

Anatomy of a Financial Crisis

By Marina Azzimonti

Historically, financial crises have been more prevalent in emerging economies. Yet, recent developments in the European Union remind us that developed economies are not immune to such crises. In exploring the current episode, there is much we can learn from crises that have occurred around the world during the past few decades. Viewed through this comparative lens, we see that there is a distinct anatomy to a financial crisis. This article will investigate the reasons behind financial crises and how they unfold. It is important to gain insight into this pattern so we can design mechanisms to prevent these crises.

In this article, we will look at case studies — Latin America in the 1980s, Nordic countries in the early 1990s, and Southeast Asia in the mid-1990s — to show how credit booms and busts have triggered banking, sovereign debt, and currency crises. We summarize key stylized facts that characterize crises and their evolution. We show that key economic and financial variables in certain European countries today — Portugal, Ireland, Italy, Greece, and Spain — follow a similar pattern. The analysis suggests that the ongoing European financial crisis shares several aspects with these previous crises, indicating that their experience is not unprecedented.

The timeline of a typical financial crisis is illustrated in Figure 1. First, we observe a *credit boom* characterized by a rapid buildup of indebtedness, or *leverage*, in the private sector. This is usually followed by a *credit bust*, resulting in *sudden stops*, or large reversals in the current account, deep recessions, and collapses in real asset prices. The resulting large ratio of nonperforming assets — bad debt — may trigger a *financial crisis*.¹

Figure 1: Timeline of a Financial Crisis



The essence of a financial crisis is a *banking crisis*.² A banking crisis is characterized by banking system bailouts, and, in more extreme cases, bank runs. Because these nonperforming assets tend to be absorbed by

¹ A country's current account includes the value of its imports and exports of goods and services, returns on foreign investments, and any international aid or transfers by individuals such as foreign workers sending money back home.

² See Schwartz (1986).

the public sector — either through market purchases or by nationalizing banks under stress — public debt-to-output ratios increase sharply.

This sharp increase in government indebtedness often triggers a *sovereign debt crisis* followed by debt restructuring or sovereign default, or both. As Figure 2 illustrates, there is a feedback effect between banking crises and sovereign debt crises. This happens because the value of the government's own bonds declines when it issues more bonds to finance a bank bailout: Investors foresee that the government is less likely to repay its obligations and so they demand a higher interest rate to compensate for the increased riskiness of the government's bonds.³ Meanwhile, the resulting decrease in the value of existing government bonds worsens the balance sheets of banks, requiring the government to inject even more money to shore up the banks.

Because governments caught in this situation have a hard time raising revenue by collecting taxes or issuing new bonds, they often print more money — known as the “inflation tax” — or cut spending by defaulting on their existing bonds. Foreign and domestic investors react to sovereign default by questioning whether the government has enough reserves to defend the country's exchange rate, causing a *currency crisis* and a large devaluation of the country's currency.⁴ Notice that there is also a feedback loop between currency crises and sovereign default crises: A sudden depreciation increases government liabilities that are denominated in foreign currency. It also raises the debt service cost to banks, furthering the banking crisis.

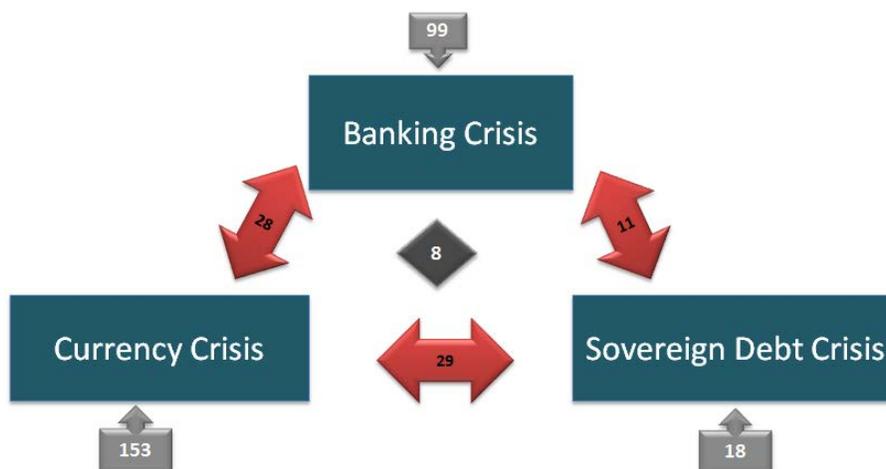
While banking crises are at the core of financial crises, they tend to be accompanied by a currency or debt crisis (creating a *twin crisis*) or by both a currency crisis and a debt crisis (a *triplet crisis*). Figure 2 shows the number of twin (arrows) and triplet (central diamond) crises observed around the world between 1970 and 2012.⁵ Triplet crises are rare, occurring in only 2 percent of the cases (eight cases in the whole sample). Among twin crises, those involving currency crises are the most common.

³ See Burcu Eyigungor's 2013 *Business Review* article.

⁴ Countries that try to maintain a fixed exchange rate pegged to a foreign currency must defend this parity by buying or selling the foreign currency whenever market demand changes. For more on currency crises see www.frbatlanta.org/filelegacydocs/ACF91.pdf.

