



Economic Letter

Current Account Surplus May Damp the Effects of China's Credit Boom

by J. Scott Davis, Adrienne Mack, Wesley Phoa and Anne Vandenabeele

ABSTRACT: In contrast to similar credit expansions in the euro periphery in the 2000s and East Asia in the 1990s, China's credit boom is far less likely to end in a dramatic bust because it's financed by domestic savings.

Analysts and the financial press have scrutinized the buildup of private sector borrowing in China over the past few years. Debt accumulation seems eerily familiar to what occurred in past credit booms, most notably in the euro zone periphery in the mid-2000s and in East Asia a decade earlier.

There was no buildup of leverage in China prior to the global financial crisis in 2008, though there was a rapid rise in leverage afterward, mainly the result of government investment-led stimulus efforts that drove China's post-crisis recovery. The major banks in China are state owned, and the government directed them to increase lending in the dark days of the global financial crisis to drive a credit-fueled investment-led recovery.

At the time of Lehman Brothers' September 2008 collapse, which partially precipitated the global financial crisis, the ratio of private nonfinancial credit to gross domestic product (GDP) in China was 110 percent. Five years later, the ratio was 178 percent, greatly exceeding financial crisis levels experienced in the euro zone periphery, where it rose from 113 percent in 2003 to 160 percent of GDP in 2008.

Over that same period, the ratio of private nonfinancial credit to gross GDP in the U.S. rose from 141 percent to 168 percent, while in the core of the euro zone, the ratio increased from 138 percent to 142 percent (*Chart 1*).

Previous Financial Crises

The ratio of private sector credit to GDP in China has increased 67 percentage points since 2009 (*Chart 2*). This ratio has grown less than 3 percentage points in the rest of the world since then.¹

Periods of rapid credit expansion in recent decades have often been followed by financial upheaval. *Chart 2* also presents credit growth in the countries involved in the East Asian financial crisis in the 1990s. Over the five years preceding that crisis, the credit-to-GDP ratio increased 38 percentage points.² Meanwhile, in the rest of the world, credit growth was less than 5 percentage points.

Similarly, in the five years leading up to the global financial crisis, the private sector credit-to-GDP ratio in the U.S. grew 27 percentage points, the ratio in the U.K. expanded 25 percentage points and the ratio in the euro zone periphery swelled 47 percentage points. By comparison, euro zone core private sector credit grew 4 percentage points between 2003 and 2008.

At first glance, it may seem as if China is heading for the same type of disaster that befell the euro zone periphery. But there is one major difference between China today and these past episodes. The past credit booms all occurred in countries running a current account deficit, meaning the credit boom was financed from foreign borrowing. China, conversely, is running a current account surplus, meaning that China's credit boom is financed from domestic savings.

Importance of the Current Account

Researchers can quantify the effect of this credit growth on the probability of a banking crisis. The statistical or model approach is particularly useful since other potential determinants of a banking crisis can be factored into the analysis.

To gauge the impact of a high rate of credit growth on the probability of a subsequent banking crisis, we use data for a large panel of countries to model the incidence of banking crises, controlling for a range of economic factors as well as the growth in credit.

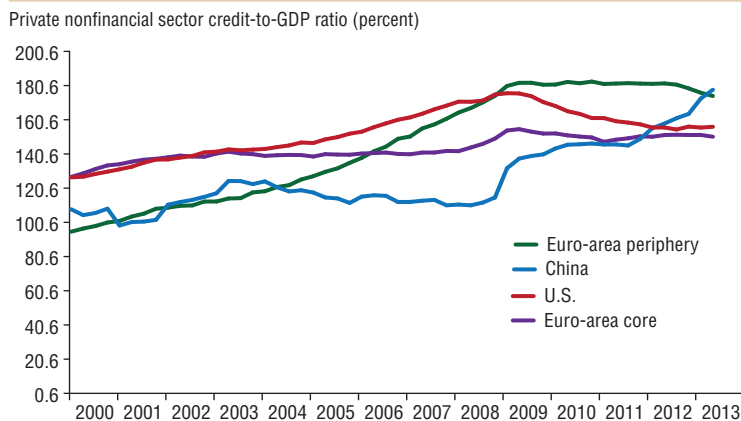
Specifically, we consider statistical relationships. We regress a variable for the incidence of a banking crisis in a given year and a given country on that country's excess credit growth over the previous five years and other country-specific variables. These variables include the current account surplus or deficit (whether the country is a net creditor or debtor) as a ratio of GDP, the output gap (the difference between what a country produces and its theoretical potential), the inflation rate and whether the country has a fixed or floating currency.

