capi-

Exhibit 2. U.S. Commercial Banking Industry Loan Volume and Net Charge-offs 1970–2009
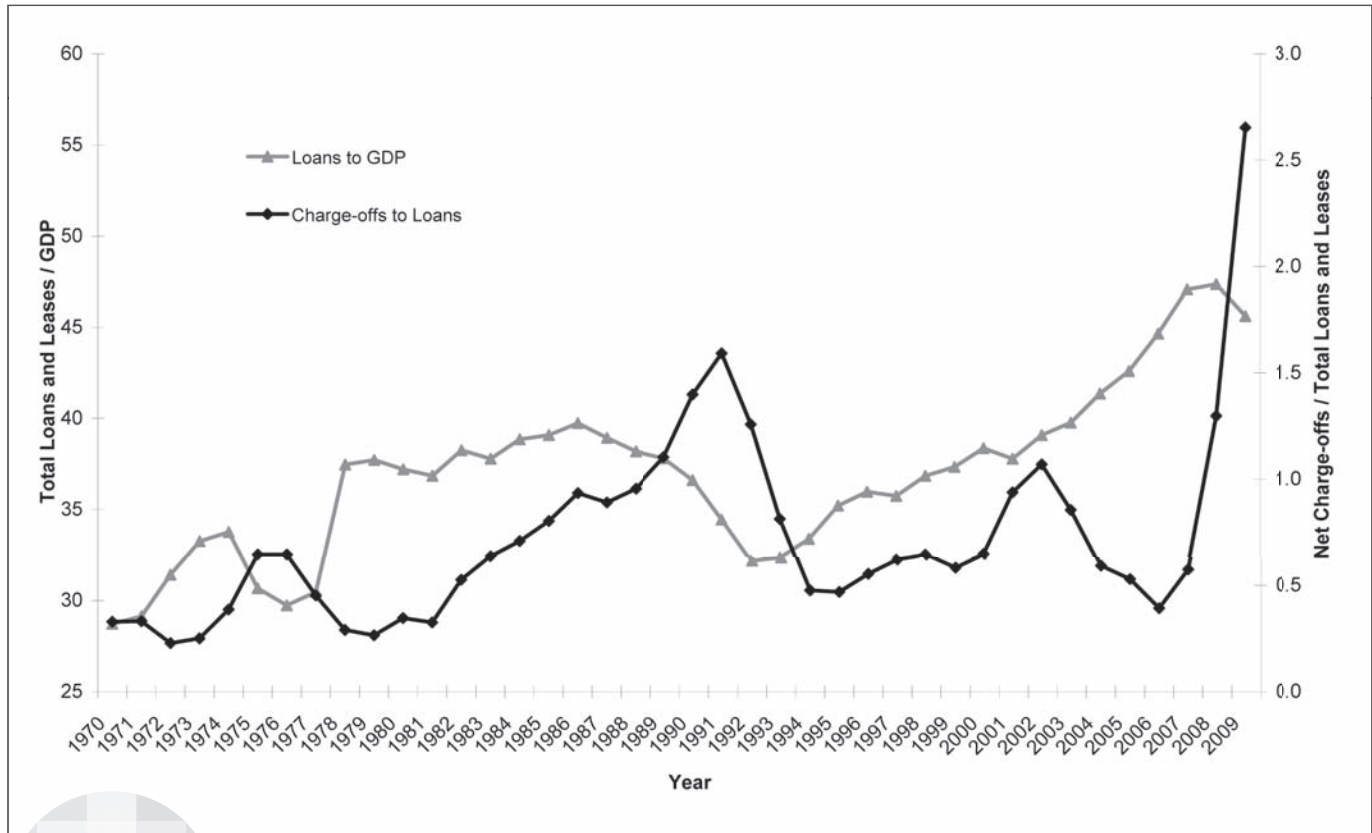
Sources: FDIC and BEA.

tal flows) and the real 10-year bond rate (inflation expectations) as predictors. This model affirmed two conclusions: (1) Loan losses are highest two to four years following a peak in loan volume, and (2) loan losses can be mitigated based on changes in long-term interest rates.

This regression model was fit to the data for the entire period 1970 to 2009 (*see* Exhibit 2), with strong results (model R-squared = 0.880; Durbin-Watson statistic = 2.06).[10] Confirmed over the larger sample, loan losses are a lagged function of excess capital in the loan market.

The excess capital hypothesis holds that, when lending occurs in excess of economic growth, loans are made to borrowers who would not receive credit in periods of normal lending activity. This overlending tends to mask poor credit characteristics, such as weak profitability,

Late in a lending cycle, credit standards are compromised and returns on loans fall as banks reduce the price of loans to induce demand.

of individual borrowers. Often, bank-supplied lines of credit are sources of capital for the weaker borrowers that support activities that cannot be justified by the borrower's own cash flow. When lending contracts (often as a result of an initial wave of defaults), the risky borrowers have few means of loan repayment other than their internally generated cash flow.