⁵ See Laeven and Valencia (2012).

Figure 2: Twin and Triplet Crises



Source: Laeven and Valencia (2012).

Banking crises tend to precede currency and sovereign debt crises.⁶ In their 2012 study, Luc Laeven and Fabiàn Valencia show that within three years of their onset, about 21 percent of banking crises are followed by a currency crisis, whereas 11 percent of banking crises are concurrent with or followed by a sovereign debt crisis.

CREDIT CYCLES AND DEBT DEFLATION THEORY

Ever since the Great Depression, abundant research has been devoted to analyzing the fundamental causes and remedies of economic crises. The particular theory that links the various stages of a typical crisis is one that emphasizes the role of debt deflation and dates back to Irving Fisher:

“...in the great booms and depressions, each of the above named factors (over-production, under-consumption, over-capacity, price-dislocation, over-confidence, over-investment, over-saving, over-spending etc.) has played a subordinate role as compared with two dominant factors, namely, over indebtedness to start with and deflation following soon after;... disturbances in these two factors will set up disturbances in all, or nearly all, other economic variables.”

According to Fisher’s theory, if an economy is overly indebted, even a mild shock to confidence can lead to debt liquidation. This selloff causes nominal interest rates on safe loans to decline and interest rates on unsafe loans to rise, which in turn triggers distress selling. The resulting contraction of deposits (as bank loans are paid off) slows down the velocity of money circulation. As this sequence cascades across the economy, it leads to a fall in the price level, or deflation. Real interest rates, which are defined as the

⁶ See Kaminsky and Reinhart (1999) and Reinhart and Rogoff (2011).

difference between nominal interest rates and the inflation rate, increase when the economy experiences deflation. In addition, distress selling intensifies, increasing the burden of debt and eroding households' and firms' net worth, which can trigger bankruptcies. For firms, lower profits or higher losses result in more debt liquidation and a reduction in the volume of stock trading. Eventually, these effects curtail real economic activity: Construction, output, trade, and employment all fall, leading to even more pessimism and hoarding. The potential for bank runs induces banks to curtail credit and sell investments, leading to bank failures, growing general distrust, and further deflation, which Fisher referred to as a "swelling of the dollar:"

"Each dollar of debt still unpaid becomes a bigger dollar, and if the over-indebtedness with which we started was great enough, the liquidation of debts cannot keep up with the fall of prices which it causes. In that case, the liquidation defeats itself. While it diminishes the number of dollars owed, it may not do so as fast, as it increases the value of each dollar owed. Then, the very effort of individuals to lessen their burden of debts increases it, because of the mass effect of the stampede to liquidate in swelling each dollar owed."

The downward spiral Fisher described can start even in the presence of inflation, as long as the inflation rate drops unexpectedly. Suppose that a borrower, expecting inflation to be 2 percent for a long time, takes out a loan with a 6 percent interest rate. If inflation suddenly falls to 1 percent, the real interest rate he faces increases from 4 percent to 5 percent, raising his burden of debt. A similar thing could happen with "asset deflation." If house prices are expected to increase 10 percent per year, a homebuyer may be willing to take out a mortgage with little or no down payment, as the value of the loan will soon be lower than the value of his home.⁷ A bank is willing to lend this amount because the likelihood of repayment in this scenario is high. If house prices instead drop 10 percent, the house will quickly be worth less than the loan, putting both borrower and lender at higher risk of bankruptcy.

Where does the initial buildup of debt come from? According to Fisher, the most common cause appears to be "new opportunities to invest at a big prospective profit, such as new inventions, new industries, developments of new resources, opening of new lands, or new markets." More recent theories have suggested that increased leverage ratios resulted from financial liberalization (in which countries received large capital inflows from abroad) and the sophistication of financial markets. A main feature of Fisher's debt-deflation process is that individual borrowers, lenders, and companies do not factor in the effects of their actions on the overall economy and prices. This creates a "pecuniary externality" which, as pointed out by Enrique Mendoza, may amplify the effects of standard booms and recessions and may lead to deep

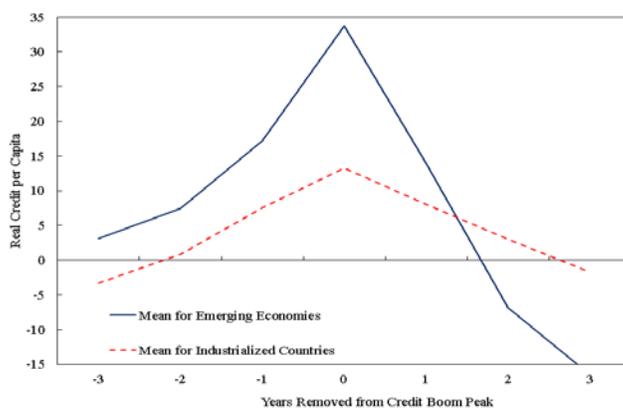
⁷ For a discussion of the role of mortgage lending in housing cycles, see Leonard Nakamura's 2014 *Business Review* article.

recessions and crises. Their main characteristics and transmission channels will be described in detail in the following sections.

