Financial Crises
Causes, Consequences, and Policy Responses

EDITORS
Stijn Claessens, M. Ayhan Kose, Luc Laeven, and Fabián Valencia

INTERNATIONAL MONETARY FUND
Financial crises are the central economic concern of our time. In well-written chapters, *Financial Crises: Causes, Consequences, and Policy Responses* covers every aspect of them: their characteristics; how they should be managed; their short-term effects; their long-term effects; how to avoid them in the first place; and, especially, how to restructure those overhanging debts. This volume superlatively encapsulates the work of many of the world’s greatest experts on this topic of all topics.

George Akerlof

*Nobel Laureate in Economics, 2001; University of California, Berkeley*

A fact-filled, integrated, and highly policy-relevant account of the current global pandemic of crises, this unparalleled volume identifies crisis causes, consequences, and policy implications in an intellectually deep but accessible way. The star-studded cast of authors do so by combining microeconomic and macroeconomic perspectives on banking crises in a way that is absent in other volumes.

Charles W. Calomiris

*Henry Kaufman Professor of Financial Institutions, Columbia University*

Even with the 2008 explosion of the literature on financial crises, it has been impossible to find a single source that covers the key aspects of crises—until now. This book assembles the wisdom of top experts in the field on crises, covering everything from the key database on banking crises since 1970, crisis management and short-term economic impacts to longer-run growth effects, crisis prevention and mitigation, and resolution. Simply a must-have volume for anyone interested in the area.

Jerry Caprio

*William Brough Professor of Economics and Chair, Center for Development Economics, Williams College*

The IMF is to financial crises as the medical profession is to disease. They both have a rough idea of the contributory factors, but still find it hard to predict the exact timing of its onset. They have a sensible view of best practice in treating the malady. The 2007–09 Great Financial Crisis was an extreme example. This book distils the accumulated wisdom of some 28 IMF authors, plus a number of eminent outside economists. It provides the best available analysis and documentation of this awful event.

Charles Goodhart

*Emeritus Professor, Financial Markets Group, London School of Economics*

This superb collection of policy-oriented studies covers all facets of financial crisis prediction, prevention, management, and clean up. Despite our best regulatory efforts, crises are likely to remain an inescapable consequence of financial globalization and innovation. The lessons in this volume are essential background not only for policymakers, but for anyone who wants to understand today’s global economy.

Maurice Obstfeld

*Class of 1958 Professor of Economics, University of California, Berkeley*

Policymakers face enormous challenges during financial crises. Empirical evidence is scant, which seriously limits the power of econometrics, and, moreover, appropriate policies are, in many instances, unconventional or downright heterodox. This makes reaching political consensus much more difficult than usual. Thus, adding and summarizing new knowledge on these issues—which this book superbly does—is highly valuable. This book’s timeliness is remarkable because the world is still undergoing a major crisis. It offers a comprehensive discussion of several central issues related to financial crises, going from crisis prevention to remedies, if crisis occurs; and it covers at great length topics like banking crises and sovereign debt. The reader will find answers and, when not available, a discussion of the nature and relevance of the unanswered questions. The book should take a place of honor in the library of every policymaker, and anyone wanting to have up-to-date knowledge on these issues.

Guillermo Calvo

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Financial crises are damaging and contagious, prompting calls for swift policy responses when they happen, and justifying much effort to avoid them. As seen in recent years, crises can result in deep and long-lasting recessions and, in some cases, can trigger sharp current account reversals. Unsustainable macroeconomic policies, excessive credit booms, large capital inflows, and balance sheet fragilities appear prominently as common patterns before financial crises. However, not all crises are preceded by such events. Some crises can be contagious and rapidly spread to other countries with no apparent vulnerabilities.

The quest for knowledge on the best predictors of, and the best policy responses to, financial crises is ongoing. Extensive research has been conducted on various aspects of crises, including analyses of centuries-old episodes. The IMF has been closely involved in the resolution of crises and in mitigating their macroeconomic impact. In addition, the IMF has pursued a comprehensive research agenda over the years to analyze the causes and consequences of financial crises, to develop best measures to prevent crises, and to formulate strategies for coping with their consequences. Moreover, the IMF has been a major international forum for researchers and policymakers to debate and exchange their views on these issues.

As a result of these collective efforts in academia and policy institutions, much knowledge has been accumulated on the causes, evolution, and resolution of various types of crises. Despite the progress so far, these issues remain topics of intense policy discussions, as ongoing events clearly remind us every day. Therefore, there is much value in having leading researchers in the field of financial crises provide their cutting-edge perspectives on the topic, combining their contributions with those of economists at the IMF, and disseminating these insights broadly. This book exactly serves this purpose.

Prevention is always better than a cure, so the book includes a detailed analysis of the key factors leading up to financial crises. For example, credit booms are a particular characteristic that comes up as one of the most powerful predictors of crises over the decades, as Alan Taylor’s contribution (Chapter 6) makes clear. Increases in leverage and rapid credit growth are seen time and again. The contribution by Carmen Reinhart and Kenneth Rogoff (Chapter 3), building on their studies of crises over a very long history, makes this pattern quite evident. In addition, funding fragility shows up prominently, particularly during the 2007–09 crisis, as Hyun Shin’s contribution documents (Chapter 4).

The book has valuable lessons on how countries can better monitor their economies and financial systems. However, rapid changes in financial systems and growing linkages among economies mean that it is still quite difficult to find robust patterns that can help us to predict crises accurately. Given the developments witnessed during the 2007–09 episodes, the view that only emerging
markets are prone to crises is surely wrong. Advanced economies were at the epicenter of the crisis, whereas many emerging markets proved relatively resilient. In his contribution (Chapter 5), José De Gregorio provides an elegant perspective on the sources of this resilience in emerging markets in Latin America, and explores the potential lessons for other emerging markets and advanced economies.

In addition to the chapters by these eminent scholars, a number of contributions from researchers at the IMF are presented in the book. These chapters focus on the causes and consequences of financial crises, and on the best policies for their resolution. They reflect that IMF research and policy activities are geared toward improving the institution’s crisis prevention and resolution toolkits, encompassing surveillance, technical assistance, policy design, and emergency lending.

Recent work on credit booms and banking crises conducted by IMF researchers confirms academic research on the critical role of rapid credit expansion before crises. This work has found that one in three boom episodes ends in a crisis. Although it is difficult to differentiate a good credit boom from a bad one beforehand, this research shows that bad booms tend to be longer. Specifically, roughly half of the booms lasting longer than six years ended in a crisis.

Research conducted at the IMF also documents that cross-border financial linkages have intensified and become more complex. Increased linkages promote risk diversification by reducing exposure to local shocks, but global financial networks also transmit shocks and can make the sudden elevation of systemic risk more likely. When such risks materialize and turn into systemic crises, they affect a large number of countries, including “bystanders,” that is, those countries with relatively strong fundamentals that are less vulnerable to idiosyncratic crises.

As research advances, we hope to further improve early detection of vulnerabilities. As we learn more about incentives and factors that lead to financial fragility, we will be able to design better policies, including macroprudential ones, and improve the institutional infrastructure and strengthen supervision, thereby reducing the incidence of crises. Having said this, I am realistic enough to realize that there is a long road ahead in having the knowledge and tools, combined with the necessary political will, to prevent all financial crises.

Political economy considerations are often at the core of the challenges policymakers face in preventing and coping with financial crises. In the past they hampered the design of efficient policy responses and they have been present in recent crises. Much needs to be explored to design effective regulatory and supervisory interventions when the signs of excessive risk taking demand strong actions. The flourishing research on macroprudential policies can help provide some answers toward the better design of such interventions.

The findings presented are not just important for crisis prevention, but can also guide the appropriate design of international lending instruments and safety nets, including those of the IMF. For example, to reduce the incidence and scale of crises brought on by contagion, resources should be pooled globally, thus proactively helping to provide the necessary liquidity to avoid self-reinforcing crises.
and reduce the risk of contagion. In turn, policy space would be provided for
innocent bystanders. The IMF has internalized this lesson, quadrupling its
resources and revamping its lending toolkit by giving greater emphasis to crisis
insurance.

Although further research in this area can help in many dimensions, there are
challenges ahead and crises will inevitably happen again. Therefore, the global
policy community should also continue to devote efforts to buttressing our
understanding of crisis resolution policies. As chapters in this book show, design-
ing a strategy for resolving a crisis and formulating policies to accelerate eco-
nomic recovery involve many trade-offs. Resolution policies that transfer wealth
from savers to borrowers can help restart productive investment, but can create
moral hazard. It is clear now that adequate implementation requires arrangements
that properly align incentives. Open bank assistance without proper restructuring
and recapitalization is not an efficient way to deal with an ailing banking system.
Moreover, excessive liquidity support and guarantees cannot substitute for proper
restructuring and recapitalization. After all, most crises involve solvency prob-
lems, not just liquidity shortfalls.

The book highlights the macroeconomic challenges and consequences of cri-

The collection of research in this book provides an excellent overview of these
critical policy areas. However, because many challenges in the prevention and
resolution of crises are yet to be addressed, the topic of financial crises remains a
fertile area for future research.

David Lipton
First Deputy Managing Director
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Introduction

STIJN CLAESSENS, M. AYHAN KOSE, LUC LAEVEN, AND FABIÁN VALENCIA

By now, the tectonic damage left by the global financial crisis of 2007–09 has been well documented. Global per capita output, which typically expands by about 2.2 percent annually, contracted by 1.8 percent in 2009, the largest contraction the global economy has experienced since World War II. During the crisis, markets around the world experienced colossal disruptions in asset and credit markets, massive erosions of wealth, and unprecedented numbers of bankruptcies. Five years after the crisis began, its lingering effects are still all too visible in advanced economies and emerging markets alike: the global recession left in its wake a worldwide increase of 30 million people unemployed. These are painful reminders of why the understanding of financial crises needs to be improved. This book serves this purpose by bringing together a number of innovative studies on the causes and consequences of financial crises and policy responses to them.

Although there is a rich literature on financial crises, no publication since the 2007–09 crisis has provided a broad overview of this research and distilled its policy lessons. This book fills this critical gap. It covers a wide range of crises, including banking, balance of payments, and sovereign debt crises. It reviews the typical patterns that precede crises and considers lessons on their antecedents, analyzes the evolution of crises and examines various policy responses—macroeconomic policies and the restructuring of banks, households, financial institutions, and sovereigns—and studies their aftermath, including short- and medium-term growth impacts and financial and fiscal consequences. This volume includes contributions from outstanding scholars engaged in research on financial crises and a select set of chapters produced by researchers at the IMF. The book’s audience includes researchers, academics, and graduate students working on financial crises. Because it shows that applied research can provide lessons, it is also an excellent reference for policymakers.

SIMILARITIES BETWEEN CRISSES ABOUND

As the book documents, lessons from past crises are insightful because many similarities across crisis episodes can be detected, even when the exact triggers for and timing of crises vary. Although the relative importance of the sources of the 2007–09 crisis will be debated for some time, the run-up to this episode shares at least four major features with earlier episodes: rapid increases in asset prices, credit booms, a dramatic expansion in marginal loans, and regulation and supervision that failed to keep up with developments. Combined, these factors sharply increased the risk of a financial crisis, as they had in earlier episodes.
Asset Price Bubbles

Although the specific sector experiencing a boom can vary across crises, asset price booms are common. In the 2007–09 crisis, it was house prices that sharply increased before the meltdown, including in Iceland, Ireland, Spain, the United Kingdom, the United States, and other markets that subsequently ran into problems. The patterns of house price increases are reminiscent of those in earlier major crisis episodes. The overall size of the housing booms and their dynamics—including house prices rising in excess of 30 percent in the five years preceding the crisis and peaking just before the beginning of the crisis—are remarkably similar to developments that preceded previous banking crises in advanced economies, as observed by Reinhart and Rogoff (2008). These booms were generally fueled by quickly rising credit resulting in sharp increases in household leverage. As happened so often before, the rapid house price increases and the buildup in leverage turned out to be a dangerous combination.

Credit Booms

As in most earlier crises, the rapid expansion of credit played a large role in the run-up to the 2007–09 crisis. Credit aggregates grew very fast in Iceland, Ireland, Spain, the United Kingdom, and several eastern European countries, often fueling real estate booms. Rapid credit growth episodes generally coincide, as they did again this time, with large cyclical fluctuations in economic activity. Although aggregate credit growth was less pronounced, reflecting slower corporate credit expansion, household indebtedness in the United States rose rapidly after 2000, driven largely by increased mortgage financing, along with contributions from historically low interest rates and financial innovation. And in spite of low interest rates, debt service relative to disposable income reached record highs.

Historically, not all credit booms end up in crises, but the probability of a crisis increases with a boom, especially the larger its size and the longer its duration. The mechanisms linking credit booms to crises include increases in the leverage of borrowers and lenders and a decline in lending standards. In the 2007–09 episode, both channels were at work. Increased leverage, in part attributable to inadequate oversight, left households vulnerable to a decline in house prices, a tightening in credit conditions, and a slowdown in economic activity. Not only did the correction harm consumers as they ran into debt-servicing problems, it also led to systemic risks. And default rates were higher where credit growth had been more rapid; this pattern extended to other countries caught in crises.

Marginal Loans and Systemic Risk

Credit booms or, more generally, rapid growth in financial markets, are often associated with a deterioration in lending standards. They often mean the creation of marginal assets that are viable only as long as favorable economic conditions last. In the United States and elsewhere, a large portion of the mortgage expansion consisted of loans extended to borrowers with limited credit and employment histories, and often on terms poorly suited to the borrowers’ conditions. Debt
servicing and repayment were vulnerable to economic downturns and changes in credit and monetary conditions. This situation maximized default correlations across loans, generating portfolios highly exposed to declines in house prices—confirmed afterward by the large fraction of nonperforming loans.

In other countries, the same pattern meant large portions of credit denominated in foreign currency. Similar exposures had been common before, for example, in the corporate and financial sectors before the Asian crisis of the late 1990s. In the 2007–09 crisis, large portions of credit (including to households) in several Eastern European economies were denominated in foreign currency (euros, Swiss francs, and yen). Although interest rates lower than those on local currency loans increased affordability, borrowers’ ability to service those loans depended on continued exchange rate stability. Again, this meant high default risk correlations across loans and systemic exposure to macroeconomic shocks.