This hypothesis is based on five assumptions:

(1) In any given market at any given time, there is a finite number of creditworthy borrowers.

(2) In periods of normal capital flows, banks lend to the most creditworthy customers. Banks have a normal tolerance for losses and generally are willing lenders.

(3) As banks compete for borrowers and markets become more liquid, capital flows to increasingly

risky customers. Leverage increases for these borrowers with a concomitant increase in the risk of default and loss. Deterioration in lending and underwriting standards often occurs.

(4) Defaults emerge as a result of the elevated level of risk in the market and for individual borrowers, causing the excess capital to leave the market. As markets return to more stable levels of liquidity, loans to the most risky borrowers are not renewed, which, in turn, causes a liquidity crunch for those customers. Banks change their tolerance for risk by moving away from loans and into less risky government securities.

(5) Illiquidity contributes further to default and loss.

The assumptions of the excess capital hypothesis give rise to five predictions that can be tested:

(1) Leverage increases for borrowers during periods of liquidity and excess capital, especially among weaker borrowers.

(2) In periods of excess capital, there is a weakening of lending and underwriting standards by banks.

(3) There is a negative correlation between rates of loan growth and the level of net loan charge-offs.

(4) Banks change their tolerance for risk as charge-offs increase.

(5) As markets return to more stable levels of liquidity, loans to the most risky borrowers are not renewed, which, in turn, causes a liquidity crunch for those customers.

In the following analysis, I examine whether there is evidence to support these predictions. For each prediction, I examine each of the major credit crises in the last three decades.

Increased leverage during periods of liquidity and excess capital, especially among weaker borrowers. *Subprime mortgage crisis.* In the most intense phase of mortgage lending (2003 to 2006), there was an increased number of risky mortgages, and the weakest borrowers experienced a significant increase in leverage. Specifically, in 2001 fewer than 10 percent of outstanding mortgages were classified as nonprime (consisting of subprime and near-prime [Alternative-A, or Alt-A]) mortgages. Rapid growth of this category ensued so that, by 2006, 34 percent of all mortgage originations were nonprime.[11] At year-end 2007, nearly one-quarter of all outstanding

mortgages were either subprime (approximately 13 percent) or near prime (10 percent).

Mortgage originations followed the same pattern (Exhibit 3). The most rapid growth of newly originated subprime and Alt-A loans occurred late in the expansion of the mortgage market, notably in 2003 to 2006.[12] This growth implies an increase in riskiness since subprime loans are characterized by weaker borrowers (for example, low credit scores) and near-prime loans are characterized by riskier loan structures (for example, limited documentation).[13] As home prices began to level off in 2005, coupled with slowing house price appreciation, origination rates for subprime and Alt-A mortgages fell.[14]

Among nonprime borrowers, household leverage increased in this period. In 2001, 45 percent of subprime borrowers had less than 20-percent equity in their homes at the time they took out their mortgages. By 2006, 58 percent of mortgage originations were in this category. The increased leverage of home mortgage borrowers is a part of a trend from the 1990s.[15]

During the credit boom period of 2000 to 2006, the growth of mortgage credit was much stronger in neighborhoods in which subprime mortgages predominated than in neighborhoods in which prime mortgages predominated.[16] From 2002 to 2005, there was a negative correlation between income growth and mortgage credit growth, implying that subprime neighborhoods were becoming increasingly more levered.

Exhibit 3 also indicates that the rapid expansion of mortgage originations in the 2000s began with conventional loans. Shortly thereafter, originations for jumbo mortgages began to increase and only late in the cycle did the market move to initiating the riskier types of loans. The excess capital hypothesis holds that, in periods of economic expansion, banks lend to meet demand by creditworthy borrowers. However, once the latent demand of those borrowers is met, banks continue to lend seeking to maintain levels of interest income in their loan portfolios by shifting to less creditworthy customers. The temporal pattern in mortgage originations shown in Exhibit 3 reflects the shift from prime to subprime borrowers predicted by the excess capital hypothesis.

Mian and Sufi[17] argue that the creation of securitizations of subprime mortgages created an expansion of the credit supply that extended financing for new