Stage 1: Credit Boom. A credit boom, as defined by Mendoza and Terrones, is an episode in which credit to the private sector grows significantly above its long-run trend.⁸ They develop a method that identifies and measures credit booms using data from 40 emerging markets and 21 industrialized countries between 1960 and 2010. They identify 70 credit boom episodes in their sample, half in each group of countries. These events generally followed surges in capital inflows, productivity gains, and financial reforms, and were far more common in economies with managed exchange rates than in those with flexible exchange rates. For example, emerging economies during the 1980s and 1990s liberalized capital markets, attained price stabilization, and privatized public companies. These reforms attracted large inflows of capital, particularly in the form of foreign direct investment. In the United States, financial innovation in the mid-1980s lowered borrowing costs. Easy access to credit at low rates resulted in a large expansion of domestic credit.

Mendoza and Terrones identify a set of common factors that characterize credit booms. First, booms tend to be much more pronounced in emerging markets than in industrialized countries. This difference can be seen in Figure 3, which depicts cross-country averages of the cyclical component of real credit per capita over the three years before and three years after the peak year of a credit boom. Real credit per capita in emerging markets is about 30 percent above its normal trend at the peak, while the increase in industrialized countries is less than half that number.

Figure 3: Credit Booms Much Greater in Emerging Markets



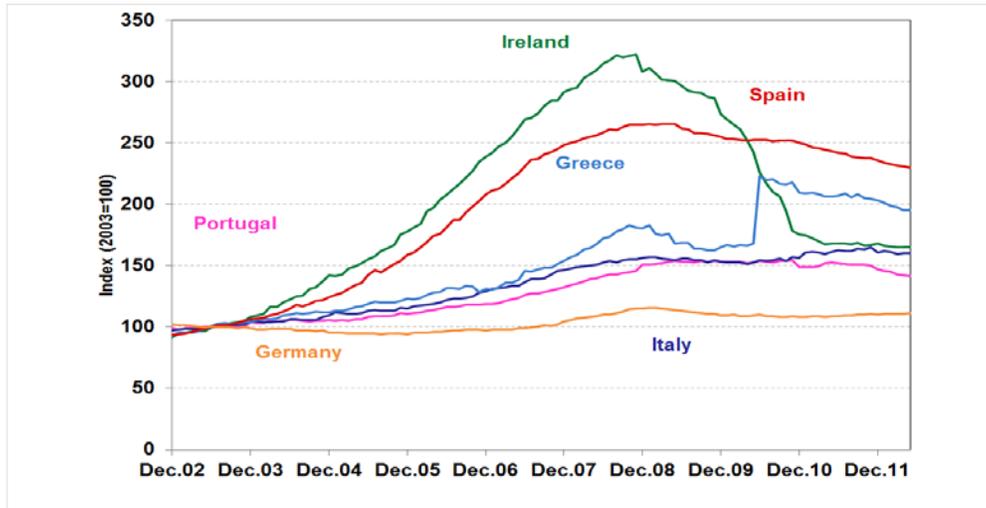
Source: Mendoza and Terrones, 2012

A similar pattern can be observed in Portugal, Ireland, Italy, Greece, and Spain, which experienced a credit boom during the early 2000s. Price stabilization and the convergence of nominal and real interest rates upon

⁸ See Mendoza and Terrones (2012).

their entrance to the European Union reduced their governments' borrowing costs (to Germany's rates). This lower cost resulted in a sharp increase in credit to nonfinancial firms, depicted in Figure 4, most noticeably in Ireland, Greece, and Spain. Germany's credit levels, on the other hand, remained basically unchanged.

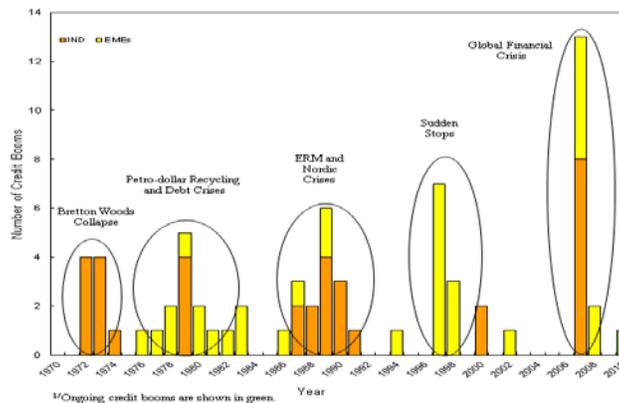
Figure 4: Credit to Nonfinancial Institutions Index (2003=100)



Source: Haver Analytics.

A second characteristic of credit booms is that they tend not to be limited to a single country and tend to be clustered geographically. Third, their timing is synchronized internationally around “big events” such as the Southeast Asian crisis, the sudden stops in Latin America, and the Nordic crisis, as shown in Figure 5. As might be expected given its severity, the 2008 global financial crisis coincides with the largest number of credit booms in the sample.

Figure 5: Credit Booms Often Occur in Clusters



Source: Mendoza and Terrones (2012).

Mendoza and Terrones document that at the firm level, low interest rates observed during a credit boom foster investment and reduce the cost of working capital, which results in an economic expansion.