Risky liability structures in financial intermediaries typically add to vulnerabilities. The importance of wholesale bank funding, which in the past often took the form of foreign liabilities, especially in emerging market crises, manifested itself this time in the nonbank financial system, particularly in the United States. Moreover, commercial banks and investment banks in many advanced economies sharply increased their leverage. As a result of buoyant housing and corporate financing markets, favorable conditions spurred the emergence of large-scale derivatives markets, such as those for mortgage-backed securities and collateralized debt obligations with payoffs that depended in complex ways on underlying asset prices. The corporate credit default swap market also expanded dramatically because of favorable spreads and low volatility. The pricing of these instruments was often based on a continuation of increasing or high asset prices.

Poorly Designed Liberalization, Ineffective Regulation and Supervision, and Inadequate Interventions

Crisis often follow expansions triggered by badly sequenced regulatory reforms and financial liberalization. Poorly developed domestic financial systems have often been unable to intermediate large capital inflows in the wake of capital account liberalization. Deficiencies in oversight often led to currency and maturity mismatches and to large and concentrated credit risks. In the 2007–09 crisis as well, although perhaps in more subtle forms, regulatory approaches and prudential oversight were insufficient to restrict excessive risk taking.

As in the past, financial institutions, merchant banks, investment banks, and off-balance-sheet vehicles of commercial banks operated—to varying degrees—outside the regulatory perimeter. The shadow banking system was able to grow without much oversight, eventually becoming a systemic risk. Derivatives markets were largely unregulated and poorly overseen, creating the potential for chain reactions leading to systemic risk. The international activities of financial institutions were not monitored properly. Market discipline was not effective in halting the buildup of systemic risks. Markets, rating agencies, and regulators
underestimated the conflicts of interest and information problems associated with the originate-to-distribute model.

As happened in earlier episodes, prevention and early intervention mechanisms also proved to be insufficient. Before the crisis, the focus of authorities remained primarily on the liquidity and solvency of individual institutions, rather than on the resilience of the financial system as a whole. This lapse led to an underestimation of the probability and costs of systemic risk. In addition, as has been common in previous episodes, intervention came late in many countries, significantly raising the real and fiscal costs, and hampering the postcrisis recovery. At the international level, insufficient coordination among regulators and supervisors and the absence of clear procedures for the resolution of global financial institutions hindered efforts to prevent the cross-border transmission of the crisis.

DIFFERENCES DO EXIST

Despite the similarities described above, crises continue to occur partly because the economic and financial conditions before each batch of crises have their own unique features, making people think “this time is different” as succinctly described by Carmen Reinhart and Kenneth Rogoff (2009). In addition to presenting a careful study of the similarities, the book also covers the features that distinguish the 2007–09 crisis from earlier episodes. In particular, many chapters in the book consider four major differentiating elements: benign macroeconomic conditions before the crisis, the opaqueness of financial transactions and the large role of nonbank financial institutions, the high degree of international financial integration, and the major roles played by advanced economies.

Remarkably Benign Macroeconomic Conditions

One of the most significant differences was that the buildup of risks around the world occurred within relatively benign macroeconomic conditions in most countries, with solid economic growth, low inflation, and few financial crises. These circumstances created a sense of exuberance in financial markets and a feeling of accomplishment among policymakers. Historically low real interest rates helped foster increased leverage across a wide range of agents—notably financial institutions and households—and markets. The high degree of leverage, however, limited the ability of borrowers and the financial system to absorb even small shocks, leading to a quick erosion of capital buffers, a rapid decline in confidence, and an escalation of counterparty risk early on in the crisis. These weak spots, in turn, triggered a liquidity crisis with global ramifications.

Opaqueness of Financial Transactions and the Role of Nonbanks

Although the originate-to-distribute model in the United States seemed to be a good template for risk allocation, it turned out to undermine incentives for
properly assessing risks and led to a buildup of tail risks. The model also caused serious difficulties for assessing the true value of assets as the crisis unraveled. This lack of understanding quickly turned a liquidity crisis into a solvency crisis. Indeed, the financial turmoil began in those countries in which nonbanks (including money market funds, investment banks, and special-purpose vehicles) played important roles in financial intermediation. Because these nonbanks typically did not fall within the formal financial regulatory perimeter, the risk of runs became more likely.

The complex interdependencies between the regulated and unregulated parts of the financial system also made responses more difficult than when the financial system consisted primarily of traditional banks (as in many earlier crises). The restructuring of assets became far more complicated because homeowners in many countries were directly involved. There are no established best practices for dealing with large-scale household defaults and the associated moral hazard problems and equity and distribution issues. Restoring household balance sheets proved to be very complex and prolonged the recovery from the crisis.

High Degree of International Financial Integration

A significant fraction of financial instruments originated in the United States were held in other advanced economies and by the official sector in emerging markets. Large cross-border banks, exceeding many countries’ GDP in size, had extensive, complex exposures in and across many markets. International financial integration more generally had increased dramatically in the decades before the crisis, with global finance no longer involving just a few large players, but many from various markets and different countries. Although this structural evolution undoubtedly had many benefits, it quickly turned turmoil in a few, large countries into a global crisis. The cross-border linkages across institutions and markets meant that disturbances spread quickly, made globally coordinated solutions much more difficult to implement, and worsened confidence in many ways.

The Role of Advanced Economies

The 2007–09 episode was concentrated in advanced economies, in contrast to past crises, which often took place in emerging markets and developing economies. This concentration led to significant contagion effects from financial institutions in advanced economies to other countries, through both financial and trade channels. After all, the crisis countries were not only home to the main intermediaries of global capital but also the main importers of goods and services. Differences in institutional and economic settings, including the typically larger size of advanced economies’ financial systems, required different policy responses, both macroeconomic and financial. Whereas emerging markets, for example, typically tightened monetary policy following a crisis to stem capital outflows, advanced economies were able to resort to expansionary monetary policies to support their financial systems and to boost activity, including through fiscal
policy, without considering the implications of these policies for capital flows. This strategy had its benefits, but also had costs, because the necessary restructuring was more easily postponed in the presence of expansionary policies.

**SYNOPSIS**

The remainder of this introduction presents detailed summaries of the chapters in the book. Part I of the book provides an overview of the various types of crises and introduces a comprehensive database of crises. Part II reviews broad lessons on crisis prevention and management. Part III discusses the short-term economic effects of crises, recessions, and recoveries. Part IV analyzes the medium-term effects of financial crises on economic growth. Part V reviews the use of policy measures to prevent booms, mitigate busts, and avoid crises. Finally, Part VI reviews the policy measures for mitigating the adverse impact of crises and examines how to restructure banks, households, and sovereigns.

**Part I: Introduction and Description of Financial Crises**

The book starts with a review of financial crises, including their origins and macroeconomic consequences, and an overview of the policy responses that countries tend to resort to when dealing with major banking crises. In Chapter 1, Claessens and Kose provide a comprehensive review of the literature on financial crises. They focus on currency crises, sudden stops in capital flows, debt crises, and banking crises. The chapter begins with a general overview of the common elements that precede different types of crises, including asset price bubbles, credit booms, buildups of leverage, and large capital inflows. These can, of course, turn into asset price crashes, credit crunches, deleveraging spirals, sudden capital outflows, or sovereign defaults during financial crises.

They also present a brief discussion of the determinants of crises and document the differences in models developed to explain different types of episodes. Over the years, for example, various generations of models have been developed to explain currency crises, whereas the modeling of systemic banking crises is relatively less advanced. The chapter also reviews the causes identified in empirical work. Despite much overlap, causes can vary depending on the type of crisis. Changes in terms of trade, capital flows, and international interest rates, for example, have been found to be important triggers for currency and foreign debt crises, whereas fundamentals, policy failures, and domestic or external shocks have been shown to be important triggers for banking crises.

The authors discuss the identification of crises in practice, a key challenge for empirical studies. Using existing databases, they show that, although often associated with emerging markets, crises have been universal phenomena. Crises also often overlap and come in waves, indicating the significance of global factors in driving these episodes. In addition, the authors provide a review of the macroeconomic implications of crises. Output losses are almost universal, and
consumption, investment, and industrial production follow qualitatively similar declines, although severity and duration vary.

In Chapter 2, Laeven and Valencia provide a detailed database of the starting dates of financial crises and of the resolution policies and fiscal costs associated with resolving crises. Their focus is on banking crises, although information on currency crises and sovereign debt crises is also provided. Using the data, they show that countries typically resort to a mix of policies to contain and resolve banking crises, ranging from macroeconomic stabilization to financial sector restructuring policies and institutional reform.

In addition to offering the most comprehensive and up-to-date available database on banking crises, Laeven and Valencia also point out that, despite the numerous commonalities among crisis origins, many attempted crisis-management strategies have met with mixed success. Successful crisis resolutions have been characterized by transparency and steadfastness in resolving insolvent institutions, thereby removing uncertainty surrounding the viability of financial institutions. This strategy requires a triage of strong and weak institutions, with full disclosure of bad assets and recognition of losses, followed by the recapitalization of viable institutions and the removal of bad assets and unviable institutions from the system.

Conventional wisdom would have it that advanced economies, with their stronger macroeconomic frameworks and institutional settings, have an edge in crisis resolution, but the record thus far supports the opposite: advanced economies have been slow to resolve banking crises, with the average crisis lasting about twice as long as in developing and emerging market economies.

Although differences in initial shocks and financial system size surely contribute to these different outcomes, the authors suggest that the greater reliance by advanced economies on macroeconomic policies as crisis-management tools may delay the needed financial restructuring, thereby prolonging the crisis. This is not to say that macroeconomic policies should not be used to support the broader economy during a crisis. Macroeconomic policies can be the first line of defense. They stimulate aggregate demand and sustain asset prices, thus supporting output and employment, and indirectly a country’s financial system. This support helps prevent disorderly deleveraging and provides room for balance sheet repair, buying time to address solvency problems head-on. However, by masking financial institutions’ and borrowers’ balance sheet problems, macroeconomic policies may also reduce incentives for financial restructuring, with the risk of dampening growth and prolonging the crisis.

Part II: Lessons in Crisis Prevention and Management

The chapters in the second part of the book provide elegant analyses of the lessons learned about the warning signals ahead of crises and the management of such episodes. These specially commissioned papers were presented at a conference held at the IMF on September 14, 2012. Chapter 3, by Reinhart and Rogoff, is based on the keynote address Carmen Reinhart delivered at the conference.
The chapter makes a convincing case that the 2007–09 crisis, which began with the unraveling of the U.S. subprime mortgage market, is far from over and is on a scale that has not been seen in advanced economies since the 1930s and the defaults on World War I debt.

Reinhart and Rogoff draw four thought-provoking lessons from the 2007–09 crisis. First, policymakers have often been better at managing crises than at preventing them, which was also true in the 2007–09 episode. They speculate that this is unlikely to change anytime soon. Second, they argue that significant differences between advanced economies and emerging market economies are not clear with respect to the likelihood of experiencing a crisis. Specifically, they provide a reminder that although crises were the domain of emerging markets in the last half of the 20th century, before 1940, advanced economies were involved in many crises. Third, both the diagnosis and understanding of the scope and depth of the risks and magnitudes of various debts are still incomplete. Observers tend to forget that domestic and external debt are not created equal, that public debt is different from private debt, and that the stock of debt is usually much larger than ever estimated.

Finally, Reinhart and Rogoff show a recurring pattern following global crises, in which governments have resorted to subtly restructuring their debt, rather than defaulting or formally reworking repayment terms. The techniques, part of which they call financial repression, include keeping interest rates low, which lowers debt-servicing costs and liquidates the real value of government debt. Many advanced economies have also used public debt restructurings and conversions of high-yield, short-term debt into low-yield, long-term debt. Other techniques include directed lending to governments by captive domestic savers such as pension funds, regulation of cross-border flows of funds, and a generally tighter relationship between banks and government. The end result is that funds that would otherwise go to nongovernment borrowers are directed to government use, usually at below-market rates. In light of this history, they suggest an increasing likelihood of debt restructurings and conversions to ease sovereign repayments in some of the stressed economies in Europe.

The global financial crisis of 2007–09 caught most economists and policymakers flat-footed, so the search for predictors of such crises has been a major area of research in recent years. Chapters 4, 5, and 6 ask a fundamental question: what are the best warning signals of financial crises?

In Chapter 4, Shin observes that finding a set of early warning indicators that can flag vulnerability to financial turmoil is an extremely challenging task. Shin focuses on three sets of indicators: those based on market prices; the ratio of credit to GDP—to assess whether credit is expanding excessively; and the behavior of banking sector liabilities, such as monetary aggregates. His results suggest that those indicators based on market prices, such as spreads on credit default swaps, do not give sufficient warning of a crisis. Judging the extent to which the ratio of credit to GDP diverges from its long-term trend is more useful, but determining the long-term trend is difficult until after the crisis. He claims that the behavior of bank liabilities has the most promise, simply because banks must
borrow to lend. When credit demand is high, banks tend to exhaust their normal, or core, sources of funds and turn to noncore sources, the defining characteristics of which can vary by institution and financial system. A spike in the ratio of noncore to core liabilities is a good indicator that a boom is under way. However, he also notes that it can be difficult to differentiate between core and noncore liabilities before a crisis.

In past global crises, emerging market economies often suffered more than advanced economies did. The reverse was true in the 2007–09 global financial crisis. Whereas advanced economies suffered—and continue to suffer five years later—emerging market economies, including in Latin America, had shorter recessions and quicker recoveries. In Chapter 5, De Gregorio claims that a number of factors contributed to the better performance of emerging markets in the recent financial crisis. Sound macroeconomic policies before the crisis permitted emerging markets in Latin America to undertake sizable monetary and fiscal stimulus to offset the recession. Countries also allowed their currencies to depreciate sharply, which dampened speculation about further declines.

Financial systems were also generally sound, well capitalized, and regulated, and not prone to accumulating risky financial instruments, such as structured securities, that disabled financial systems in advanced economies. Good luck also helped—commodity prices were high before the crisis and, after a sharp contraction in international trade in 2009, rebounded sharply in 2010. In addition, De Gregorio’s chapter documents that countries maintained high levels of international reserves, which served dual roles—as a form of self-insurance to be tapped in case of a sudden cessation of foreign capital inflow and as a bulwark against currency speculation.

Taylor argues in Chapter 6 that unusually high, sustained rates of credit growth, so-called credit booms, tend to be the main precursors to financial crises. Before the global financial crisis of 2007–09, many prominent policymakers and economists focused on the turmoil-producing potential of large current account imbalances, in which some major deficit countries, such as the United States, faced possible “jarring shocks” if surplus countries, such as China, ceased financing their deficits. Although external imbalances can play a role in creating credit booms, his chapter documents that it is the credit boom itself, not its source, that policymakers should watch for as a sign of an impending financial crisis. Although economies can have credit booms fueled by external imbalances, most credit booms are homegrown and unrelated to shifts in the current account.