The estimated credit-to-GDP coefficients from this regression may be interpreted as the "marginal effect" of an increase in the credit-to-GDP ratio on the probability of a banking crisis—that is, an estimate of the change in the probability of a banking crisis resulting from a 1 percentage-point increase in the private sector credit-to-GDP ratio.³

Two scenarios for estimating the effect of credit growth on the probability of a banking crisis may provide insight.

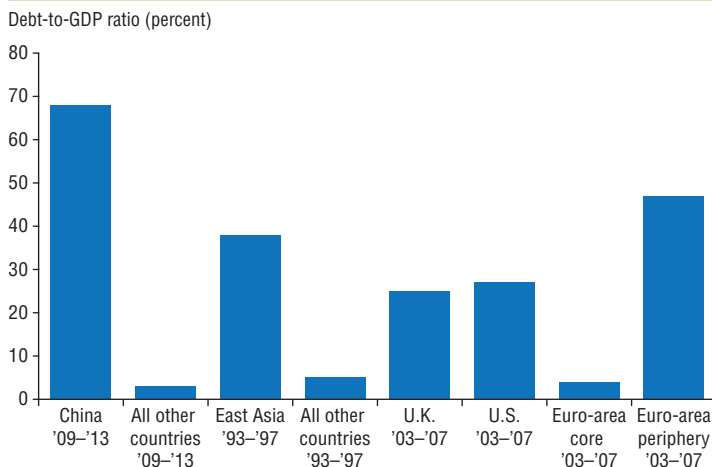
In the first, there is no interaction between credit growth and a country's current account surplus or deficit. Credit growth is just as likely to lead to a crisis

Chart 1 Private Sector Credit as a Share of China's GDP Jumps



SOURCES: "How Much Does the Private Sector Really Borrow—A New Database for Total Credit to the Private Non-Financial Sector," by Christian Dembiermont, Mathias Drehmann and Siriporn Muksakunratana, Bank for International Settlements *Quarterly Review*, March 18, 2013; Haver Analytics; authors' calculations.

Chart 2 China's Private Sector Debt Increase Outpaces Rest of World



SOURCES: "How Much Does the Private Sector Really Borrow—A New Database for Total Credit to the Private Non-Financial Sector," by Christian Dembiermont, Mathias Drehmann and Siriporn Muksakunratana, Bank for International Settlements *Quarterly Review*, March 18, 2013; Haver Analytics; authors' calculations.

whether that credit was financed at home or abroad.

In the second specification, the possibility of an interaction between credit growth and the current account is permitted and may produce different results depending on whether the current account is in surplus or deficit. By allowing for this interaction, the marginal effect becomes a function of a country's current account balance.

The current account is equal to domestic savings minus domestic investment, so if the current account is in surplus, domestic savings can more than

finance any domestic investment. If it is in deficit, domestic savings are insufficient to finance domestic investment, and foreign borrowing is necessary. Previous crisis episodes suggest that domestic savings tends to be a more stable form of financing than foreign borrowing. Foreign lenders are much more likely to withdraw their financing and refuse to roll over existing debt, and thus the possibility that high credit growth may frighten investors and trigger a run on a country's financial system is much more likely when credit growth depends on foreign financing.