This expansion fosters private and public consumption due to positive wealth effects. Credit booms are not associated with spikes in inflation, but housing and stocks show a clear pattern of rising prices, as. The real exchange rate — which tells us how many times more goods and services can be purchased abroad (after being converted into foreign currency) than in the domestic market — appreciates as well.

During the process, all sectors become more leveraged. Banks' ratios of capital adequacy and nonperforming loans rise, and the current account worsens as the country borrows more from abroad to finance the growing demand for imports during the buildup period.⁹ Procyclical movements in firm-level indicators of leverage, firm values, and use of external financing are also observed.

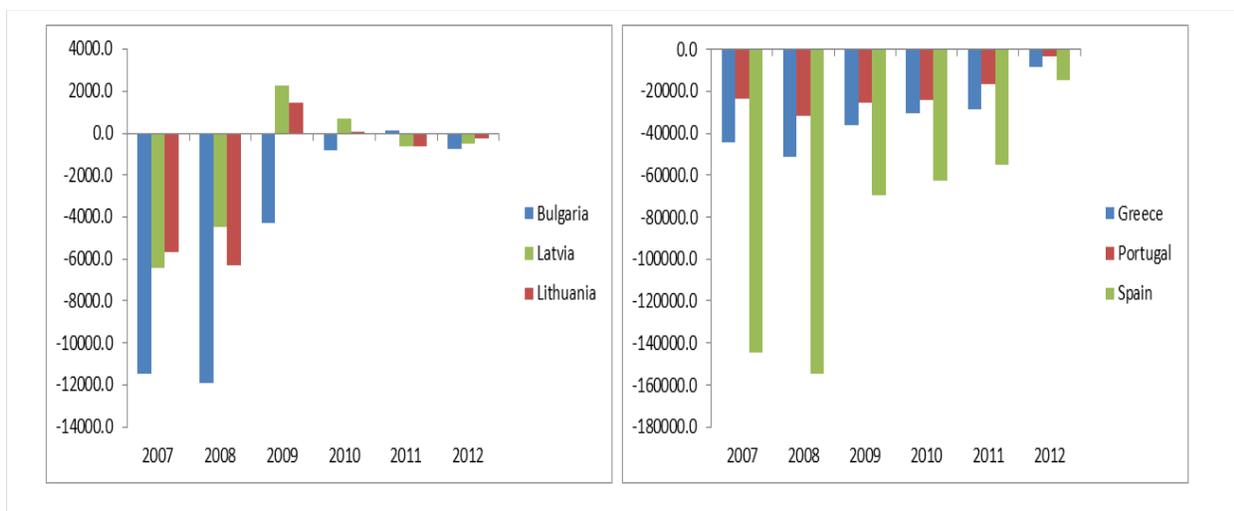
Stage 2: Credit Bust. The second phase of a credit cycle is a credit bust, when credit contracts more than during a typical business cycle. This contraction is abrupt and has important consequences for a country's current account. Foreign credit dries up, and large reversals in the country's current account — that is, the current account abruptly switches from negative to positive— or *sudden stops* are observed. For example, Mexico suffered a current account reversal of 5.2 percent of output in one just quarter as a result of the “Tequila crisis” in 1995. During the Korean and Russian credit crises, these countries experienced reversals of 11 and 9.5 percentage points of output, respectively. The sudden stop phenomenon was observed not only in emerging economies such as Argentina during the 1990s but also in industrialized countries such as Sweden during the Nordic.

During the 2008 financial crisis, Portugal, Greece, and Spain experienced the largest contractions in credit among the peripheral European countries, as we saw in Figure 4. Yet, as Figure 6 shows, they did not suffer current account reversals (right panel), in sharp contrast with Latvia, Bulgaria, and Lithuania (left panel).

Restricting our attention to the current accounts in the European case, however, can be misleading. As noted by Silvia Merler and Jean Pisani-Ferry, the decline in private inflows has been offset by transfers from the rest of the EU through the so-called TARGET2 system. As seen in Figure 7, Germany has a large TARGET2 claim (assets), while southern Europe and Ireland's national central banks have equally large TARGET2 liabilities. In other words, most of the European Central Bank's newly created money ended up in Germany.

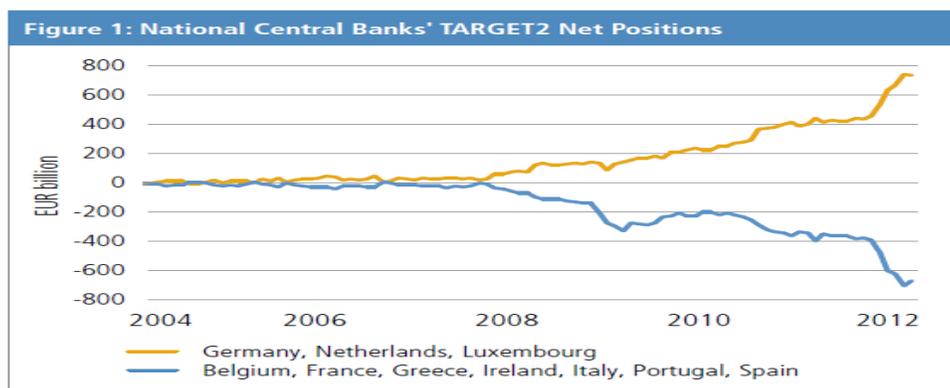
⁹ The capital adequacy ratio reflects the minimum amount of capital that a regulator requires a bank to hold as a percentage of its weighted assets. See www.federalreserve.gov/bankinforeg/topics/capital.htm.