Together with other contributions in the book, these chapters also provide some lessons for crisis management, notably for advanced economies today and with regard to banking crises. The response during the 2007–09 global financial crisis, dominated by advanced economies, relied heavily on the use of monetary and fiscal policies. Advanced economies were generally well placed to resort to such policies without being overly concerned about the impact on their exchange rates, inflation, or public debt. Advanced economies typically benefit from well-anchored inflation expectations, and their reserve currencies benefit from flight-to-quality effects during financial crises. Emerging market economies, conversely, often do not have the fiscal space or the access to external finance to support
accommodative fiscal policy, and excessive monetary expansion quickly translates into inflation and large declines in the value of the currency, further impairing balance sheets in the presence of currency mismatches.

In comparison with past episodes in emerging markets, advanced economies used a much broader range of policy measures, including unconventional asset purchases and guarantees, and significant fiscal stimulus packages. These policies were combined with substantial government guarantees on nondeposit bank liabilities and ample liquidity support for banks, often at concessional rates and with reduced collateral requirements. Liquidity support was particularly large in the euro area, indicating the significant role played by the Eurosystem in managing the crisis, compensating in part for the absence of a common fiscal authority.

The lack of deeper restructuring also reflected the limited nature of the available tools. Initially, countries’ responses to the crisis were limited to tools that were on hand and did not require institutional reforms or parliamentary approval. For example, many advanced economies did not have the tools in place to resolve complex financial institutions, including nonbanks, before the crisis. Restructuring often involved budgetary approval for government programs to purchase assets or recapitalize financial institutions, causing delays or inadequate funds. Given the lack of cross-border resolution frameworks and often complex burden-sharing challenges, interventions in ailing institutions with international spillovers were often poor.

Political economy considerations, in addition to economic conditions, can also favor the use of such policies over deep financial restructuring using tools such as bank recapitalization. The latter are generally seen by the public as enriching bankers. Accommodative monetary policy, although less targeted to the underlying problems, is more likely to garner broad-based support: low interest rates will support asset prices for investors and house prices for homeowners, and will lower the debt burden for mortgage holders and other debtors. Taken together, as the chapters stress, these actions mitigated the financial turmoil, contained the crisis, and avoided an even sharper contraction in economic activity. However, they also discouraged more active financial restructuring.

The net result appears to be that much of the cost of the 2007–09 crisis has been transferred to the future, in the form of higher public debt and possibly an anemic economic recovery caused by residual uncertainty about the health of banks and continued high private sector indebtedness. The lingering effects stemming from bad assets and uncertainty about the health of financial institutions risk prolonging the crisis and depressing growth for an extended period. Thus, the broader lesson of this part is that macroeconomic stabilization policies should supplement and support, but not displace or delay, necessary financial restructuring.

**Part III: Short-Term Effects: Crises, Recessions, and Recoveries**

The next part of the book considers the short-term effects of financial crises as seen in the evolution of macroeconomic and financial variables. The chapters in this part show that recessions associated with financial crises tend to be unusually
severe, and their recoveries are typically slow as Kannan, Scott, and Terrones discuss in Chapter 8. The recent bout of crises took a particularly heavy toll on the real economy. However, as Claessens, Kose, and Terrones show in Chapter 7, this might not have been a surprising outcome. Recessions associated with financial crises tend to be unusually severe, resulting in much larger declines in real economic activity, and their recoveries tend to be slow. Similarly, globally synchronized recessions are often long and deep, and recoveries from these recessions are generally weak.

These studies also consider the effectiveness of policies during crises. Countercyclical monetary policy can help shorten recessions, but its effectiveness is limited in financial crises. By contrast, expansionary fiscal policy seems particularly effective in shortening recessions associated with financial crises and boosting recoveries. However, its effectiveness is a decreasing function of the level of public debt. These findings are consistent with the long and severe impacts of the 2007–09 financial crisis as well as the ongoing sluggish recovery. However, strong countercyclical policy action, combined with the restoration of confidence in the financial sector, could help move the recovery forward.

Claessens, Kose, and Terrones also present a brief analysis of the similarities and differences between the 2007–09 crisis and previous episodes. They show that the buildup to the crisis had four major features similar to earlier episodes: First, asset prices increased rapidly in a number of countries before the crisis. Second, a number of key economies experienced credit booms ahead of the crisis. Third, there was a dramatic expansion in marginal loans, particularly in the mortgage markets of several advanced economies, which led to a sharp increase in systemic risk. Fourth, the supervision of financial institutions failed to keep up with the development of new financial instruments. These combined factors sharply increased the risk of a financial crisis.

The authors also claim that four new dimensions played important roles in the severity and global scale of the crisis that included surprising disruptions and breakdowns of several markets in fall 2008. First, there was widespread use of complex and opaque financial instruments. Second, the interconnectedness among financial markets, nationally and internationally, with the United States at the core, had increased dramatically in a short time. Third, the degree of leverage of financial institutions accelerated sharply. Fourth, the household sector played a central role. These new elements combined to create unprecedented complications in late 2008, ultimately resulting in the global financial crisis.

**Part IV: Medium-Term Effects: Economic Growth**

This part of the book considers the medium-term effects of financial crises on the real economy. In Chapter 9, Abiad, Balakrishnan, Koeva Brooks, Leigh, and Tytell examine the medium-term output performance following 88 banking crises since 1970 across a wide range of economies, as well as the behavior of world output following major financial crises going back to the nineteenth century. They find that output tends to be depressed substantially and persistently following banking crises, with no rebound, on average, to the precrisis trend in the
medium term. However, growth eventually returns to its precrisis rate for most economies. The depressed output path tends to result from long-lasting reductions of roughly equal proportions in the employment rate, the capital-to-labor ratio, and total factor productivity. In the short term, the output loss is mainly accounted for by total factor productivity losses, but, unlike the employment rate and capital-to-labor ratio, the level of total factor productivity recovers somewhat to its precrisis trend in the medium term. In contrast, capital and employment suffer enduring losses relative to trend.

Surprisingly, a large number of recoveries from crises occur in the absence of credit growth, labeled “creditless recoveries” by Abiad, Dell’Ariccia, and Li in Chapter 10. They show that such recoveries are not rare: about one in five recoveries is creditless, but average growth during these episodes is about a third lower than during normal recoveries. Aggregate and sectoral data suggest that impaired financial intermediation is the culprit. Creditless recoveries are more common after banking crises and credit booms. Furthermore, sectors more dependent on external finance grow relatively less, and more financially dependent activities (such as investment) are curtailed more, during creditless recoveries.

Part V: Policy Measures to Prevent Booms, Mitigate Busts, and Avoid Financial Crises

This part studies the effectiveness of policies in curbing credit booms and busts, with the aim of preventing or managing financial crises. Chapters 11 (Dell’Ariccia, Igan, Laeven, and Tong) and 12 (Crowe, Dell’Ariccia, Igan, and Rabanal) study the effectiveness of macroeconomic and macroprudential policies in reducing the risks associated with real estate credit booms. Both chapters find that well-targeted macroprudential policies, such as caps on loan-to-value ratios; capital requirements that increase during boom times; and to a lesser extent macroeconomic policies, if properly designed, have some success in curbing excessive credit growth and mitigating the consequences of credit crunches and asset price busts.

Financial sector policies need not be used in isolation to address financial sector problems, but can be complemented with and supported by macroeconomic policies. This is evident in Chapters 13 and 14. Laeven and Valencia (Chapter 13) show that the direct fiscal costs of supporting the financial sector were smaller during the 2007–09 crisis than during earlier crises as a consequence of swift policy actions and significant indirect support from expansionary monetary and fiscal policy, the widespread use of guarantees on liabilities, and direct purchases of assets (such as mortgage securities by central banks). Baldacci, Gupta, and Mulas-Granados (Chapter 14) show that timely countercyclical fiscal measures can contribute to shortening the length of crisis episodes by stimulating aggregate demand, with fiscal expansions that rely mostly on measures to support government consumption proving to be more effective in shortening crisis duration than those based on cuts in public investment or income taxes.

Of course, although these policies reduce the real impact of crises, they concurrently increase the burden of public debt and the size of government contingent liabilities, raising concerns about fiscal sustainability in some countries. In fact,
the results in Chapter 14 do not hold for countries with limited fiscal space, where fiscal expansions are prevented by funding constraints. The composition of counter-cyclical fiscal responses matters as well for output recovery after a crisis, with public investment yielding the strongest impact on growth. These results suggest a potential trade-off between short-term aggregate demand support and medium-term productivity growth objectives in fiscal stimulus packages adopted in times of distress, with the trade-off affected by the depth of financial restructuring.

**Part VI: Policy Measures to Mitigate the Impact of Crises; and the Restructuring of Banks and of Household and Sovereign Debt**

The final part of the book considers policies for dealing with the restructuring of banks and of debt overhang in the public or private sectors of the economy, specifically the restructuring of household debt and sovereign debt.

Claessens, Pazarbasioglu, Laeven, Dobler, Valencia, Nedelescu, and Seal, in Chapter 15, compare policy choices in recent and past crises and argue that the overall asset restructuring and balance sheet repair of financial institutions during the 2007–09 crisis did not advance as rapidly as they should have, and as a result moral hazard may have increased. Consequently, vulnerabilities in the global financial system remain considerable and continue to threaten the sustainability of the recovery. They call for more aggressive asset restructuring to complete the much-needed financial sector repair and reform process.

In Chapter 16, Landier and Ueda argue that the optimal design of a bank-restructuring program depends on the payoffs and incentives for the various key stakeholders, including shareholders, debt holders, and government; and that the benefits and costs of financial sector interventions should be compared with those of alternative government interventions to support the economy. At the same time, time is of the essence.

The historically high levels of household debt in many crisis-hit countries heightened demands for government intervention. If unaddressed, household debt distress can be a drain on the economy and even lead to social unrest. Well-designed and well-executed government interventions may be more efficient than leaving debt restructuring to the marketplace and standard court-based resolution tools. In Chapter 17, Laeven and Laryea make the case for government intervention in household debt restructuring. They propose, in addition to targeted legal reforms, a template for government-supported household debt-restructuring programs designed to reverse nonperforming loans, which could be adapted to individual country circumstances.

The case for household debt restructuring is also made in Chapter 18 by Igan, Leigh, Simon, and Topalova, who show that housing busts and recessions preceded by larger run-ups in household debt tend to be more severe and protracted. These patterns are consistent with the predictions of recent theoretical models. Based on case studies, they show that government policies can help prevent prolonged contractions in economic activity by addressing the problem of excessive household debt. In particular, bold household debt-restructuring programs such
as those implemented in the United States in the 1930s and in Iceland in the aftermath of the global crisis can significantly reduce debt-repayment burdens and the number of household defaults and foreclosures. Therefore, such policies can help avert self-reinforcing cycles of household default, further house price declines, and additional contractions in output.

Finally, Das, Papaioannou, and Trebesch provide a comprehensive survey of issues pertinent to sovereign debt restructuring, based on a newly constructed database covering 185 debt exchanges with foreign banks and bondholders since the 1950s, and 447 bilateral debt agreements with the Paris Club. In Chapter 19, they present new stylized facts on the outcome and process of debt restructurings, including the size of haircuts, creditor participation, and the role of legal conditions. They also discuss ongoing debates about crisis resolution mechanisms, credit default swaps, and the role of collective action clauses. Their chapter shows that rapid restructuring can have many benefits.

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Abbreviations

3S  systemic sudden stop
AMC  asset management company
AUC  area under curve
BAC  bank advisory committee
BMA  Bayesian model averaging
CAC  collective action clause
CCF  Correct Classification Frontier
CDS  credit default swap
DTI  debt to income
EM  emerging market
EU  European Union
Fannie Mae  U.S. Federal National Mortgage Association
FDIC  U.S. Federal Deposit Insurance Corporation
Fed  U.S. Federal Reserve
FHA  U.S. Federal Housing Administration
Freddie Mac  U.S. Federal Home Loan Mortgage Corporation
GDP  gross domestic product
GNP  gross national product
GSE  government-sponsored entity
HAMP  Home Affordable Modification Program
HARP  Home Affordable Refinance Program
HIPC  Heavily Indebted Poor Countries
HOLC  Home Owners’ Loan Corporation
H-P  Hodrick-Prescott
IFS  International Financial Statistics
LIC  low-income country
LTV  loan to value
M2  broad money
MBS  mortgage-backed security
MDRI  Multilateral Debt Relief Initiative
MHA  Making Home Affordable
NPL  nonperforming loan
<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<tr>
<td>OLS</td>
<td>ordinary least squares</td>
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<tr>
<td>SAR</td>
<td>Special Administrative Region</td>
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<td>TARP</td>
<td>Troubled Asset Relief Program</td>
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<td>WDI</td>
<td><em>World Development Indicators</em></td>
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<td>WEO</td>
<td><em>World Economic Outlook</em></td>
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Introduction and Description of Financial Crises
CHAPTER 1

Financial Crises: Explanations, Types, and Implications

STIJN CLAESSENS AND M. AYHAN KOSE

The 2007–09 global financial crisis and its aftermath have been painful reminders of the multifaceted nature of crises. They hit small and large countries as well as poor and rich ones. As fittingly described by Reinhart and Rogoff (forthcoming), crises “are an equal opportunity menace.”1 They can have domestic or external origins, and stem from private or public sectors. They come in different shapes and sizes, evolve into different forms, and can rapidly spread across borders. They often require immediate and comprehensive policy responses, call for major changes in financial sector and fiscal policies, and can compel global coordination of policies.

The widespread impact of the 2007–09 global financial crisis underlines the importance of having a solid understanding of crises. As the latest episode has vividly shown, the implications of financial turmoil can be substantial and greatly affect the conduct of economic and financial policies. A thorough analysis of the consequences of and best responses to crises has become an integral part of current policy debates as the lingering effects of the latest crisis are still being felt around the world.

This chapter provides a selected survey of the literature on financial crises.2 Crises are, at a certain level, extreme manifestations of the interactions between the financial sector and the real economy. As such, understanding financial crises requires an understanding of macro-financial linkages, a truly complex challenge in itself. The objective of this chapter is more modest: it presents a focused survey considering three specific questions. First, what are the main factors explaining financial crises? Second, what are the major types of financial crises? Third, what are the real sector and financial sector implications of crises? The chapter also briefly reviews the literature on the prediction of crises and the evolution of early-warning models.