Exhibit 3. Mortgage Loan Originations in the United States 1990–2008
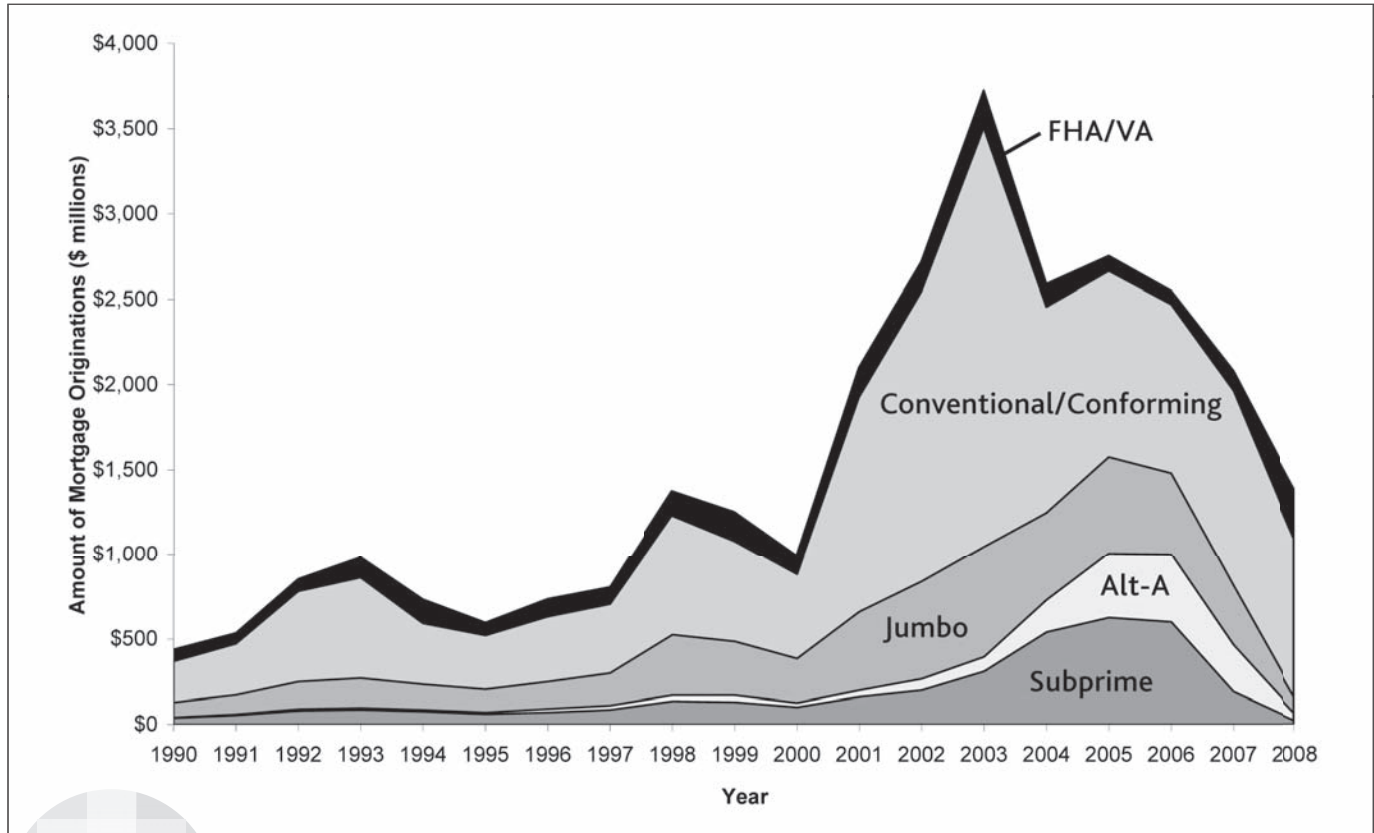
Source: Inside Mortgage Finance

home purchases to a portion of the U.S. population that previously was unable to obtain such financing. This influx of new home buyers with access to easy credit, coupled with others who were speculating in the residential mortgage markets, helped drive house prices to unprecedented levels relative to rents or disposable income. U.S. household leverage, as measured by the ratio of debt to personal disposable income, reached an all-time high, exceeding 130 percent in 2007.[18]

In periods of excess capital, there is a weakening of lending and underwriting standards. *Subprime mortgage crisis.* Mayer *et al.*[19] report that underwriting standards deteriorated in the mortgage market along several dimensions: More loans were originated to borrowers with very small down payments and more loan agreements

When lending occurs in excess of economic growth, loans are made to borrowers who would not receive credit in periods of normal lending activity.

required little or no documentation of borrower income or assets.

The median combined loan-to-value ratio for subprime purchase loans rose from 90 percent in 2003 to 100 percent in 2005, implying that in the final years of the mortgage boom more than half of borrowers with subprime mortgages put no money down when purchasing their homes. Conservative mortgage underwriting normally calls for 80 percent of a home's purchase price financed with borrowed funds and 20 percent of the market value coming from the purchaser's own equity as a down payment. Under such circumstances, the loan-to-value ratio is 80 percent.

Loan to value on mortgages has been shown to be positively correlated with foreclosure rates,

though on a lagged basis.[20] The larger the amount of debt relative to home values, the higher the level of foreclosures.