Figure 6: Current Accounts Outside and Within Euro Area



This is a strong signal of “capital flight,” in which assets and money flow out of a country as a result of an event of economic consequence such as changes in fiscal policy or loss of confidence in the country’s growth prospects.

Figure 7: Capital Flight Evident in TARGET2 Positions



Source: Bundesbank, Banco de Portugal, Central Bank & Financial Services Authority of Ireland, Banca d’Italia, Bank of Greece, Banco de España, De Nederlandsche Bank, Banque Nationale de Belgique, Banque de France, Banque centrale du Luxembourg, PIMCO

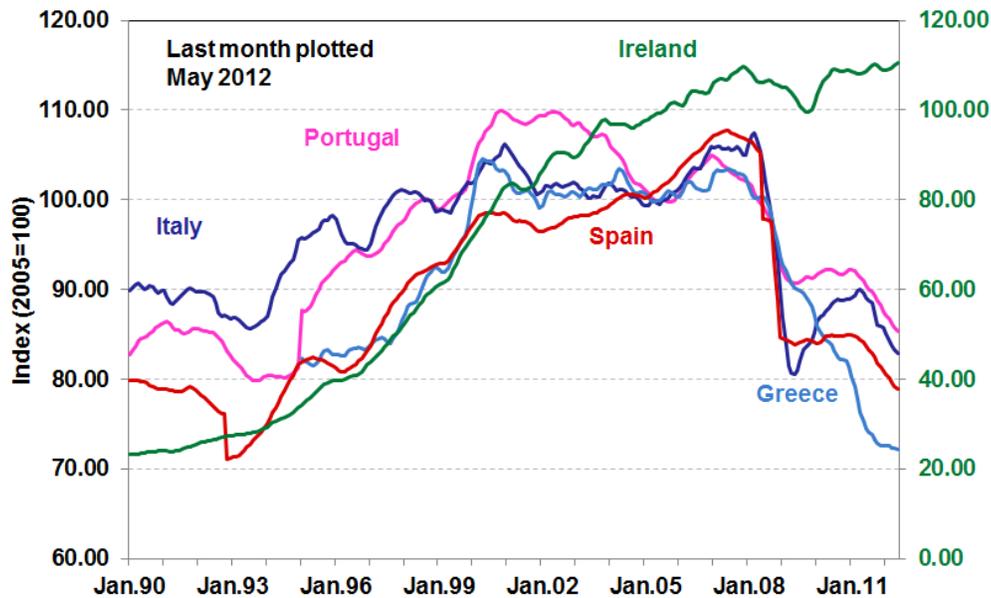
Merler and Pisani-Ferri decompose private inflows from TARGET2 liabilities for the peripheral European countries. Their analysis shows that Ireland, Portugal, and Greece’s credit bust was probably caused by a sudden stop, since private inflows declined significantly in 2008. Interestingly, the decline in private inflows started in Greece before the Lehman episode.¹⁰

¹⁰ The failure of the U.S. investment house Lehman Brothers in September 2008 — which was followed by widespread deleveraging, asset write-downs, elevated risk aversion, and severe credit market disruptions — is often regarded as the event that tipped the global financial system into full-blown crisis.

Besides capital flight, another important consequence of a credit bust is a deep recession. During Mexico's credit crisis, industrial output fell nearly 10 percent, and consumption declined 6.5 percent. Argentina's real national income per capita fell 6 percent between 2000 and 2001. GDP in Sweden and Finland declined sharply relative to the trend observed in OECD countries during the Nordic crisis.

European countries also suffered a marked recession during their credit bust, as shown in Figure 8 by the sharp decline in industrial production in 2008. The Spanish industrial production index fell 7 percent from May to June 2008 and 20 percent by May 2009, while in Italy it fell 23 percent.