The first section reviews the main factors explaining financial crises. A financial crisis is often an amalgam of events, including substantial changes in credit

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1 Reinhart and Rogoff (forthcoming) use this phrase in the context of banking crises, but it also applies to a wider range of crises.
2 For further reading on financial crises, the starting point is the authoritative study by Reinhart and Rogoff (2009b). Classical references are Minsky (1975) and Kindleberger (1978). See also, IMF (1998); Eichengreen (2002); Tirole (2002); Allen and Gale (2007); Allen, Babus, and Carletti (2009); Allen (2010); and Gorton (2012) for reviews of the causes and consequences of financial crises.
volume and asset prices; severe disruptions in financial intermediation, notably the supply of external financing; large-scale balance sheet problems; and the need for large-scale government support. Although these events can be driven by a variety of factors, financial crises often are preceded by asset and credit booms that then turn into busts. Thus, many theories focusing on the sources of financial crises have recognized the importance of sharp movements in asset and credit markets. In light of this, this section briefly reviews theoretical and empirical studies analyzing developments in asset and credit markets around financial crises.

The second section classifies the types of financial crises identified in many studies into four main groups: currency crises, sudden stop (or capital account or balance of payments) crises, debt crises, and banking crises. This section summarizes the findings of the literature on the analytical causes and empirical determinants of each type of crisis.

The identification of crises is discussed in the third section. Theories designed to explain crises are used to guide the literature on the identification of crises. However, transforming the predictions of the theories into practice has been difficult. Although it is easy to design quantitative methods for identifying currency (and inflation) crises and sudden stops, the identification of debt and banking crises is typically based on qualitative and judgmental analyses. Irrespective of the classification used, different types of crises are likely to overlap. Many banking crises, for example, are also associated with sudden stop episodes and currency crises. The coincidence of multiple types of crises leads to further challenges of identification. The literature, therefore, employs a wide range of methods to identify and classify crises. The section considers various identification approaches and reviews the frequency of crises over time and across different groups of countries.

The fourth section analyzes the implications of financial crises. The macroeconomic and financial implications of crises are typically severe and share many common features across various types. Large output losses are common to many crises, and other macroeconomic variables typically register significant declines. Financial variables, such as asset prices and credit, usually follow qualitatively similar patterns across crises, albeit with variations in severity and duration of declines. The section examines the short- and medium-term effects of crises and presents a set of stylized facts with respect to their macroeconomic and financial implications.

The fifth section summarizes the main methods used for predicting crises. Predicting the timing of crises has been a challenge. Financial markets with high leverage can easily be subject to crises of confidence, making it the main reason that the exact timing of crises is so difficult to predict. Moreover, the nature of crises changes over time as economic and financial structures evolve. Not surprisingly, early-warning tools can quickly become obsolete or inadequate. This section presents a summary of the evolution of different types of prediction models and considers the current state of early-warning models.
The last section first summarizes the major lessons from this literature review, then considers the most relevant issues for research in light of these lessons, including that future research should be geared toward eliminating the “this-time-is-different” syndrome. However, this is a very broad task requiring that two major issues be addressed: How can financial crises be prevented? And, can their costs be mitigated when they take place? In addition, more intensive efforts are required to collect the necessary data and to develop new methods to guide both empirical and theoretical studies.

EXPLAINING FINANCIAL CRISES

Financial crises have common elements, but they come in many forms. A financial crisis is often associated with one or more of the following phenomena: substantial changes in asset prices and credit volume; severe disruptions in financial intermediation and the supply of external financing to various actors in the economy; large-scale balance sheet problems (of firms, households, financial intermediaries, and sovereigns); and large-scale government support (in the form of liquidity support and recapitalization). Financial crises are typically multidimensional events and can be hard to characterize using a single indicator.

The literature has clarified some of the factors driving crises, but definitively identifying their deeper causes remains a challenge. Many theories have been developed regarding the underlying causes of crises. Although fundamental factors—macroeconomic imbalances, internal or external shocks—are often observed, many questions remain about the exact causes of crises. Financial crises sometimes appear to be driven by “irrational” factors, including sudden runs on banks; contagion and spillovers among financial markets; limits to arbitrage during times of stress; the emergence of asset busts, credit crunches, and fire sales; and other aspects of financial turmoil. Indeed, the idea of “animal spirits” (as a source of financial market movements) has long occupied a significant space in the literature attempting to explain crises (Keynes, 1930; Minsky, 1975; and Kindleberger, 1976).3

Financial crises are often preceded by asset and credit booms that eventually turn into busts. Many theories focusing on the sources of crises have recognized the importance of booms in asset and credit markets. However, explaining why asset price bubbles or credit booms are allowed to continue and eventually become unsustainable and turn into busts or crunches has been challenging. This naturally requires answering why neither financial market participants nor policymakers foresee the risks and attempt to slow down the increase in asset prices or the expansion of credit.

The dynamics of macroeconomic and financial variables around crises have been extensively studied. Empirical studies have documented the various phases

3 Related are such concepts as “reflexivity” (Soros, 1987), “irrational exuberance” (Greenspan, 1996), and “collective cognition” (de la Torre and Ize, 2011).
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of financial crises, from initial, small-scale financial disruptions to large-scale national, regional, or even global crises. They have also described how, in the aftermath of financial crises, asset prices and credit growth can remain depressed for a long time and how crises can have long-lasting consequences for the real economy. Given their central roles, the chapter next briefly discusses developments in asset and credit markets around financial crises.

Asset Price Booms and Busts

Sharp increases in asset prices, sometimes called bubbles, and often followed by crashes, have been experienced for centuries. Asset prices sometimes seem to deviate from what fundamentals would suggest and exhibit patterns different from predictions of standard models with perfect financial markets. A bubble, an extreme form of such deviation, can be defined as “the part of asset price movement that is unexplainable based on what we call fundamentals” (Garber, 2000, p. 4). Patterns of exuberant increases in asset prices, often followed by crashes, figure prominently in many accounts of financial instability, for both advanced economies and emerging market economies, going back millennia.4

Some asset price bubbles and crashes are well known. Such historical cases include the Dutch Tulip Mania from 1634 to 1637, the French Mississippi Bubble in 1719–20, and the South Sea Bubble in the United Kingdom in 1720 (Kindleberger, 1986; and Garber, 2000). During some of these periods, certain asset prices increased very rapidly in a short time, followed by sharp corrections. These cases are extreme, but not unique. In the 2007–09 financial crisis, for example, house prices in a number of countries followed this inverse U-shaped pattern (Figure 1.1).

What Explains Asset Price Bubbles?

Formal models attempting to explain asset price bubbles have been available for some time. Some of these models consider how individual episodes of rational behavior can lead to collective mispricing, which in turn can result in bubbles. Others rely on microeconomic distortions that can lead to mispricing. Some others assume “irrationality” on the part of investors. Despite parallels, explaining asset price busts (such as fire sales) often requires accounting for different factors than does explaining bubbles.

Some models using rational investors can explain bubbles without distortions. These models consider asset price bubbles as agents’ justified expectations about future returns. For example, in Blanchard and Watson (1982), under rational expectations, the asset price does not need to equal its fundamental value, leading to “rational” bubbles. Thus, observed prices, although exhibiting extremely large fluctuations, are not necessarily excessive or irrational. These models have been applied relatively successfully to explain the Internet bubble of the late 1990s. Pastor and Veronesi (2006) show how a standard model can reproduce the valu-

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4 For detailed reviews of models of asset price bubbles, see Garber (2000); Evanoff, Kaufman, and Malliaris (2012); and Scherbina (2013).
ation and volatility of Internet stocks in the late 1990s, thus arguing that there is no reason to refer to a “dot-com bubble.” Branch and Evans (2008), employing a theory of learning in which investors use the most recent (instead of past) data, find that shocks to fundamentals may increase return expectations. This may cause stock prices to rise above levels consistent with fundamentals. As prices increase, investors’ perceptions of riskiness decline until the bubble bursts. More generally, theories suggest that bubbles can appear without distortions, uncertainty, speculation, or bounded rationality.

But both micro distortions and macro factors can also lead to bubbles. Bubbles may relate to agency issues (Allen and Gale, 2007). For example, as a result of risk shifting—when agents borrow to invest (e.g., margin lending for stocks, mortgages for housing), but can default if rates of return are not sufficiently high—prices can escalate rapidly. Fund managers who are rewarded on the upside more than on the downside (somewhat analogous to the limited liability of financial institutions) bias their portfolios toward risky assets, which may trigger a bubble.

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5 Wang and Wen (2012) argue that systemic risk, commonly perceived as changes in the bubble’s probability of bursting, can produce asset price movements many times more volatile than the economy’s fundamentals and generate boom-bust cycles in the context of a dynamic stochastic general equilibrium model.
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(Rajan, 2005). Other microeconomic factors (e.g., interest rate deductibility for household mortgages and corporate debt) can exacerbate this risk-taking, possibly leading to bubbles.

Investors' behavior can also drive asset prices away from fundamentals, at least temporarily. Frictions in financial markets (notably those associated with information asymmetries) and institutional factors can affect asset prices. Theory suggests, for example, that differences of information and opinions among investors (related to disagreements about valuation of assets), short sales constraints, and other limits to arbitrage are possible reasons for asset prices to deviate from fundamentals. Mechanisms such as herding among financial market players, informational cascades, and market sentiment can affect asset prices. Virtuous feedback loops—rising asset prices and increasing net worth positions that allow financial intermediaries to leverage up and buy more of the same assets—play a significant role in driving the evolution of bubbles. The phenomenon of contagion, that is, spillovers beyond what fundamentals would suggest, may have similar roots. Brunnermeier (2001) reviews these models and shows how they can help explain bubbles, crashes, and other market inefficiencies and frictions. Empirical work confirms some of these channels, but formal econometric tests are most often not powerful enough to separate bubbles from rational increases in prices, let alone to detect the causes of bubbles (Gürkaynak, 2008).

Bubbles may also be the result of the same factors that are argued to lead to asset price anomalies. Many deviations of asset prices from the predictions of efficient-market models, on a small scale with no systemic implications, have been documented (Fama, 1998; Lo and MacKinlay, 2001; and Schwert, 2003). Although some of these deviations have diminished over time, possibly as investors have implemented strategies to exploit them, others, even though documented extensively, persist today. Furthermore, deviations have similarly been found across various markets, time periods, and institutional contexts. Thus, anomalies cannot easily be attributed to specific, institution-related distortions. Rather, they appear to reflect factors intrinsic to financial markets. Studies under the rubric of behavioral finance have tried to explain these patterns, with some success (Shleifer, 2000; Shleifer and Vishny, 1997; Lamont and Thaler, 2003; Diether, Malloy, and Scherbina, 2002; Ofek and Richardson, 2003; and Shleifer and Vishny, 1997).

Note:

6 In Rajan’s (2005) “alpha-seeking” argument, firms, asset managers, and traders take more risk to improve returns, with private rewards in the short term. See Gorton and He (2008) and Dell’Arriccia and Marquez (2006) for theories linking credit booms to the quality of lending standards and competition.
8 Models include Harrison and Kreps (1978); Chen, Hong, and Stein (2002); Scheinkman and Xiong (2003); and Hong, Scheinkman, and Xiong (2008).
9 Empirical studies include Abreu and Brunnermeier (2003); Diether, Malloy, and Scherbina (2002); Lamont and Thaler (2003); Ofek and Richardson (2003); and Shleifer and Vishny (1997).
10 For example, stocks of small firms get higher rates of return than other stocks do, even after adjusting for risk, liquidity, and other factors. Spreads on lower-rated corporate bonds appear to have a relatively larger compensation for default risk than higher-rated bonds do. Mutual funds whose assets cannot be liquidated when investors sell the funds (so-called closed-end funds) can trade at prices different from those implied by the intrinsic value of their assets.
and Barberis and Thaler, 2003). Of course, “evidence of irrationality” may reflect a misspecified model, that is, irrational behavior is not easily falsifiable.

What Triggers Asset Price Busts?

Busts following bubbles can be triggered by small shocks. Asset prices may experience small declines due to changes in either fundamental values or sentiment. Changes in international financial and economic conditions, for example, may drive prices down. The channels by which small declines in asset prices can trigger a crisis are well understood now. Given information asymmetries, for example, a small shock can lead to market freezes. Adverse feedback loops may then arise, in which asset prices exhibit rapid declines and downward spirals. Notably, a drop in prices can trigger a fire sale as financial institutions experiencing a decline in asset values struggle to attract short-term financing. Such sudden stops can lead to a cascade of forced sales and liquidations of assets, and further declines in prices, with consequences for the real economy.

Flight to quality can further intensify financial turmoil. Relationships among financial intermediaries are multiple and complex. Information asymmetries are prevalent among intermediaries and in financial markets. These problems can easily lead to financial turmoil. They can be aggravated by preferences of investors to hold debt claims (Gorton, 2008). Specifically, debt claims are “low information intensive” in normal states of the world; because the risk of default is remote, little analysis of the underlying asset value is required. They become “high information intensive,” however, in times of financial turmoil as risks increase, requiring investors to assess default risks, a complex task involving a multitude of information problems. This situation puts a premium on safety and can create perverse spirals. As investors turn to quality assets, for example, government bonds, they avoid some lower-quality types of debt claims, leading to sharper drops in the prices of those debt claims (Gorton and Ordonez, 2012).

Credit Booms and Busts

A rapid increase in credit is another common thread running through the narratives of events that precede financial crises. Leverage buildups and greater risk taking through rapid credit expansion, in concert with increases in asset prices, often precede crises (albeit typically only recognized with the benefit of hindsight). Both distant and more recent crisis episodes typically witnessed a period of significant growth in credit (and external financing), followed by busts in credit
markets along with sharp corrections in asset prices. In many respects, the
descriptions of the Australian boom and bust of the 1880–90s, for example, fit
the more recent episodes of financial instability. Likewise, the patterns before the
East Asian financial crisis in the late 1990s resembled those of the earlier ones in
Nordic countries as banking systems collapsed following periods of rapid credit
growth related to investment in real estate. The experience of the United States in
the late 1920s and early 1930s exhibits some features similar to the run-up to the
2007–09 global financial crisis with, in addition to rapid growth in asset prices
and land speculation, a sharp increase in (household) leverage. The literature has
also documented common patterns in various other macroeconomic and financial
variables around these episodes.

What Macroeconomic Factors Explain Credit Booms?