In addition, the share of loans requiring no documentation or little documentation of the borrower's ability to repay rose during the most expansive period of mortgage lending. Specifically, among Alt-A loans, the no-doc and low-doc portion grew from 62 percent in 2004 to 81 percent in 2007, with a corresponding increase in default rates; the no-doc and low-doc loans default at much higher rates than conventional mortgages or even Alt-A loans with documentation.[21]

A number of researchers argue that, in the most expansive phase of mortgage lending, feedback loops were created in which the relaxation of underwriting standards, coupled with increased lending and increased demand for housing, led to upward pressure on housing prices.[22] Mayer *et al.*[23] concluded that weakened underwriting standards, especially loans with no down payments, combined with weakening of housing prices, contributed directly to mortgage defaults.

New, more risky loan products also emerged in the mortgage boom:[24]
- **Mortgages with amortizations longer than 30 years.** As houses became more expensive, subprime borrowers may have turned to these products in an attempt to obtain more affordable monthly payments.
- **Interest-only loans.** Forty percent of Alt-A mortgages involved interest-only loans.
- **Negative amortization loans.** Another 20 percent of Alt-A mortgages allowed the mortgage balance to increase over time.

Collapse of dot-com bubble. Considerable anecdotal evidence indicates that both banks and equity investors changed their views on the fundamental characteristics of the new Internet companies that came into being in the late 1990s and that ultimately failed when the equity markets, particularly the NASDAQ, collapsed in 2000.

Leveraged buyout crisis of the late 1980s and early 1990s. During the period that the U.S. CRE market experienced explosive growth and leverage in the

In 2001 fewer than 10 percent of outstanding mortgages were classified as nonprime.

late 1980s followed by a collapse of that market in the early 1990s, there was a parallel pattern in the leveraged buyout market (LBO). This LBO era was highlighted by the corporate raiders T. Boone Pickens and Carl Icahn, the investment bank Drexel Burham Lambert and the buyout firm Kolberg Kravis Roberts.

Stevenson[25] demonstrated that, for most commercial firms, financial leverage increased in the 1980s especially among the most leveraged 25 percent of firms (bottom quartile). Profitability also declined in the 1980s, as companies struggled to make the interest payments on their debt; this decrease in profitability 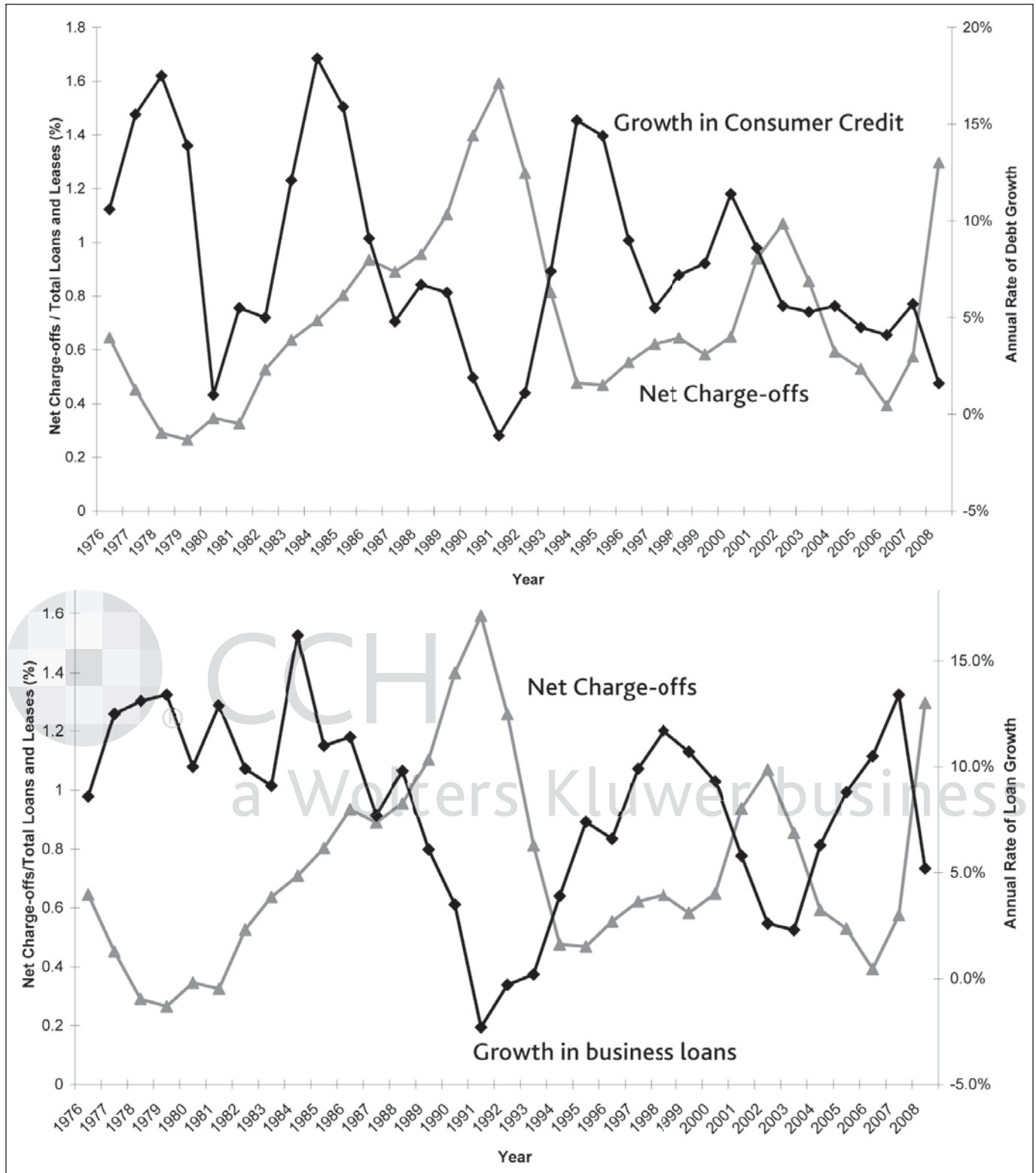was concentrated in the bottom quartile of companies. After the credit crisis at the turn of the decade, companies began to de-lever with corresponding increases in profitability. Interestingly, the most significant changes occurred among the bottom-quartile companies. Stevenson[26] concluded that the weakest companies received incremental debt capital in the 1980s, even as their profitability declined. In the 1990s, as bank-supplied capital left the market, these companies shed debt with an associated increase in profits.