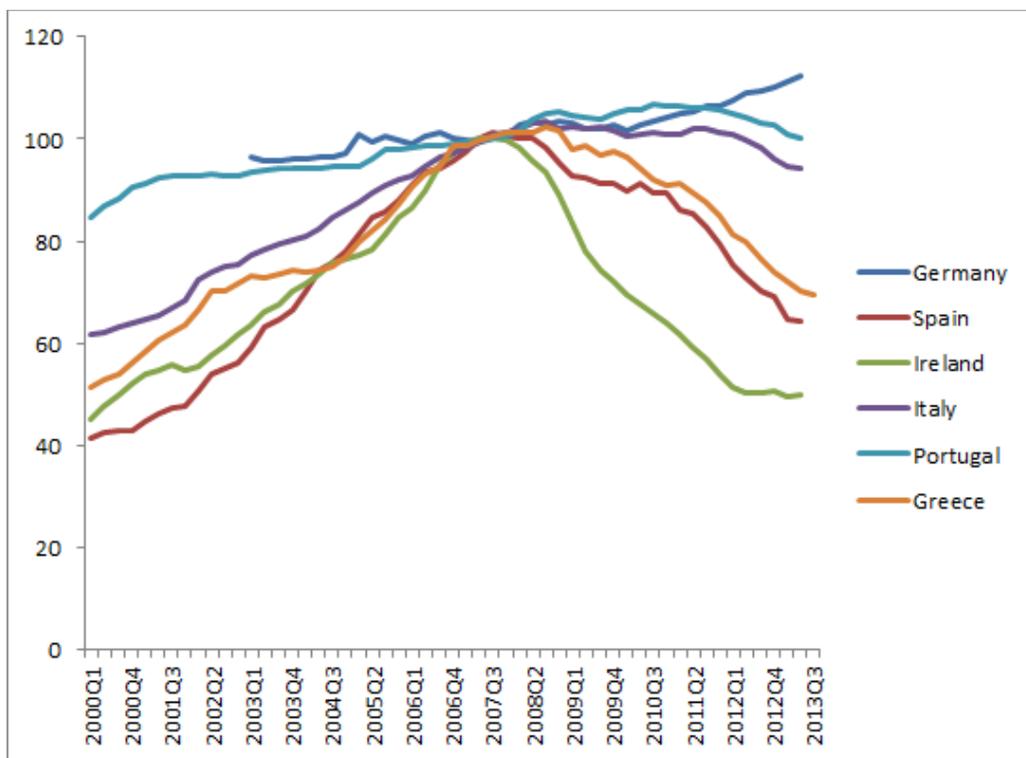
Figure 8: Sharp Declines in Production During Credit Busts



Source: Haver Analytics.

Collapses in real asset prices and the price of nontradable goods relative to tradables are also observed in credit busts. For example, stock prices fell around 20 percent in Southeast Asian countries in 1997. In Argentina, they fell 40 percent right after the credit bust (and before the 2001 default). By the end of 1990, the house price index in Sweden had fallen 52 percent (against 37 percent for the general index) from its peak in August 1989. Housing prices fell more than 15 percent in Spain between 2007 and 2011, and a sharp decline was also observed in Ireland in the same period (Figure 9). Germany's housing prices remained fairly constant.

Figure 9: House price indexes (2007=100)



Source: Haver Analytics.

STAGE 3: FINANCIAL CRISIS

Having investigated the necessary preconditions leading up to a financial crisis — a credit boom followed by a bust — we now come to the financial crisis stage. As noted earlier, the core of a financial crisis is a banking crisis. As Michael Bordo and his coauthors define it, to qualify as a banking crisis, an episode must feature either (1) bank runs, widespread bank failures, and the suspension of convertibility — that is, a banking panic in which banks temporarily refuse to allow depositors to withdraw their accounts as cash — or (2) enough bank failures and other banking sector problems to erode the value of collateral to the point that banks require government bailouts and restructuring.¹¹

Characterizing banking crises. Banking crises are usually triggered by asset price booms and busts.

Mendoza and Terrones find that about 44 percent of credit booms and busts involve a banking crisis.¹² In emerging markets, 27 percent of banking crises occur before the peak of a credit boom and 25 percent after the bust. In industrialized countries, more occur after the bust (12 percent before versus 25 percent after).

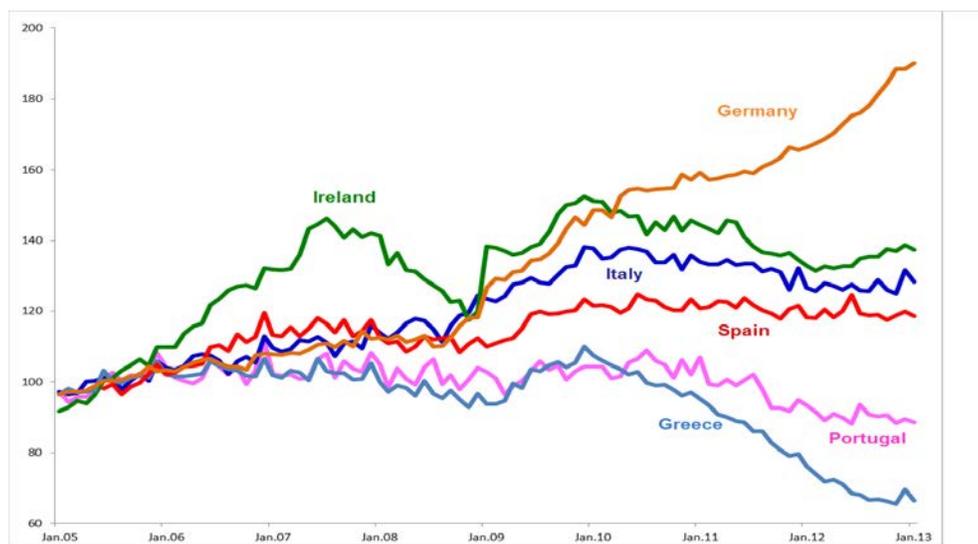
¹¹ See Bordo, Eichengreen, Klingebiel, and Martinez-Peria (2001).

¹² Mendoza and Terrones (2012).

Second, as with credit booms, banking crises happen in waves.