Credit booms can be triggered by a wide range of factors, including shocks and
structural changes in markets.12 Shocks that can lead to credit booms include
changes in productivity, economic policies, and capital flows. Some credit booms
tend to be associated with positive productivity shocks. These booms generally
start during or after periods of buoyant economic growth. Dell’Ariccia and others
(Chapter 11, this volume) find that lagged GDP growth is positively associated
with the probability of a credit boom: in the three-year period preceding a boom,
the average real GDP growth rate reaches 5.1 percent, compared with 3.4 percent
during a tranquil three-year period.

Sharp increases in international financial flows can amplify credit booms.
Most national financial markets are affected by global conditions, even more so
today, so asset bubbles can easily spill across borders. Fluctuations in capital flows
can amplify movements in local financial markets when inflows lead to a signifi-
cant increase in the funds available to banks, relaxing credit constraints for cor-
porations and households (Claessens and others, 2010). Rapid expansion of
credit and sharp growth in house and other asset prices were indeed associated
with large capital inflows in many countries before the 2007–09 financial crisis.

Accommodative monetary policies, especially when in place for extended peri-
ods, have been linked to credit booms and excessive risk taking. The channel
works as follows: Interest rates affect asset prices and borrowers’ net worth, in turn
affecting lending conditions. Analytical models, including of the relationship
between agency problems and interest rates (e.g., Stiglitz and Weiss, 1983), sug-
gest more risk taking when interest rates decline and a flight to quality when
interest rates rise, with consequent effects on the availability of external financing.
Empirical evidence (e.g., for Spain and others, 2009; and Maddaloni and Peydró,
2010) supports such a channel because credit standards tend to loosen when
policy rates decline.

12 For reviews of factors associated with the onset of credit booms, see Mendoza and Terrones (2008,
2012); Magud, Reinhart, and Vesperoni (2012); and Dell’Ariccia and others (Chapter 11, this vol-
ume).
The relatively low interest rates in the United States during 2001–04 are often mentioned as a main factor behind the rapid increases in house prices and household leverage (Lansing, 2008; Hirata and others, 2012).^{13}

**What Structural Factors Explain Credit Booms?**

Structural factors include financial liberalization and innovation. Financial liberalization, especially when poorly designed or sequenced, and financial innovation can trigger credit booms and lead to excessive increases in leverage by facilitating more risk taking. Financial liberalization has been found to often precede crises in empirical studies (Kaminsky and Reinhart, 1999; and Demirgüç-Kunt and Detragiache, 2005). Dell’Ariccia and others (Chapter 11, this volume) report that roughly a third of booms they identified follow or coincide with financial liberalization episodes.

The mechanisms involved include institutional weaknesses as well as the perverse effects of competition. Regulation, supervision, and market discipline seem to be slow to catch up with greater competition and innovation (possibly set in motion by shocks or liberalization). Vulnerabilities in credit markets can naturally arise. Another mechanism commonly linking booms to crises is a decline in lending standards. Greater competition in financial services, although generally enhancing efficiency and stability in the long term, can contribute to financial fragility over shorter periods. This was evident in the higher delinquency rates in those metropolitan areas in the United States with higher growth in loan origination before the onset of the crisis, with the deterioration in lending standards appearing to be related, in part, to increases in competition (Dell’Ariccia, Igan, and Laeven, 2012).

**Impact of Asset Price and Credit Busts**

Movements in asset and credit markets during financial crises are much sharper than those observed over the course of a normal business cycle. Booms in credit and asset markets, defined as those upturns in the uppermost quartile of all upturns, are shorter, stronger, and faster than other upturns. For example, booms often take place over relatively shorter periods than do other upturns and are associated with much faster increases in the financial variables (Figure 1.2a). The slope of a typical boom, that is, the average increase in the financial variable in each quarter, is two to three times larger than that of regular upturns. And crunches and busts are longer, deeper, and more violent than other downturns.

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^{13} However, whether and how monetary policy affects risk taking, and thereby asset prices and leverage, remains a subject for further research (see de Nicolo and others, 2010, for recent analysis and review). The extent of bank capitalization appears to be an important factor given that it affects incentives: when facing a lower interest rate, a well-capitalized bank decreases its monitoring and takes more risk, whereas a highly levered, poorly capitalized bank does the opposite (see Dell’Ariccia, Laeven, and Marquez, 2011).
Credit crunches and asset price busts have much larger declines than do other downturns (Figure 1.2b). Specifically, credit crunches and house price busts, respectively, lead to roughly 10 and 15 times larger drops than do other downturns, whereas equity busts are more than 2.5 times as large. These episodes also last longer, some two times longer, than other downturns, with house price busts...
Figure 1.2.B  Credit Crunches and Asset Price Busts

Source: Authors’ calculations.
Note: The sample includes data for 23 advanced economies and covers 1960–2011. Amplitude and slope correspond to sample median, and duration corresponds to sample mean. Duration is the number of quarters between peak and trough. Amplitude is calculated as the decline in each respective variable during the downturn. Slope is the amplitude from peak to trough divided by the duration. Crunches and busts are the worst 25 percent of downturns calculated by the amplitude.

***, ** indicate that the difference between the corresponding disruptions and other downturns is statistically significant at the 1 and 5 percent levels, respectively.

the longest of all, about 18 quarters, whereas credit crunches and equity busts last about 10–12 quarters. Moreover, disruptions are more violent, as evidenced by higher slope coefficients, with busts in equity prices being three times more violent than those in credit and house prices (Claessens, Kose, and Terrones, 2010a).
Asset price busts and credit crunches typically have adverse effects on the real economy. Asset price busts can affect bank lending and other financial institutions’ investment decisions and, in turn, the real economy through two channels. First, when borrowing and lending is collateralized and the market price of collateral falls, the ability of firms to rely on assets as collateral for new loans and financial institutions’ ability to extend new credit become impaired, which in turn adversely affect investment. Second, the prospect of large price dislocations arising from fire sales and related financial turmoil distorts financial institutions’ decisions to lend or invest, prompting them (among other actions) to hoard cash. Through these channels, fire sales can trigger a credit crunch and cause a severe contraction in real activity.

Those asset price busts supported by leveraged financing and involving financial intermediaries appear to entail larger risks for the economy. Evidence from past episodes suggests that whether excessive movements in asset prices lead to severe misallocations of resources depends in large part on the nature of the boom and how it is financed. Booms largely involving equity market activities appear to have lower risks of adverse consequences. The burst of the Internet bubble of the late 1990s, which mainly involved only equity markets, was not very costly for the real economy. When banks are involved in financing asset price busts, however, as in real estate mortgage and corporate sector financing, risks of adverse consequences from a subsequent asset bust are typically much higher. These booms involve leverage and banks, meaning that the flow of credit to the economy is interrupted when a bust occurs.

The burst of the latest bubble—financed by banks (and the shadow banking system) and involving housing—has been very costly. For the 2007–09 episode, Crow and others (Chapter 12, this volume) report that, in a 40-country sample, almost all the countries with “twin booms” in real estate and credit markets (21 out of 23) ended up suffering from either a crisis or a severe drop in the GDP growth rate relative to the country’s performance in the 2003–07 period (Figure 1.3). Eleven of these countries actually suffered both financial sector damage and a sharp drop in economic activity. In contrast, of the seven countries that experienced a real estate boom but not a credit boom, only two went through a systemic crisis and, on average, had relatively mild recessions. A broader discussion of the real and financial implications of financial crises and disruptions is presented in the section below titled “Real and Financial Implications of Crises.”

14 Some economists used to be sanguine about the costs of busts in credit and asset markets. Until the 2007–09 crisis, for example, the economic cost of bubbles was dismissed by some analysts. For example, Roger W. Ferguson, then Vice Chairman of the U.S. Federal Reserve Board, argued in January 2005 that “recessions that follow swings in asset prices are not necessarily longer, deeper, and associated with a greater decline in output and investment than other recessions” (Ferguson, 2005, p. 16). There are also theories in which even fully irrational asset bubbles are not necessarily harmful or could even be beneficial (Kocherlakota, 2009). Bubbles can allow for a store of value (collateral) and thereby enhance overall financial intermediation through facilitating exchanges, thus improving overall economic performance. As such, the presence of bubbles per se, whether rational or irrational, need not necessarily be a cause for concern.
TYPES OF FINANCIAL CRISES

Financial crises can take various shapes and forms, but two broad types can be distinguished. Reinhart and Rogoff (2009b) describe two types of crises: those classified using strictly quantitative definitions, and those dependent largely on qualitative and judgmental analysis. The first group mainly includes currency and sudden stop crises, and the second group contains debt and banking crises. Regardless, definitions are strongly influenced by the theories trying to explain crises.

The literature has been able to arrive at concrete definitions of many types of crises. For example, a currency crisis involves a speculative attack on the currency resulting in a devaluation (or sharp depreciation); or forces the authorities to defend the currency by expending large amounts of international reserves, or sharply raising interest rates, or imposing capital controls. A sudden stop (or capital account or balance of payments crisis) can be defined as a large (and often unexpected) decline in international capital inflows or a sharp reversal in aggregate capital flows to a country, likely taking place in conjunction with a sharp rise in its credit spreads. Because these are measurable variables, they lend themselves to the use of quantitative methodologies.

Other crises are associated with adverse debt dynamics or banking system turmoil. A foreign debt crisis takes place when a country cannot (or does not want to) service its foreign debt, sovereign, private, or both. A domestic public debt crisis takes place when a country does not honor its domestic fiscal obligations in real terms, either by defaulting explicitly, or by inflating or otherwise debasing its currency, or by employing other forms of financial repression. In a systemic banking crisis, actual or potential bank runs and failures can induce banks to suspend
the convertibility of their liabilities, or compel the government to intervene to prevent them from doing so by extending liquidity and capital assistance on a large scale. Because these variables are not so easily measured, these crises lend themselves more to the use of qualitative methodologies.

Other classifications are possible, but the types of crises are still likely to overlap. A number of banking crises, for example, are associated with sudden stop episodes and currency crises. This section examines analytical causes and empirical determinants of each type of crisis. The identification, dating, and frequency of crises are considered in the next section.

**Currency Crises**

Theories of currency crises, often more precisely articulated than theories for other types of crisis, have evolved as the nature of such crises has changed. In particular, the literature has changed from a focus on the fundamental causes of currency crises, to emphasizing the scope for multiple equilibria, and to stressing the role of financial variables, especially changes in balance sheets, in triggering currency crises (and other types of financial turmoil). Three generations of models are typically used to explain currency crises that took place during the past four decades.

The first generation of models, largely motivated by the collapse in the price of gold, an important nominal anchor before the floating of exchange rates in the 1970s, was often applied to currency devaluations in Latin America and other developing countries (Claessens, 1991). These models are from seminal papers by Krugman (1979) and Flood and Garber (1984), and hence called “KFG” models.\(^{15}\) They show that a sudden speculative attack on a fixed or pegged currency can result from rational behavior by investors who correctly foresee that a government has been running excessive deficits financed with central bank credit. Investors continue to hold the currency as long as they expect the exchange rate regime to remain intact, but they start dumping it when they anticipate that the peg is about to end. This run leads the central bank to quickly lose its liquid assets or hard foreign currency supporting the exchange rate. The currency then collapses.

The second generation of models stress the importance of multiple equilibria. These models show that doubts about whether a government is willing to maintain its exchange rate peg could lead to multiple equilibria and currency crises (Obstfeld, 1986). In these models, self-fulfilling prophecies are possible, in which the reason investors attack the currency is simply that they expect other investors to attack the currency. As discussed in Flood and Marion (1997), policies before the attack in the first-generation models can translate into a crisis, whereas changes in policies in response to a possible attack (even if these policies are compatible with macroeconomic fundamentals) can lead to an attack and be the trigger of a crisis in the second generation of models. The second-generation

\(^{15}\) Earlier versions of the canonical crisis model were Salant and Henderson (1978) and Salant (1983).
models are, in part, motivated by episodes like the European Exchange Rate Mechanism crisis, in which countries like the United Kingdom came under pressure in 1992 and ended up devaluing, even though other outcomes (that were consistent with macroeconomic fundamentals) were possible too (Eichengreen, Rose, and Wyplosz, 1995).

The third-generation crisis models explore how rapid deteriorations of balance sheets associated with fluctuations in asset prices, including exchange rates, can lead to currency crises. These models were largely motivated by the Asian crises of the late 1990s. In the Asian countries, macroeconomic imbalances were small before the crisis—fiscal positions were often in surplus and current account deficits appeared to be manageable, but vulnerabilities associated with financial and corporate sectors were large. The models show how balance sheet mismatches in these sectors can give rise to currency crises. For example, Chang and Velasco (2000) show how local banks with large debts outstanding that are denominated in foreign currency may lead to a banking and currency crisis.16

This generation of models also considers the roles played by banks and the self-fulfilling nature of crises. McKinnon and Pill (1996), Krugman (1999), and Corsetti, Pesenti, and Roubini (1998) suggest that overborrowing by banks can arise as the result of government subsidies (to the extent that governments would bail out failing banks). In turn, vulnerabilities stemming from overborrowing can trigger currency crises. Burnside, Eichenbaum, and Rebelo (2001, 2004) argue that crises can be self-fulfilling because of fiscal concerns and volatile real exchange rate movements (when the banking system has such a government guarantee, a good or a bad equilibrium can result). Radelet and Sachs (1998) argue more generally that self-fulfilling panics hitting financial intermediaries can force a liquidation of assets, which then confirms the panic and leads to a currency crisis.

Empirical research has not been able to determine which generation of these models provides the best characterization of currency crises. Early work had good success with the KFG model. Blanco and Garber (1986), for example, applied the KFG model to the Mexican devaluations in 1976 and 1981–82 and showed that crisis probabilities had built to peaks just before the devaluations (Cumby and van Wijnbergen, 1989; and Klein and Marion, 1994). However, although the KFG model worked well in cases in which macroeconomic fundamentals grew explosively, it was not successful if fundamentals were merely highly volatile and money demand was unstable.

Later empirical work moved away from explicit tests of structural models. Some studies used censored dependent variable models, for example, logit models, to estimate crisis probabilities based on a wide range of lagged variables (Eichengreen, Rose, and Wyploz, 1995; Frankel and Rose, 1996; and Kumar, 1998). Hallwood and MacDonald (2000) provide a detailed summary of the first- and second-generation models and consider their extensions to different contexts. Krugman (1999), in an attempt to explain the Asian financial crisis, also provides a similar mechanism operating through firms’ balance sheets, with investment as a function of net worth.