There is a negative correlation between rates of loan growth and net charge-offs. The excess capital hypothesis postulates a negative correlation between the relative level of loan losses and the growth rate of debt in the market. During the period of excess capital when debt markets are most liquid and loan losses are low, capital flows to both strong borrowers and weak borrowers. The result is an extended period of loan growth and an expansion of the amount of loans outstanding. Later, when defaults and losses emerge, banks withdraw loans to the riskiest borrowers, often creating a credit crunch. In such illiquid markets, the amount of debt grows more slowly or even shrinks as banks shift away from loans. Loans outstanding stabilize or even decline.

Importantly, these patterns can be seen in the national patterns of debt, as reported in the Federal Reserve Bank's Flow of Funds report. Exhibit 4 demonstrates that there are clear cyclical patterns in the growth rate of debt in the United States. One exam-

Exhibit 4. Relationship of Loan Growth to Loan Losses 1976–2008

Exhibit 5. Correlations of Annual Growth Rates in Debt and Loan-Loss Rates 1976–2008

	Correlation of Loan Growth to Loan Losses/ GDP
Retail credit	
Consumer credit	–0.5069
Mortgages	–0.2524
Business credit	
Total business	–0.6800
Corporate	–0.5522

Note: "Corporate" refers to loans to corporations; total business refers to loans to all types of businesses, including corporations.

Sources: FDIC and BEA.

ple is consumer credit. There are striking declines in the growth rate of consumer credit at the beginning of the 1980 to 1982, 1990 to 1991 and 2008 recessions. In fact, consumer credit actually contracted in 1991 (top panel of Exhibit 4).

After the first two of these declines, consumer credit expanded significantly (specifically, from 1981 to 1985 and from 1992 to 1995). However, the growth rate of consumer credit declined steadily from 2000 through 2006 and the 2001 recession was not a notable influence. This pattern suggests that the rate of growth in consumer debt is only partly influenced by the expansion and contraction of the U.S. economy.

Instead, the growth rate of consumer credit is mirrored in reverse by the ratio of net charge-offs to GDP (top panel of Exhibit 4). As charge-offs decline, the growth rate of consumer credit increases and, as charge-offs increase, loan growth slows.

Growth of corporate debt (Total Business Loans) follows a similar pattern, although the volatility of growth rates in the late 1970s and 1980s is limited, relative to that of consumer credit (bottom panel of Exhibit 4). Here, the inverse relationship between loan growth and net charge-offs/total loans and leases is even more pronounced.

> *The excess capital hypothesis holds that this episodic pattern is consistent and predictable and that it describes each of the major credit crises in the last four decades and in the 1920s leading to the Great Depression.*

Negative correlations between the growth of debt and loan losses are reported in Exhibit 5 for four categories of loans, including the two categories shown in Exhibit 4. Only mortgages have a relatively weak association between charge-offs and loan growth.

For mortgages, loan growth was strongly positive through the 1990s and 2000s with contraction only in 2008. Thus, for a period of time, the mortgage market seemed to defy the gravitational pull of increasing loan losses. However, the explosion in defaults and foreclosures beginning in 2007 precipitated a contraction in mortgage lending that continues through 2010. Mayer *et al.*[27] (2008) reported that the decline in originations of nonprime mortgage loans coincided with this sharp rise in delinquency and foreclosure rates.