Banking Crisis Risk

Estimates of the marginal effect of credit growth on the probability of a banking crisis under these two specifications are presented in Chart 3. When interaction between credit growth and the current account isn't allowed, the effect is constant and equal to 0.14—in other words, a 10 percentage-point increase in the credit-to-GDP ratio over a five-year period should raise the probability of a banking crisis by about 1.4 percentage points.⁴

When interaction between credit growth and the current account is allowed, the marginal effect varies negatively with a country's current account balance. It is smaller in countries with a current account surplus and higher in countries with a current account deficit.

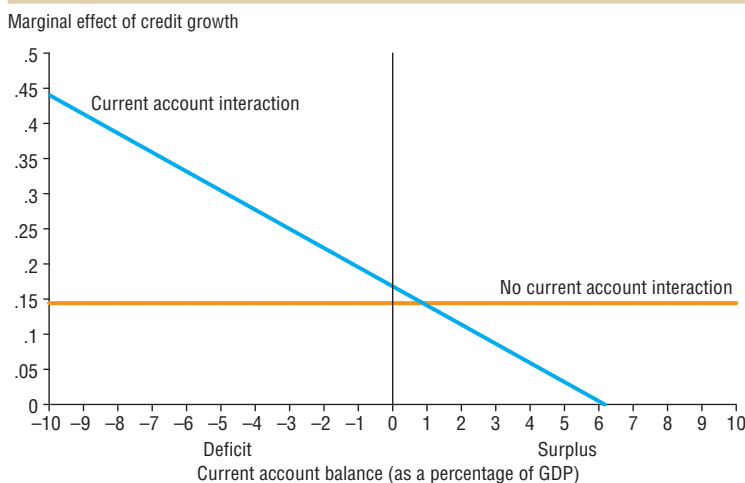
For a country with a balanced current account, the estimated marginal effect is around 0.16. For a country with a current account surplus of 5 percent of GDP, this marginal effect is only 0.03, but for a country with a current account deficit of 5 percent of GDP, it is around 0.30—a 10 percentage-point increase in the credit-to-GDP ratio over a five-year period should raise the probability of a banking crisis by about 3 percentage points.⁵

Thus, the estimates from this statistical model suggest that a credit boom financed from domestic savings is much less likely to end in a banking crisis than a credit boom financed from foreign borrowing.

Growth of the private sector credit-to-GDP ratio, the previous year's current account balance (as a percentage of GDP) and the estimated effect of that credit growth on the probability of a crisis are shown in Table 1. The impact is calculated under two specifications, with and without an interaction between credit growth and the current account.

The euro zone periphery countries that experienced growth in the private sector credit-to-GDP ratio of 47 percentage points before the financial crisis also ran a current account deficit of 5 percent of GDP in 2006. Without allowing for an interaction between credit growth and the current account, each percentage point of credit growth should have increased the probability of a banking crisis by 0.14 percentage points. If that marginal effect is multiplied by the 47 percentage points

Chart 3 Probability of Crisis Grows as Current Account Falls into Deficit



SOURCES: "How Much Does the Private Sector Really Borrow—A New Database for Total Credit to the Private Non-Financial Sector," by Christian Dembiermont, Mathias Drehmann and Siriporn Muksakunratana, Bank for International Settlements *Quarterly Review*, March 18, 2013; Haver Analytics; authors' calculations.

Table 1 Probability of Banking Crisis in China Is Low

	Credit growth (in percentage points)	Current account balance (as a percentage of GDP)	Effect of credit growth on the probability of a crisis (in percentage points)	
			No current account interaction	With current account interaction
East Asia, 1993–97	38.2	-4.4	+5.3	+10.7
U.S., 2003–07	27.3	-5.8	+3.8	+8.7
U.K., 2003–07	24.9	-2.8	+3.5	+6.0
Euro core, 2003–07	4.1	+3.6	+0.6	+0.3
Euro periphery, 2003–07	47.4	-5.2	+6.6	+14.2
China, 2009–13	67.6	+2.6	+9.5	+6.1

SOURCES: "How Much Does the Private Sector Really Borrow—A New Database for Total Credit to the Private Non-Financial Sector," by Christian Dembiermont, Mathias Drehmann and Siriporn Muksakunratana, Bank for International Settlements *Quarterly Review*, March 18, 2013; Haver Analytics; authors' calculations.

of credit growth, that credit growth should have increased the probability of a crisis in the euro zone periphery by 6.6 percentage points. However, when the model includes an interaction between credit growth and the current account, the estimated marginal effect is 0.30—in this instance, 47 percentage points of credit growth raised the probability of a crisis by 14.2 percentage points.