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Moorthy, and Perraudin, 2003). Others, such as Kaminsky, Lizondo, and Reinhart (1998) and Kaminsky and Reinhart (1999), employed signaling models to evaluate the usefulness of several variables in signaling an impending crisis. This literature found that certain indicators tend to be associated with crises, but the outcomes have nevertheless been disappointing, with the timing of crises very hard to predict. The issue of crisis prediction will be revisited later.

**Sudden Stops**

Models with sudden stops are more closely associated with disruptions in the supply of external financing. These models resemble the third generation of currency crisis models in that they also focus on balance sheet mismatches—notably currency, but also maturity—in financial and corporate sectors (Calvo, Izquierdo, and Mejía, 2004). They tend to give greater weight, however, to the role of international factors (as captured, for example, by changes in international interest rates or spreads on risky assets) in causing sudden stops in capital flows. These models can account for the current account reversals and the real exchange rate depreciation typically observed during crises in emerging markets. The models explain less well the typical sharp drops in output and total factor productivity.

To match data better, more-recent sudden stop models introduce various frictions. Although counterintuitive, in most models, a sudden stop or currency crisis generates an increase in output rather than a drop. This increase in output happens through an abrupt increase in net exports resulting from the currency depreciation. This theory has led to various arguments explaining why sudden stops in capital flows are associated with large output losses, as is often the case. Models typically include Fisherian channels and financial accelerator mechanisms, or frictions in labor markets, to generate an output drop during a sudden stop, without losing the ability to account for the movements of other variables.

Closely following the literature on domestic financial intermediation, models with financial frictions help to account better for the dynamics of output and productivity in sudden stops. With frictions, for example, when firms must borrow in advance to pay for inputs (e.g., wages, foreign inputs), a decline in credit—the sudden stop combined with rising external financing premiums—reduces aggregate demand and causes a decline in output (Calvo and Reinhart, 2000). Or as a result of collateral constraints in lending, a sudden stop can lead to a debt-deflation spiral of declines in credit, prices, and quantity of collateral assets, resulting in a decline in output. Like the domestic financial accelerator mechanism, financial distress and bankruptcies cause negative externalities, because banks become more cautious and reduce new lending, in turn, inducing a further decline in credit, and thereby contributing to a recession (Calvo, 2000).

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17 See Kaminsky, Lizondo, and Reinhart (1998) for an early review; Kaminsky (2003) for an update; and Frankel and Saravelos (2012) for an extensive recent survey up to the 2000s.
These types of amplification mechanisms can make small shocks cause sudden stops. Relatively small shocks—to imported input prices, the world interest rate, or productivity—can trigger collateral constraints on debt and working capital, especially when borrowing levels are high relative to asset values. Fisher’s debt-deflation mechanisms can then cause sudden stops through a spiraling decline in asset prices and holdings of collateral assets (Fisher, 1933). This chain of events immediately affects output and demand. Mendoza (2010) shows how a business cycle model with collateral constraints can be consistent with the key features of sudden stops. Korinek (2011) provides a model analyzing the adverse implications of large movements in capital flows on real activity.

Sudden stops often take place in countries with relatively small tradable sectors and large foreign exchange liabilities. Sudden stops have affected countries with widely disparate levels of per capita GDP, levels of financial development, and exchange rate regimes, as well as countries with different levels of reserve coverage. However, most episodes share two elements, as Calvo, Izquierdo, and Mejía (2008) document: a small supply of tradable goods relative to domestic absorption—a proxy for potential changes in the real exchange rate—and a domestic banking system with large foreign exchange-denominated liabilities, raising the probability of a “perverse” cycle.

Empirical studies find that many sudden stops have been associated with global shocks. For a number of emerging markets, for example, those in Latin America and Asia in the 1990s and in Central and Eastern Europe in the 2000s, after a period of large capital inflows, a sharp retrenchment or reversal of capital flows occurred, triggered by global shocks (such as increases in interest rates or changes in commodity prices). Sudden stops are more likely with large cross-border financial linkages. Milesi-Ferretti and Tille (2011) document that rapid changes in capital flows were important triggers of local crises during the 2007–09 crisis. Others, such as Rose and Spiegel (2011), however, find little role for international factors, including capital flows, in the spread of the 2007–09 crisis.

**Foreign and Domestic Debt Crises**

Theories on foreign debt crises and default are closely linked to those explaining sovereign lending. Absent military action, lenders cannot seize collateral from another country, or at least from a sovereign, when it refuses to honor its debt obligations. Without an enforcement mechanism—the analogue to domestic bankruptcy—economic reasons, instead of legal arguments, are needed to explain why international (sovereign) lending exists at all.

As a gross simplification, models so far rely on either intertemporal or intratemporal sanctions. Intertemporal sanctions arise because of the threat that future lending will be cut off if a country defaults (Eaton and Gersovitz, 1981). With no access to credit (forever or for some time), the country would no longer be able to smooth idiosyncratic income shocks using international financial markets. This cost can induce the country to continue making its debt payments today,
even without any immediate, direct costs to default. Intratemporal sanctions can arise from the inability to earn foreign exchange today because trading partners impose sanctions or otherwise shut the country out of international markets, again forever or for some time (Bulow and Rogoff, 1989). Both types of cost can support a certain volume of sovereign lending (Eaton and Fernandez, 1995; and Panizza, Sturzenegger, and Zettelmeyer, 2009).

These models imply that inability or unwillingness to pay, that is, default, can result from different factors. The incentives governments face in repaying debt differ from those for domestic corporations and households. They also vary across models. In the intratemporal model, a country defaults when the opportunity cost of not being able to borrow ever again is low, one such case presumably being when the terms of trade are good and are expected to remain so (Kletzer and Wright, 2000). In the intratemporal sanctions model, in contrast, the costs of a cutoff from trade may be the least when the terms of trade are bad. Aguiar and Gopinath (2006) demonstrate how in a model with persistent shocks, countries default in bad times to smooth consumption. The models thus also have different implications with respect to a country’s borrowing capacity.

However, these models are unable to fully account for why sovereigns default and why creditors lend as much as they do. Many models actually assume that default does not happen in equilibrium because creditors and debtors want to avoid the dead-weight costs of default and renegotiation of debt payments. Although some models have been calibrated to match actual experiences of default, models often still underpredict the likelihood of actual defaults. Notably, countries do not always default when times are bad, as most models predict: Tomz and Wright (2007) report that output was below trend in only 62 percent of default cases. Models also underestimate the willingness of investors to lend to countries in spite of large default risk. Moreover, changes in the institutional environment, such as those implemented after the debt crises of the 1980s, do not appear to have modified the relationship between economic and political variables and the probability of a debt default. Together, these factors suggest that models still fail to capture all aspects necessary to explain defaults (Panizza, Sturzenegger, and Zettelmeyer, 2009).

Although domestic debt crises have occurred throughout history, these episodes received only limited attention in the literature until recently. Economic theory assigns a trivial role to domestic debt crises because models often assume that governments always honor their domestic debt obligations—the typical assumption is of “risk-free” government assets. Models also often assume Ricardian equivalence, making government debt less relevant. However, recent reviews of history (Reinhart and Rogoff, 2009b) show that few countries were able to escape default on domestic debt, with often adverse economic consequences.

Government default on domestic debt often happens through bouts of high inflation caused by abuse of the government monopoly on currency issuance. One such episode was when the United States experienced an inflation rate of
close to 200 percent in the late 1770s. The periods of hyperinflation in some European countries following World War II were also in this category. Debt defaults in the form of inflation are often followed by currency crashes. In the past, countries would often “debase” their currency by reducing the metal content of coins or switching to another metal. This tactic reduced the real value of government debt and thus provided fiscal relief. There have also been other forms of debt “default,” including through financial repression (Reinhart, Kirkegaard, and Sbrancia, 2011). After inflation or debasing crises, it takes a long time to convince the public to start using the currency again. This, in turn, significantly increases the fiscal costs of inflation stabilization, leading to large negative real effects of high inflation and associated currency crashes.

Debt intolerance tends to be associated with the extreme duress many emerging market economies experience at levels of external debt that would often be easily managed by advanced economies. Empirical studies on debt intolerance and serial default suggest that, although safe debt thresholds hinge on country-specific factors, such as a country’s record of default and inflation, when the external debt level of an emerging economy is greater than 30–35 percent of GNP, the likelihood of an external debt crisis rises substantially (Reinhart and Rogoff, 2009a). More important, when an emerging market economy becomes a serial defaulter on its external debt, its debt intolerance increases, making it very difficult to graduate to the club of countries that have continuous access to global capital markets.

Many challenges remain with regard to modeling the ability of countries to sustain various types of domestic and external debt. An important challenge is that the form of financing countries use is endogenous. Jeanne (2003) argues that short-term (foreign exchange) debt can be a useful commitment device for countries to employ good macroeconomic policies. Diamond and Rajan (2001) posit that banks in developing countries have little choice but to borrow short term to finance illiquid projects given the low-quality institutional environments in which they operate. Eichengreen and Hausmann (1999) propose the “original sin” argument, explaining how countries with unfavorable conditions have no choice but to rely mostly on short-term, foreign currency–denominated debt as their main source of capital. More generally, although short-term debt can increase vulnerabilities, especially when the domestic financial system is underdeveloped, poorly supervised, and subject to governance problems, it also may be the only source of (external) financing for a capital-poor country with limited access to equity or foreign direct investment inflows. Thus, the country’s accumulation of short-term debt and increasing vulnerability to crises are simultaneous outcomes.

More generally, the deeper causes behind debt crises are hard to separate from the proximate causes. Many of the vulnerabilities raising the risk of a debt crisis can result from factors related to financial integration, political economy, and institutional environments. Opening up to capital flows can make countries with profligate governments and weakly supervised financial sectors more vulnerable to shocks. McKinnon and Pill (1996, 1998) describe how moral
hazard and inadequate supervision combined with unrestricted capital flows can lead to crises as banks incur currency risks. Debt crises are also likely to involve sudden stops or currency or banking crises (or various combinations), making it hard to identify the initial cause. Empirical studies of the identification of causes are thus subject to the usual problems of omitted variables, endogeneity, and simultaneity. For example, although using short-term (foreign currency) debt as a crisis predictor may work, it does not constitute a proof of the root cause of the crisis. The difficulty of identifying the deeper causes is more generally reflected in the fact that debt crises have occurred throughout history.

**Banking Crises**

Banking crises are quite common, but perhaps the least understood type of crisis. Banks are inherently fragile, making them subject to runs by depositors. Moreover, the problems of individual banks can quickly spread to the whole banking system. Although public safety nets, including deposit insurance, can limit this risk, public support comes with distortions that can actually increase the likelihood of a crisis. Institutional weaknesses can also elevate the risk of a crisis. For example, banks depend heavily on the informational, legal, and judicial environments to make prudent investment decisions and collect on their loans. With institutional weaknesses, risks can be higher. Although banking crises have occurred over the centuries and exhibited some common patterns, their timing remains hard to predict empirically.

**Bank Runs and Banking Crises**

Financial institutions are inherently fragile entities, giving rise to many possible coordination problems. Because of their roles in maturity transformation and liquidity creation, financial institutions operate with highly leveraged balance sheets. Hence, banking and other similar forms of financial intermediation can be precarious undertakings. Fragility makes coordination, or lack thereof, a major challenge in financial markets. Coordination problems arise when investors or institutions take actions—like withdrawing liquidity or capital—merely out of fear that others will also take such actions. Given this fragility, a crisis can easily occur in which large amounts of liquidity or capital are withdrawn because of a self-fulfilling belief: it happens because investors fear it will happen. Small shocks, whether real or financial, can translate into turmoil in markets and even a financial crisis.

A simple example of a coordination problem is a bank run. It is a truism that banks borrow short and lend long. This maturity transformation reflects the preferences of consumers and borrowers. However, it makes banks vulnerable to sudden demands for liquidity, that is, runs (the seminal reference here is Diamond and Dybvig, 1983). A run occurs when a large number of customers withdraw their deposits because they believe the bank is, or might become, insolvent. As a bank run proceeds, it generates its own momentum, leading to
a self-fulfilling prophecy (or perverse feedback loop): as more people withdraw their deposits, the likelihood of default increases, encouraging further withdrawals. This sequence can destabilize the bank to the point that it faces bankruptcy because it cannot liquidate assets fast enough to cover its short-term liabilities.

These fragilities have long been recognized, and markets, institutions, and policymakers have developed many coping mechanisms (Dewatripont and Tirole, 1994). Market discipline encourages institutions to limit vulnerabilities. At the firm level, intermediaries have adopted risk-management strategies to reduce their fragility. Furthermore, microprudential regulation, with supervision to enforce rules, is designed to reduce the risky behavior of individual financial institutions and can help engineer stability. Deposit insurance can eliminate the concerns of small depositors and can help reduce coordination problems. Lender-of-last-resort facilities (i.e., central banks) can provide short-term liquidity to banks during periods of elevated financial stress. Policy intervention by the public sector, such as public guarantees, capital support, and purchases of nonperforming assets, can mitigate systemic risk when financial turmoil hits.

Although regulation and safety net measures can help, when poorly designed or implemented these measures can increase the likelihood of a banking crisis. Regulations aim to reduce fragility (for example, limits on balance sheet mismatches stemming from interest rate, exchange rate, or maturity mismatches, or certain activities of financial institutions). Regulation and supervision, however, often find themselves playing catch-up with innovation. And they may be poorly designed or implemented. Support from the public sector can also have distortionary effects (Barth, Caprio, and Levine, 2006). Moral hazard caused by a state guarantee (e.g., explicit or implicit deposit insurance) may, for example, lead banks to assume too much leverage. Institutions that know they are too big to fail or unwind can take excessive risks, thereby creating systemic vulnerabilities. More generally, fragilities in the banking system can arise because of policies at both the micro and macro levels (Laeven, 2011).

History of Bank Runs

Runs have occurred in many countries throughout history. In the United States, bank runs were common during the banking panics of the 1800s and in the early 1900s (during the Great Depression). Only with the introduction of deposit insurance in 1933 did most runs stop in the United States (Calomiris and Gorton, 1991). Widespread runs also happened frequently in emerging markets and developing countries in the later decades of the twentieth century, such as in Indonesia during the 1997 Asian financial crisis. Runs occurred more rarely in

18 Ranciere and Tornell (2011) model how financial innovations can allow institutions to maximize a systemic bailout guarantee, and report evidence supporting this mechanism in the context of the 2007 U.S. financial crisis.
Financial Crises: Explanations, Types, and Implications

other advanced economies, and have occurred even less so in the first decade of
the 2000s, in part as a result of the widespread availability of deposit insurance."19
Yet, Northern Rock, a bank specializing in housing finance in the United
Kingdom, provides a very recent example of a bank run in an advanced country
(Shin, 2009). Rapid withdrawals of wholesale market funding also took place
during the 2007–09 financial crisis, when several investment banks and some
commercial banks faced large liquidity demands from investors.