The evidence in Exhibit 4 and Exhibit 5 clearly indicates that lenders expand their portfolios in periods of low loan losses and they reduce their lending activity when losses increase, as predicted by the excess capital hypothesis.

Banks change their tolerance for risk in response to increases in loan losses. The excess capital hypothesis holds that banks become less tolerant of risk when charge-offs increase and the riskiness of loans increases. Consistent with the negative correlation between loan growth rates and net charge-offs, the excess capital hypothesis predicts that reduced investment by banks in loans in periods of high loan losses should be accompanied by higher rates of investment in less risky assets.

Treasury and agency securities carry the AAA rating of the U.S. government and are considered by most investors to be free of default risk. If there is a shift to these securities over time, it likely reflects a desire by the banks to hold these default-free securities. This shift may also be driven by a need to increase regulatory capital ratios, since government securities require less regulatory capital than loans.

Exhibit 6 shows the relationship between net loan charge-offs as a percentage of total assets and the percentage of total bank assets invested in U.S. Treasury

Exhibit 6. U.S. Commercial Banking Industry Loan Losses and Investment in U.S. Government Securities 1970–2009
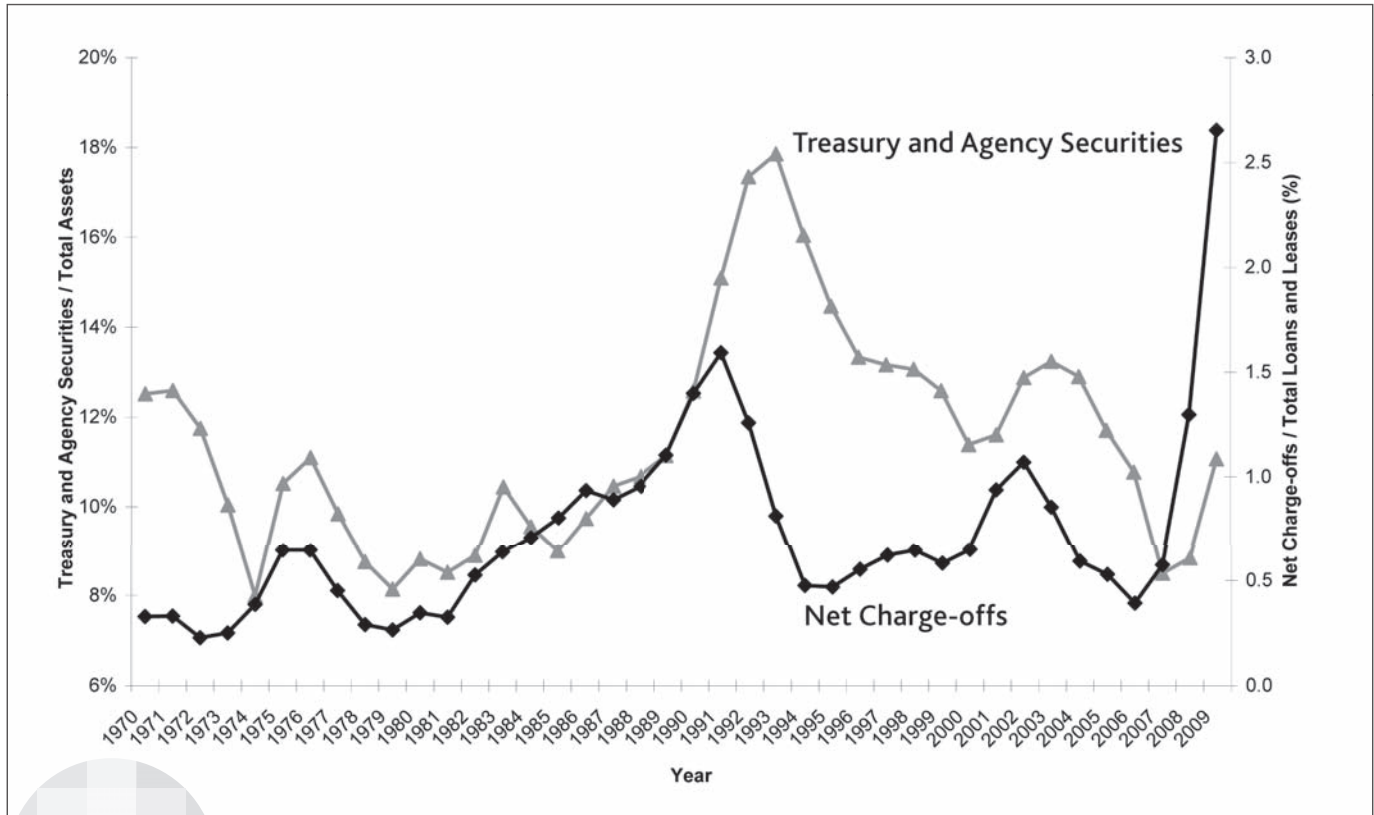
Sources: FDIC and BEA.

securities and in the securities issued by agencies of the U.S. federal government, and it gives evidence of changing risk tolerance in banks.