A third important indicator of a banking crisis is a sharp reduction in bank deposits. When analyzing the European experience, we also observe a decline in demand deposits starting in 2008 for the peripheral European countries (Figure 10). Germany, on the other hand, exhibits a continuous upward trend since 2005, illustrating that deposits were flowing from the periphery to the perceived safety of Europe's largest economy.

Figure 10: Bank Deposits (euros, millions)



Source: Haver Analytics.

Characterizing sovereign debt and currency crises. Financial crises are aggravated when they lead to or occur simultaneously with currency crises and sovereign debt crises. Sovereign debt crises are characterized by large fiscal imbalances that eventually lead to a restructuring and a default on sovereign debt, or both. The three usual triggers to a sovereign debt crisis are (i) a banking crisis, (ii) liability dollarization, which we will define, and (iii) the national government's inability to control debt held by local and state governments.

Banking crises trigger sovereign debt crises through deleveraging, followed by banks hoarding cash to offset their mounting losses, which reduces the supply of bank loans and hence the general extension of credit across the economy, exacerbating the debt deflation mechanism described earlier. As a result, economic growth slows, government revenue falls, and deficits rise or surpluses shrink. If banks require capital injections — bailouts — these additional expenditures can weaken the public sector balance sheet even further, as bank recapitalizations can be quite expensive.

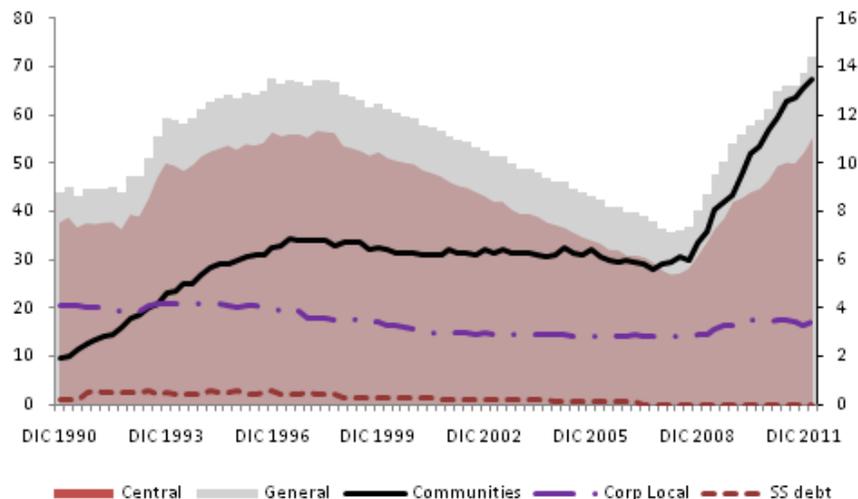
Because banks hold government bonds as assets regardless of whether they are distressed, a negative feedback loop may arise between the banking and public sectors, as illustrated in Figure 2. When a government issues additional bonds, banks' balance sheets deteriorate, because government bonds are no longer perceived as riskless. If the government's total debt equals a significant percentage of the country's economic output, fears of sovereign default may trigger bank runs, because the government bonds the banks hold may be viewed as insufficient backing for their deposits. Deposits in the peripheral European countries declined significantly around 2010, when fears of default arose, also increasing sovereign debt spreads in these countries. Under the threat of a potential bank run, more capital injections are required, which in turn increases government debt. For instance, Spain's debt-to-output ratio increased dramatically in 2008-09 as a result of bank recapitalization. Mutually reinforcing forces can eventually result in sovereign default. The sovereign debt crises in Argentina in 2001 and Greece in 2008 are good examples of the unintended consequences of government intervention in the banking sector.

A second common trigger of sovereign debt crises is liability dollarization, which occurs when government debt is denominated in a foreign currency and the country's own currency depreciates, making debt repayment unbearable. The depreciation requires more of the home country's currency in order to pay foreign creditors, and since tax revenue is denominated in the home country's currency, higher taxes are needed to make up the difference. Given the weakness of the economy, this policy may not be easily implemented or even desirable. Thus, default becomes more likely.¹³

Finally, a sovereign debt crisis may arise as a result of an imbalance between the national government and local or provincial governments. Even if the central government practices fiscal discipline, default pressures could arise if lower levels of government are not required to maintain balanced budgets and decide to finance deficit spending with debt that ultimately becomes a central government liability. The central government may be forced to bail out the local government by issuing additional debt, which can result in the country's default. Argentina during the 2001 crisis is a good example. Certain federal tax-sharing agreements (such as the "co-participation" systems in Spain or Argentina) may be more prone to suffer these pressures because no individual state or province has an incentive to reduce spending in the wake of a crisis. Figure 11 illustrates this dynamic for Spain. We can see that debt issued by communities (a group of local governments) was fairly constant from 1996 to 2008 but increased sharply in December 2008, further pressuring the central government's finances and increasing the probability that Spain would default. As this pressure built, credit default swap spreads on Spanish bonds and the risk premium increased.

¹³ See Mendoza (1995).