Widespread runs can also take place in nonbank financial markets. For exam-
ple, in the United States during the fall of 2008, some mutual funds “broke the
buck,” that is, their net asset value fell below par. This triggered sharp outflows
from individual investors and many other mutual funds (Wermers, 2012). This
“run,” in turn, led the government to provide a guarantee against further declines.
These guarantees are a continued source of fiscal risk because the government
might be forced to step in to prevent a run again. Other investment vehicles
specializing in specific asset classes (such as emerging markets) also experienced
sharp outflows because there was a general flight to safety (i.e., more demand for
advanced economies’ government bonds and treasury bills). More generally, the
2007–09 crisis has been interpreted by many as a widespread liquidity run
(Gorton, 2009).

Deeper Causes of Banking Crises

Although funding and liquidity problems can be triggers or proximate causes, a
broader perspective shows that banking crises often relate to problems in asset
markets. Banking crises may appear to originate from the liability side, but they
typically reflect solvency issues. Banks often run into problems when many of
their loans go sour or when securities quickly lose their value. This happened in
crises as diverse as the Nordic banking crises in the late 1980s, the crisis in Japan
in the late 1990s, and the crises in Europe in the 2010s. In all of these episodes,
no large-scale deposit runs on banks occurred, but large-scale problems arising
from real estate loans resulted in undercapitalization in many banks and required
government support. Problems in asset markets, such as those related to the sub-
prime and other mortgage loans, also played a major role during the 2007–09
crisis. These types of problems can go undetected for some time, and a banking
crisis often comes into the open through the emergence of funding difficulties
among a large fraction of banks.

Although the exact causes are often hard to identify, and risks can be difficult
to foresee, in hindsight, banking crises and other financial panics are rarely ran-
dom events. Banking panics more likely to occur near the peak of the business
cycle, with recessions on the horizon, because of concerns that loans will not be

19 Deposit insurance, first introduced in the United States in 1933, was adopted following World War
II by many advanced economies, and has since been employed by developing countries (Demirgüç-
Kunt, Kane, and Laeven, 2008). Although deposit insurance can reduce the risk of bank runs, it
can have severe negative side effects, including increased moral hazard, leading to more risk taking.
repaid (Gorton, 1988; and Gorton and Winton, 2003). Depositors, noticing the risks, demand cash from the banks. Because banks cannot immediately satisfy all requests, a panic may occur. The large-scale bank distress in the 1930s in the United States was traced back to shocks in the real sector. In many emerging markets, banking crises were triggered by external developments, such as sharp movements in capital flows, global interest rates, and commodity prices, which, in turn, led to an increase in nonperforming loans.

Panics can also be policy induced. Panics can take place when some banks experience difficulties and governments intervene in an ad hoc manner, without providing clear signals about the status of other institutions. The banking panic in Indonesia in 1997 has been attributed to poorly managed early interventions.20 Runs can also be directly triggered by government actions: the runs on banks in Argentina in 2001 occurred when the government imposed a limit on withdrawals, making depositors question the soundness of the entire banking system. The 2007–09 financial crisis in advanced economies has, in part, been attributed to the lack of consistency across government interventions and other policy measures (Calomiris, 2009).

Structural problems can also lead to banking crises. Studies have identified some common, structural characteristics related to banking crises (e.g., Lindgren, Garcia; and Saal, 1996; Barth, Caprio, and Levine, 2006; and many others). These include notably poor market discipline caused by moral hazard and excessive deposit insurance; limited disclosure; weak corporate governance frameworks; and poor supervision, in part due to conflicts of interest.21 Other structural aspects found to increase the risk of a crisis include large state ownership and limited competition in the financial system, including restricted entry from abroad; and an undiversified financial system, for example, a dominance of banks (World Bank, 2001).

Because the financial sector receives many forms of public support, policy distortions that can lead to crises easily arise. In the context of the 2007–09 financial crisis in the United States, large government support for housing finance (through the government-sponsored enterprises Fannie Mae and Freddie Mac) has been argued to lead to excessive risk taking. The tendency to pursue accommodative monetary and fiscal policies following crises, at least in some advanced economies, can also be interpreted as a form of ex post systemic bailout, which,

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20 See Honohan and Laeven (2007) for this and other case studies.
21 Failures in regulation and supervision remain the most mentioned cause for crises, despite significant upgrading of regulations, supervisory capacity, and expertise. For analysis of how weaknesses in regulation and supervision contributed to the 2007–09 crisis, see Čihák and others (2012). Analysis suggests, though, that the design of regulation matters for the risk of financial distress. Barth, Caprio, and Levine (2006, 2012), for example, suggest not relying solely on regulation and supervision. Rather, they advocate, among other actions, an active but carefully balanced mix of market discipline and official regulation and supervision. This should all be supported by institutional infrastructure that protects property rights; allows for competition, including engagement with global finance; and ensures adequate information. The wider threats to financial stability, including those arising from political economy and corruption, should be kept at bay.
in turn, distorts ex ante incentives and can lead to excessive risk taking (Farhi and Tirole, 2012). Another often-cited problem has been “connected lending,” which leads to perverse incentives, because politically connected firms and individuals borrow too much from banks, which can cause a buildup of systemic risk. Some well-studied cases of this phenomenon include Mexico (La Porta, López-de-Silanes, and Zamzaripa, 2003; and Haber, 2005), the Russian Federation (Laeven, 2001), and Indonesia (Fisman, 2001).

Systemic banking panics still require further study because many puzzles remain, especially about how contagion arises. The individual importance of the factors listed above in contributing to crises is not known, in part because many of them tend to be observed at the same time. Fragilities remain inherent to the process of financial intermediation, with the causes for panics often difficult to understand. For reasons usually unknown, small shocks can result in significant problems for the entire financial system. Similarly, shocks may spill over from one market to another or from one country to others, leading to financial crises.

The 2007–09 financial crisis had many elements common to other crises. Much has been written about the causes of the 2007–09 crisis (Calomiris, 2009; Gorton, 2009; Claessens and others, 2012a; and many others). Although observers differ on the exact weights, the list of factors common to previous crises is generally similar. Four features often mentioned in common are asset price increases that turned out to be unsustainable, credit booms that led to excessive debt burdens, buildups of marginal loans and systemic risk, and the failure of regulation and supervision to keep up with financial innovation and get ahead of the crisis when it erupted.²²

The global financial crisis was, however, also rooted in some new factors. Four key new aspects often mentioned are the widespread use of complex and opaque financial instruments; the increased interconnectedness among financial markets, nationally and internationally, with the United States at the core; the high degree of leverage of financial institutions; and the central role of the household sector. These factors, in combination with those common to other crises, and fueled at times by poor government interventions during different stages, led to the worst financial crisis since the Great Depression. It required massive government outlays and guarantees to restore confidence in financial systems. The consequences of the crisis are still being felt in many advanced economies and as of 2013 the crisis is still ongoing in some European countries.

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²² Specifically, there was an increase in real estate prices in many markets around the world, paralleled by a run-up in other asset prices, especially in equity. Reinhart and Rogoff (2008) demonstrate that the appreciation of equity and house prices in the United States before the crisis was even more dramatic than appreciations experienced before the “Big Five” post-World War II debt crises. As the global crisis unfolded, those countries that had experienced the greatest increases in equity and house prices during the boom found themselves most vulnerable (Feldstein, 2009). Unfortunately, the similarity in crises patterns was, as is often the case, only recognized after the fact.
IDENTIFICATION, DATING, AND FREQUENCY OF CRISES

A large body of work has been devoted to the identification and dating of crises, but ambiguities remain. Methodologies based on the main theories explaining various types of crises can be used to identify and classify crises.\(^23\) In practice, however, this classification is not so straightforward. Although currency and inflation crises and sudden stops lend themselves to quantitative approaches, the dating of debt and banking crises is typically based on qualitative and judgmental analyses. Irrespective of type, variations in methodologies can lead to differences in the start and end dates of crises. And, as noted, various types of crises can overlap in a single episode, creating possible ambiguities about how to classify the episode. In practice, a wide range of quantitative and qualitative methods involving judgment are used to identify and classify crises.

The difficulties arise, in part, because the frequency and types of financial crises have evolved. For example, currency crises were dominant during the 1980s, whereas banking crises and sudden stops became more prevalent in the 1990s and the first decade of the 2000s. This section begins with a summary of common identification and dating methods (IMF, 1998; Laeven and Valencia, 2008, and Chapter 2, this volume; and Reinhard and Rogoff, 2009b). It then provides a summary of the frequency of crises over time and across groups of countries, and of the overlap among types of crises.

Identification and Dating

Because currency crises involve large changes in exchange rates, and related inflation crises, they are relatively easy to identify. Reinhart and Rogoff (2009b) distinguish these episodes by assigning threshold values for the relevant variables. For currency crises, they consider an exchange rate depreciation in excess of 15 percent per year to be a crisis, whereas for inflation, they adopt a threshold of 20 percent per year.\(^24\) A currency crisis is defined in Frankel and Rose (1996) as a cumulative depreciation of at least 25 percent over a 12-month period, and at least 10 percentage points greater than in the preceding 12 months. The dates identified are obviously sensitive to the thresholds used. These thresholds can be universal, specific to the sample of countries under study, or country specific (as

\(^{23}\) Dating does not, of course, establish causes, including whether the event was a rational outcome of some other “cause” (e.g., a crash in an asset price may be rational in response to a real shock).

\(^{24}\) Their comprehensive analysis includes the period 1258–1799, during which the principal means of exchange was metallic coins. During this earlier era, instead of modern inflation and currency crises, there were a number of episodes of currency debasements, which were associated with a reduction in the metallic content of coins in circulation in excess of 5 percent. They also consider the introduction of a brand new currency replacing a much-depreciated earlier currency in circulation as another form of currency debasement, which is still practiced in the modern era.
when the threshold is adjusted for the country’s “normal” exchange rate variations).

A measurement issue naturally arises if no significant adjustment in the currency occurred despite pressures or attacks. Movements in international reserves or adjustments in interest rates can absorb exchange rate pressures and prevent or moderate the fluctuations in the rate. However, episodes involving such pressures or attacks are also important to document and study. To address this issue, starting with Eichengreen, Rose, and Wyplosz (1995), different methodologies have been employed. A composite index of speculative pressure is often constructed based on actual exchange rate changes and movements in international reserves and interest rates, with weights chosen to equalize the variance of the components, thereby preventing one component from dominating the index. Thresholds are then set to date the currency events, including both large exchange rate movements and periods of pressure.25

Sudden stops and balance of payments crises can also be objectively classified. Calvo, Izquierdo, and Mejía (2004) define systemic sudden stop events as episodes with output collapses that coincide with large reversals in capital flows. Calvo, Izquierdo, and Mejía (2008) expand on these criteria in two ways: first, the period contains one or more year-over-year declines in capital flows that are at least two standard deviations below its sample mean (thus addressing the “unexpected” requirement of a sudden stop); second, it starts (ends) when the annual change in capital flows falls (exceeds) one standard deviation below (above) its mean (Mauro and Becker, 2006).

Because methodologies vary, various samples of events follow. Calvo, Izquierdo, and Mejía (2004) identified 33 sudden stop events with large and mild output collapses in a sample of 31 emerging market economies. Although studies use different cutoff criteria (Calvo and Reinhart, 2000; Milesi-Ferretti and Razin, 2000; and Calvo, Izquierdo, and Loo-Kung, 2006), the datings of events are very similar. Some studies also require a decline in output, but later studies excluded this requirement (since a decline may be endogenous) and replaced it with the requirement of large spikes in the Emerging Markets Bond Index spread, indicating a shift in the supply of foreign capital (Calvo, Izquierdo, and Mejía, 2008). Cardarelli, Elekdag, and Kose (2010) consider a large capital inflow episode to end “abruptly” if the ratio of net private capital inflows to GDP in the year after the episode terminates is more than 5 percentage points lower than at the end of the episode—closely following the definition of sudden stops in the literature. An episode is also considered to finish abruptly if its end coincides with a currency crisis.

Balance of payments crises can similarly be identified using capital flow data. Despite some differences in approach (e.g., how reserve losses are treated) and statistical variations across studies (e.g., whether the same current account deficit threshold is used for all countries or whether country-specific thresholds are

25 See Frankel and Saravelos (2012) and Glick and Hutchison (2012) for reviews; and Cardarelli, Elekdag, and Kose (2010) for applications.
used), many of them point to similar samples of actual events. Forbes and Warnock (2011) analyze a large set of countries’ gross flows instead of the more typical net capital flows (or current account). They identify episodes of extreme capital flow movements using quarterly data, differentiating activity by foreigners and domestics. They classify episodes as “surge,” “stop,” “flight,” or “retrenchment,” with surges and stops related, respectively, to periods of large gross capital in- or outflows by foreigners, and flights and retrenchments, respectively, related to periods of large capital out- or inflows by domestic residents.

External sovereign debt crises are generally easy to identify as well, although differences in classifications across studies remain. Sovereign defaults are relatively easy to identify because they involve a unique event, the default on payments. Typical dating of such episodes relies on the classification by rating agencies or on information from international financial institutions (see McFadden and others, 1985; and papers summarized in Sturzenegger and Zettelmeyer, 2007). Still, there are choices of methodology. For example, differences arise from considering the magnitude of defaults (whether default has to be widespread or on just one class of claims), default by type of claim (such as bank claims or bond claims, private or public claims), and the length of default (missing a single or several payments). Others look instead at the increases in spreads in sovereign bonds as an indicator of the probability of default (Edwards, 1984).

The end of a default is harder to date. A major issue with dating an episode, including of default and sovereign debt crises, can be identifying its end, that is, when default or crisis is over. Some studies date this as when countries regained access in some form to private financial markets. Others date it as when countries regain a certain credit rating (IMF, 2005; 2011). As a consequence, differences arise as to how long it takes for a country to emerge from a sovereign default.