As charge-offs increase, banks invest in these "riskless" government securities, albeit with a lag (Exhibit 6). The four periods of sharp increases in charge-offs (1974 to 1976, mid-1980s to early 1990s, 2001 to 2003 and 2008 to 2009) coincided or led rapid shifts by banks into Treasury and agency securities. In fact, the correlation of these two variables, with a one-year lag in holdings of government securities, is 0.601, suggesting a strong positive association.

The association is not perfectly positive because banks appear to retain their aversion to risky loans well after charge-offs begin to decline. For example,

The subprime mortgage crisis and the deep economic recession that overlapped with it have striking parallels to an earlier crisis, the Great Depression.

charge-offs declined sharply from their peak in 1992. Yet, the banking industry reduced its holdings of Treasury and agency securities more slowly and retained significant investments throughout the 1990s. This pattern also was apparent in the 2000s.

CRE crisis of late 1980s and early 1990s. Browne and Case[28] noted that, during the CRE crisis in the late 1980s and early 1990s, loan losses and the resulting poor condition of bank balance sheets appear to have made banks more cautious and pushed them more toward holding government securities and away from making loans.

As markets return to more stable levels of liquidity, loans to the most risky borrowers are not renewed, which, in turn, causes a liquidity crunch for those customers. *Subprime mortgage crisis.* Mayer

et al.[29] observed that, when home prices stopped rising during the second half of the 2000s, mortgage default rates increased. This increase was followed by lenders tightening underwriting standards, including reducing commitments on home equity loans and lines of credit. As a result, borrowers with higher risk found refinancing to be more difficult, leading some to default. Such tightening was especially pronounced in states that experienced the largest run-up in house prices followed by the steepest decline in prices, including California, Florida, Arizona and Nevada.

In fact, subprime mortgage defaults and impacts of the economic recession were most pronounced in the regions that experienced the largest increases in household leverage during the mortgage boom.[30]

CRE crisis of late 1980s and early 1990s. Johnson[31] demonstrated that the reduction in loan originations by banks in 1990 was attributable to both the economic recession adversely impacting loan demand and to the banks' unwillingness to lend. Altig *et al.*[32] observed that adverse shocks to the economy can be amplified by increasing restrictiveness on the part of lenders that find their own balance sheets deteriorating and that face increasing difficulty in assessing the financial viability of potential borrowers.

The Great Depression

The data that underlie this analysis and that give rise to the excess capital hypothesis are limited to the 1970s and later. However, the subprime mortgage crisis and the deep economic recession that overlapped with it have striking parallels to an earlier crisis, the Great Depression. In fact, there is much circumstantial evidence to suggest that the excess capital hypothesis is applicable to the Depression just as it appears to apply today.

For example, Wheelock[33] demonstrates that there was a significant increase in defaults on mortgage loans during the Depression, and these defaults, as in the subprime mortgage crisis, were preceded by a period of rising home prices, extensive home building and a reliance on debt to finance home purchases. Gordon[34] suggests that speculation in real estate was widespread in the late 1920s and such speculation was supported by lax lending standards and the use of financial securities to finance construction.

During this period, as in the modern era, there was a boom in land prices in Florida accompanied by extensive construction of homes, giving rise to a housing bubble that ended with the hurricane of September 1926.[35]

Wheelock[36] highlights a number of other characteristics of the housing market of the 1920s that have striking similarities to the housing market of the 2000s:

- Rapid increases in home building, house prices and outstanding mortgage debt
- Easy-to-obtain mortgage refinancing that accompanied rising home values
- Increases in loan-to-value ratios for home mortgages[37]
- Relaxation of lending standards,[38] including home loans with terms of five years or less and often no, or only partial, payment of principal before a balloon payment was due when the loan matured or was refinanced. A survey conducted by the National Bureau of Economic Research found evidence that deterioration of mortgage underwriting criteria occurred late in the 1920s, shortly before the collapse of the housing market.[39]
- Substantial declines in home values at the end of the 1920s, after a period of rapid gains, that continued into the 1930s and that precipitated mortgage defaults and foreclosures

Thus, increases in mortgage defaults during the Depression were correlated with strong declines in house prices after a run-up in home values.[40] These defaults were more prevalent on mortgages with unconventional terms, such as short-term, nonamortizing loans. Furthermore, mortgage underwriting standards appear to have deteriorated before the downturn of the 1930s.

The Anomaly of 2003 to 2007

We return to the question above: Why does the period 2003 to 2007 show very low levels of loan losses for the U.S. banking industry even as loan growth is increasing dramatically (Exhibit 2)? The excess capital hypothesis predicts that loan losses should increase with increasing levels of loans to GDP, since the capital that is being lent is flowing to increasingly risky borrowers (*e.g.,* originations of subprime and Alt-A mortgages occurred in this period, Exhibit 3).