China has experienced more growth in the private sector credit-to-GDP ratio in the past five years than did the euro zone periphery between 2002 and 2007, the table shows. If we did not take into

account the interaction between credit growth and the current account, China's recent credit would raise the probability of a crisis by 9.5 percentage points.

However, China has a current account surplus of over 2 percent of GDP. When accounting for the effect of this surplus, each additional percentage point of credit growth in China should only lead to a 0.09 percentage-point increase in the probability of a crisis. Thus, according to these estimates, China's credit boom should have raised the estimated probability of a crisis by only 6.1 percentage points.

Possible Instability Sources

These results suggest that credit growth and the extent to which it is financed abroad affect the probability that a country will face a banking crisis. China, unlike most countries that experienced banking crises in recent years, has a current account surplus that makes its credit boom less dangerous. The model of banking crises predicts that the effect of credit growth on the likelihood of a crisis should depend on whether that credit growth is financed at home or abroad.

It also suggests that each additional percentage point of credit growth in China should raise the likelihood of a banking crisis by about 0.16 percentage points. Credit growth is estimated to have boosted the probability of a banking crisis by more than 6 percentage points in 2013.

However, the probability of a banking crisis is rising due to the recent acceleration in leverage and the deterioration in China's current account surplus. The surplus has fallen steadily from its peak of 10 percent of GDP in 2007 to about 2 percent in 2013. Should the current account go into deficit, the probability of a banking crisis will increase significantly. This suggests that while a banking crisis may not be imminent, the risk of financial instability in China is rising.

Davis is a senior research economist and Mack was a senior research analyst in the Research Department of the Federal Reserve Bank of Dallas. Phoa is a partner and portfolio manager, and Vandenabeele is an economist at Capital Group Cos.

Notes

¹ The rest of the world includes Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Italy, Japan, Malaysia, Mexico, the Netherlands, Norway, Poland, Portugal, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, the U.K. and the U.S. Data on the stock of private nonfinancial sector credit are available from the Bank for International Settlements and described in "How Much Does the Private Sector Really Borrow—A New Database for Total Credit to the Private Non-Financial Sector," by Christian Dembiermont, Mathias Drehmann and Siriporn Muksakunratana, Bank for International Settlements *Quarterly Review*, March 18, 2013.

² East Asia refers to a GDP-weighted average of Indonesia, Malaysia, Singapore, South Korea and Thailand. The euro-area core refers to Austria, Belgium, Finland, France, Germany and the Netherlands; the euro-area periphery refers to Greece, Ireland, Italy, Portugal and Spain.

³ Banking crises are fairly rare events. The unconditional probability of a banking crisis in our dataset is 4 percent. Additionally, crises are driven by many factors that are outside the reach of this or any other statistical-based predictor model. However, models can still be effective for measuring the probability of a crisis and the effect of certain

variables on the probability of a crisis, as shown by diagnostic tests in "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008," by Moritz Schularick and Alan M. Taylor, *American Economic Review*, vol. 102, no. 2, 2012, pp. 1029–61.

⁴ This estimated marginal effect of credit growth is similar to that found in Schularick and Taylor. See note 3.

⁵ The details about these regressions can be found in "Credit Booms, Banking Crises, and the Current Account," by J. Scott Davis, Adrienne Mack, Wesley Phoa and Anne Vandenabeele, Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 178, May 2014. The regressions are run using a panel of 35 countries. The data for most of the developed countries in the sample start in the 1970s; the data for China begin in 1985. The results presented here are specifically those from the linear probability (OLS) model in Table 8.

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