Figure 11: Composition of Spanish Debt as Percentage of GDP

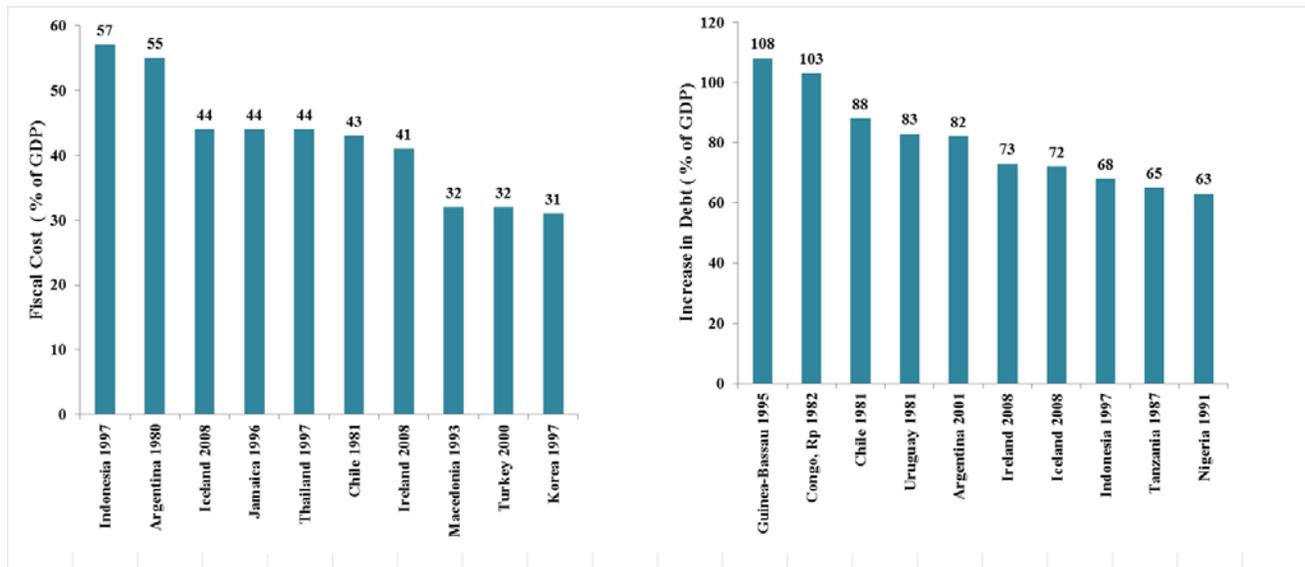


Source: Bank of Spain. [Legend: **Central government**, **General government**, **Communities**, **Local government**, **Social security**.]

Characterizing currency crises. When a bank run occurs and the public sector cannot increase revenues because it is excluded from credit (for example, after a default), a monetary collapse may follow. Currency crises result from a fundamental inconsistency between domestic policies — usually the persistence of money-financed government deficits — and the attempt to maintain a fixed exchange rate. When the central bank has enough reserves, this inconsistency can be maintained. But when these reserves become inadequate, speculators sell off their domestic currency holdings for fear of devaluation or high inflation. For example, defaults by Brazil in 1998 and Greece in the 1940s prompted long periods of inflation and even hyperinflation.

Financial crises are costly. The left panel of Figure 12 depicts the fiscal costs associated with bank recapitalizations as a percentage of a country’s total economic output. During the Southeast Asian crisis, Indonesia’s cost has been estimated at more than half its gross domestic product, while Thailand’s costs were about 44 percent of its output. Recapitalization costs incurred during the 2008 financial crisis were likewise high: On average, government debt as a result of a banking crisis increased 21 percent in advanced economies and around 10 percent in emerging ones. Ireland’s costs amounted to 41 percent of its output and its increase in public debt amounted to 72 percent of output.

**Figure 12: Fiscal Costs of Recapitalization as Percentage of GDP (left panel)
Increase in Debt as Percentage of GDP (right panel)**



Source: Laeven and Valencia, 2012.

From 1970 to 2011, the average loss of economic output resulting from banking crises has been estimated at 23 percent —around 26 percent for emerging market countries and 33 percent for industrialized countries, whose more developed financial systems make banking crises more disruptive.¹⁴ In some countries, these costs were significantly higher: In Thailand in 1997, cumulative costs were estimated to be 109 percent of output, and Ireland in 2006 had a cumulative loss of 106 percent.

Analyzed over an even longer time horizon, 1880 to 2009, financial crisis have resulted in average losses of 7 percent.¹⁵ Pure currency crises generate average losses of around 3 percent, while pure banking crises are much costlier, with losses above 10 percent. Twin banking and currency crises involve losses of 16 percent, on average. To put this economic damage in perspective, consider that the U.S. economy’s annual growth rate is currently about 2 percent.

¹⁴ Laeven and Valencia (2012).

¹⁵ Average loss is weighted. See Bordo and Landon-Lane (2010).

CONCLUSION

Our review of both theory and actual crises has shown how a heavy buildup of indebtedness in an economy may amplify the effect of even a mild shock. Instead of leading to an ordinary economic downturn, a credit bust may trigger a downward spiral into banking, sovereign debt, and currency crises. It's important to understand the distinct pattern that such events follow. By recognizing the triggers and sequence of events, we can try to assess where various European economies today may fall in our crisis timeline, where they may be headed.

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