This period was characterized by very low interest rates. For example, the real (inflation-adjusted) 10-year bond rate was less than 2.0 percent for this entire period, well below its average in the 1980s and 1990s. In fact, the 1970s were the only other period in the modern era when the real 10-year bond rate averaged two percent or less.

In addition, asset values rose dramatically from 2003 to 2007. For example, the Standard & Poor's Index nearly doubled from its low of 848 in mid-February 2003 to its high of 1,558 in early October 2007. Home values appreciated by approximately 48 percent from the beginning of 2003 until the peak of house prices in mid-2006, and this growth was an acceleration of the long-term trend in home-value appreciation.

From 2003 to 2007, very low interest rates, coupled with rising asset values, allowed borrowers to refinance their debt and avoid the defaults that could have arisen due to the rising indebtedness in the economy. As discussed above, these three factors worked together to fuel the housing bubble: Rising demand for homes and for risky assets like stocks led to rising prices for both, and the increasing demand gave rise to higher need for debt to finance those purchases. Speculation in both the housing market and the equity market was common at this time.

This speculative bubble could not be maintained indefinitely, of course, and the contraction in the housing market, fueled by defaults, foreclosures and falling prices, ultimately spilled into the equity markets when banks dramatically slowed lending in order to nurse their balance sheets back to health. Equity investors were spooked by the collapse of Bear Stearns and Lehman Brothers in the fall of 2008.

This article describes a regression model that predicts net charge-offs to loans as a function of loans to GDP, the real 10-year Treasury bond rate and the spread of the 10-year bond rate and the fed funds rate. The predicted values of this model capture well the unexpected decline in loan losses from 2003 to 2007, indicating that low interest rates meaningfully reduce the expected level of loans implied from rising financial leverage. However, once those inflation-adjusted interest rates return to their historical average, the latent loan losses actually appear, just as they did beginning in 2007.

Credit Crises Result from Excess Debt Capital

Capital flows in the U.S. loan markets are episodic, characterized initially by periods in which loans are available to creditworthy borrowers based on prudent underwriting criteria. This beginning phase is followed by periods in which credit becomes available to more risky borrowers, underwriting standards are relaxed, and risky loan structures are introduced. As debt capital flows to these risky borrowers, their leverage and default probabilities increase. Credit crises are a direct, though lagged, function of excess debt capital that becomes available in these highly liquid markets, and these crises are triggered when the elevated default probabilities become manifest in bankruptcies and defaults. At this point, lenders typically withdraw from the markets by limiting new loan originations and cutting lines of credit, as well as shifting to U.S. government securities. The final phase occurs when banks focus on managing loan losses and preserving capital. Only when they have nursed their balance sheets back to health do banks return to active, though prudent, lending.

The excess capital hypothesis holds that this episodic pattern is consistent and predictable and that it describes each of the major credit crises in the last four decades and in the 1920s leading to the Great Depression. Importantly, the growth of loans relative to GDP offers bankers, investors and regulators a leading indicator by which they can monitor and manage the risk of future credit crises. Certainly, if a bank can avoid the excess capital phase of the lending cycle, and the corresponding extreme losses that are created in this phase, it stands a good chance of avoiding the consequences of the next credit crisis.

Endnotes

[1] B.G. Stevenson, *Capital Flows and Loan Losses in Commercial Lending,* J. COMMERCIAL LENDING, Jan. 1994, at 18–26. B.G. Stevenson, *The Tail Wags the Dog in Commercial Lending,* COMMERCIAL LENDING REV., May 2010, at 3–10.

[2] Stevenson, *Capital Flows and Loan Losses in Commercial Lending, id.*

[3] *Id.*

[4] K. Emery, S. Ou, J. Tennant, A. Matos and R. Cantor, *Corporate default and recovery rates, 1920–2008,* Moody's Investor Service, Special Comment (2009), at 1–55.

[5] Stevenson, *supra* note 2; B.G. Stevenson, *Capital Flows and the Cycles of Losses in Commercial Real Estate,* REAL ESTATE REV. Feb. 1995, at 34–42.

[6] Emery *et al., supra* note 4.

[7] Y. Demyanyk, *Did Credit Scores Predict the Subprime Crisis?* REGIONAL ECONOMIST, October 2008, at 12–13.

[8] Stevenson, *supra* note 2

[9] *Id.*

[10] In addition to the two predictors in the earlier model, the updated version also includes the spread between the nominal rate on the 10-year Treasury bond and the nominal rate on fed funds. This spread widens in credit crises when the Federal Reserve pumps liquidity into the banking system causing short-term interest rates to fall.

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[20] Elmer & Seelig, *supra* note 15.

[21] Mayer *et al., supra* note 12.

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