Domestic debt crises are more difficult to identify. First, consistent historical data on domestic public debt across countries were missing, at least until recently. Furthermore, following a crisis, unrecorded debt obligations can come to light. However, Abbas and others (2011) and Reinhart and Rogoff (2009b) have since made significant progress in putting together historical series on domestic debt. Second, countries can default in many ways: outright direct default, periods of hyper or high inflation, punitive taxation of interest payments, forced interest rate or principal adjustments or conversions, gold clause abrogation, debasing of currency, and forms of financial repression. Reinhart and Rogoff (2009b) describe each of these and make clear that considerable ambiguity remains in classifications of defaults, especially of “inflation-related default” episodes.

Determining start and end dates for banking crises can be particularly challenging. Such crises are usually dated by researchers using a qualitative approach on the basis of a combination of events, such as forced closures, mergers, or government takeover of many financial institutions; runs on several banks; or the extension of government assistance to one or more financial institutions. In addition, in-depth assessments of financial conditions are used as a criterion. Another metric is the fiscal cost associated with resolving these episodes. The end of a
banking crisis is also difficult to identify, in part, because its effects can linger for some time.

There are large overlaps in the dating of banking crises across different studies. Reinhart and Rogoff (2009b) date the beginning of banking crises by two types of events: First are bank runs that lead to the closure of, merging, or takeover by the public sector of one or more financial institutions. Second, if there are no runs, they check the closure of, merging of, takeover of, or large-scale public assistance to an important financial institution. As they acknowledge, this approach has some obvious drawbacks: it could date crises too late (or too early) and gives no information about the end date of these episodes. Still, the classification of Reinhart and Rogoff (2009b) largely overlaps with that of Laeven and Valencia (Chapter 2, this volume).

Differences remain in the dating of crises, which can affect analyses. One example of a difference is the start of Japan's banking crisis, which is dated by Reinhart and Rogoff (2009b) as 1992 and as 1997 by Laeven and Valencia (Chapter 2, this volume). Another example, with significant implications for analysis, is from Lopez-Salido and Nelson (2010). Analyzing events surrounding financial market difficulties in the United States over the past 60 years, Lopez-Salido and Nelson report three distinct crises: 1973–75; 1982–84; and 1988–91. These differ from Reinhart and Rogoff (2009b), who identify only one crisis (1984–91), and Laeven and Valencia (Chapter 2, this volume) who also identify only one crisis, 1988 in that period (and another in 2007, since that period). In contrast to most claims that recoveries are systematically slower after financial crises, Lopez-Salido and Nelson (2010) argue on the basis of their analysis that crises need not impact the strength of recoveries.26 These differences clearly show the importance of dating.

Last, asset price and credit booms, busts, and crunches, common to many crises, are relatively easy to classify, but again approaches vary across studies. Asset prices (notably equity and to a lesser degree house prices) and credit volumes are available from standard data sources. Large changes (in nominal or real terms) in these variables can thus easily be identified. Still, because approaches and focus vary, so do the classifications of booms, busts, and crunches. Claessens, Kose, and Terrones (2012) use the classical business cycle approach, looking at the level of real asset prices or credit to identify peaks and troughs in these variables. They then focus on the top and bottom quartiles of these changes to determine the booms, busts, or crunches. Large deviations from trend in real credit growth (Mendoza and Terrones, 2008) and from the credit-to-GDP ratio can also be used to classify credit booms. And Gourinchas, Valdes, and Landerretche (2001) classify 80 booms based on absolute and relative (to the credit-to-GDP ratio) deviation from trend, but rather than setting the thresholds first, they limit the number of episodes to classify.

26 Bordo and Haubrich (2012) and Howard, Martin, and Wilson (2011) also argue that recoveries following financial crises do not appear to be different from typical recoveries.
Different types of crises can overlap and do not necessarily take place as independent events. One type of crisis can lead to another type. Or two crises can take place simultaneously because of common factors. To classify a crisis as only one type can be misleading when one event is really a derivative of another. Crises in emerging markets, for example, have often been combinations of currency and banking crises associated with sudden stops in capital flows, and subsequently turning into sovereign debt crises. Overall, considerable ambiguity remains on the identification and dating of financial crises, which should serve as an important caveat in reviewing the frequency and distribution of crises over time, as is done in the next section.

**Frequency and Distribution**

Crises have afflicted both emerging market economies and advanced economies throughout centuries. In the three decades before 2007, most crises occurred in emerging markets and included the Latin American crises in the late 1970s and early 1980s, the Mexican crisis in 1995, and the East Asian crises in the mid- to late 1990s. The susceptibility of emerging markets to crises is not new (Reinhart and Rogoff, Chapter 3, this volume). History shows that many countries that are advanced today, including Australia, Spain, the United Kingdom, and the United States, experienced financial crises when they were going through their own emergence processes in the 1800s. For example, France defaulted on its external debt eight times during the period 1550–1800. Some advanced economies experienced crises in recent decades as well, from the Nordic countries in the late 1980s, to Japan in the 1990s. The most recent crises, starting with the U.S. subprime crisis in late 2007 and then spreading to other advanced economies, show (once again) that crises can affect all types of countries.

Some claim that crises have become more frequent. The three decades after World War II were relatively crisis free, whereas the most recent three decades have seen many episodes (Figure 1.4). Some relate this increase to more liberalized financial markets, including floating exchange rates and greater financial integration. Using macroeconomic and financial series for 14 advanced economies for 1870–2008, Jordà, Schularick, and Taylor (2011) report no financial crises during the Bretton Woods period of highly regulated financial markets and capital controls. Also, Bordo and others (2001) argue that the sudden stop problem has become more severe since the abandonment of the gold standard in the early 1970s.

More recent crises seem to have been shorter, but banking crises still last the longest. The median duration of debt-default episodes in the post-World War II period has been much shorter than for the period 1800–1945, possibly because of improvement in policies in the later period, improved international financial markets, or the active involvement of multilateral lending agencies (see further Das, Papaioannou, and Trebesch, 2012). Currency and sudden stop crises are relatively short (almost by definition). With the major caveat that their ends are hard to date, banking crises tend to last the longest, consistent with their large real and fiscal impacts.
Financial crises clearly often come in bunches. Sovereign defaults tend to come in waves and in specific regions. Jordà, Schularick, and Taylor (2011) report that there were five major periods when a substantial number of now-advanced economies experienced crises: 1890, 1907, 1921, 1930–31, and 2007–08. Earlier crises bunched around events such as the Napoleonic Wars. Examples of bunches since the 1980s include the Latin America debt crises in the 1980s; in 1992, the European Exchange Rate Mechanism currency crises; in the late 1990s, the East Asian, Russian, and Brazilian financial crisis; the multiple episodes observed in 2007–08; and the crises in Europe still ongoing in 2013. Periods of widespread sovereign defaults often coincide with a sharp rise in the number of countries going through banking crises. These coincidences point toward common factors driving these episodes as well as spillovers of financial crises across borders.

Some types of crises are more frequent than others. Comparisons can be made for the post-Bretton Woods period (although some types of crises have been documented for longer periods, not all have; and currency crises were nonexistent during the fixed exchange rate period; together this necessitates the common, but shorter period). Of the total number of crises Laeven and Valencia (Chapter 2, this volume) report, 147 are banking crises, 217 are currency crises, and 67 are sovereign debt crises during the period 1970–2011. (Note that several countries experienced multiple crises of the same type.)

However, as noted before, the various types of crises overlap to some extent. Currency crises frequently tend to overlap with banking crises, the so-called twin crises (Kaminsky and Reinhart, 1999). In addition, sudden stop crises, not surprisingly, can overlap with currency and balance of payments crises, and sometimes

![Figure 1.4](image-url)
sovereign crises (Figure 1.5). Of the 431 banking (147), currency (217), and sovereign (67) crises Laeven and Valencia report in Chapter 2, this volume, they consider 68 to be twin crises, and 8 can be classified as triple crises. There are relative differences in coincidences of these episodes. A systemic banking crisis, for example, often involves a currency crisis, and a sovereign debt crisis sometimes overlaps with other crises—20 out of 67 sovereign debt crises are also banking crises, and 42 are also currency crises.

**REAL AND FINANCIAL IMPLICATIONS OF CRISES**

Macroeconomic and financial consequences of crises are typically severe and are similar across the various types of crisis. Despite the obvious differences between crises, the macroeconomic variables follow similar patterns. Large output losses are common and other macroeconomic variables (consumption, investment, and industrial production) typically register significant declines. Financial variables
like asset prices and credit usually follow qualitatively similar patterns across crises, albeit with variations in duration and severity. This section provides a summary of the literature on the macroeconomic and financial implications of crises.

**Real Effects of Crises**

Financial crises have large economic costs with large effects on economic activity. Many recessions follow from financial crises (Figure 1.6) (Claessens, Kose, and Terrones, 2009, 2012). And financial crises often tend to make these recessions worse than a “normal” business cycle recession (Figure 1.7). The average duration of a recession associated with a financial crisis is some six quarters, two more than a normal recession. There is also typically a larger output decline in recessions associated with crises than in other recessions. And the cumulative loss of a recession associated with a crisis (computed using lost output relative to the precrisis peak) is also much larger than that of a recession without a crisis.

The real impact of a crisis on output can be computed using various approaches. For a large cross-section of countries and a long period, Claessens, Kose, and Terrones (2012) use the traditional business cycle methodology to identify recessions. They show that recessions associated with credit crunches and housing busts tend to be more costly than those associated with equity price busts. Overall losses can also be estimated by adding up the differences between trend growth and actual growth for a number of years following the crisis or until the time when annual output growth returns to its trend. On this basis, Laeven

![Figure 1.6 Coincidence of Recessions and Crises, 1960–2011](image-url)
Figure 1.7  Real Implications of Financial Crises, Crunches, and Busts, 1960–2011

Source: Authors’ calculations.

Note: The sample includes data for 23 advanced economies and covers 1960–2011. For “Duration” means are shown, for “Cumulative Loss” and “Amplitude” medians are shown. Amplitude is calculated based on the decline in output from peak to trough of a recession, duration is the number of quarters between peak and trough, and cumulative loss combines information about the duration and amplitude to measure overall cost of a recession and is expressed in percent. Disruptions (severe disruptions) are the worst 25 percent (12.5 percent) of downturns calculated by amplitude. A recession is associated with a (severe) credit crunch or a house price bust if the (severe) credit crunch or the house price bust starts at the same time or one quarter before the peak of the recession. A recession is associated with a financial crisis if the financial crisis starts at the same time as the recession or one year before or two years after the peak of the recession. The severe financial crises are the worst 50 percent of financial crises as measured by output decline during the recession.
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and Valencia (Chapter 2, this volume) estimate that the cumulative cost of banking crises is, on average, about 23 percent of GDP during the first four years. Regardless of the methodology, losses do vary across countries. Overall losses tend to be larger in emerging markets, but the large losses in recent crises in advanced economies (e.g., both Iceland's and Ireland's output losses exceeded 100 percent) paint a different picture. The median output loss for advanced economies is now about 33 percent, which exceeds that of emerging markets at 26 percent.

Crises are generally associated with significant declines in a wide range of macroeconomic aggregates. Recessions following crises exhibit much larger declines in consumption, investment, industrial production, employment, and exports and imports compared with those recessions without crises. For example, the decline in consumption during recessions associated with financial crises is typically seven to ten times larger than those without such crises in emerging markets. In recessions without crises, the growth rate of consumption slows down but does not fall below zero. In contrast, consumption tends to contract during recessions associated with financial crises, another indication of the significant toll that crises have on overall welfare.

Large declines in global output also occur during financial crisis episodes. The significant cost for the world economy associated with the Great Depression has been documented in many studies. The 2007–09 global financial crisis was associated with the worst recession since World War II, causing a 2 percent decline in world per capita GDP in 2009. In addition to 2009, the world economy experienced a global recession and witnessed crises in multiple countries in two other postwar years (Kose, Loungani, and Terrones, forthcoming). In 1982, a global recession was associated with a host of problems in advanced economies, as well as with the Latin American debt crisis. The global recession in 1991 also coincided with financial crises in many parts of the world, including difficulties in U.S. credit markets, banking and currency crises in Europe, and the burst of the asset price bubble in Japan. Although world per capita GDP grows by about 2 percent in a typical year, it declined by about 0.8 percent in 1982 and 0.2 percent in 1991.

Recent studies also document that recoveries following crises tend to be weak and slow, with long-lasting effects. Kannan, Scott, and Terrones (Chapter 8, this volume) use cross-country data and conclude that recoveries following financial crises have typically been slower, and are associated with weak domestic demand and tight credit conditions. These findings are consistent with those reported in several other studies (Reinhart and Rogoff, 2009b; Jordà, Schularick, and Taylor, 2009).

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27 These loss numbers rely on an estimated trend growth, typically proxied by the trend in GDP growth up to the year preceding the crisis. These numbers can overstate output losses, however, because the economy could have experienced a growth boom before the crisis or been on an unsustainable growth path.

28 Mexico’s default in August 1982 marked the beginning of the crisis and the region’s decade-long stagnation (the lost decade). A number of Latin American countries, including Argentina, Mexico, and Venezuela in 1982, and Brazil and Chile in 1983, experienced debt crises during the period.
2011; Papell and Prudan, 2011; and Claessens, Kose, and Terrones, 2012). Abiad and others (Chapter 9, this volume) analyze the medium-term impact of financial crises and conclude that output tends to be depressed substantially following banking crises. Specifically, seven years after a crisis, the level of output is typically about 10 percent lower relative to the precrisis trend (even though growth tends to return to its precrisis rate eventually). They report that the depressed path of output is associated with long-lasting reductions of roughly equal proportions in the employment rate, the capital-to-labor ratio, and total factor productivity.

From a fiscal perspective, banking crises can be especially costly. Both gross fiscal outlays and net fiscal costs of resolving financial distress and restructuring the financial sector can be very large. For banking crises, Laeven and Valencia (Chapter 2, this volume) estimate that fiscal costs, net of recoveries, associated with crises are on average about 6.8 percent of GDP. These costs can, however, be as high as 57 percent of GDP and in several cases are greater than 40 percent of GDP (for example, Chile and Argentina in the early 1980s, Indonesia in the later 1990s, and Iceland and Ireland in 2008). Net resolution costs for banking crises tend to be higher for emerging markets, at 10 percent of GDP, in contrast to 3.8 percent of GDP for advanced economies. Although gross fiscal outlays can be very large in advanced economies too—as in many of the recent and ongoing cases—the final direct fiscal costs have generally been lower in advanced economies, reflecting better recovery of fiscal outlays.

Debt crises can be costly for the real economy. Borensztein and Panizza (2009), Levy-Yeyati and Panizza (2011), and Furceri and Zdzienicka (2012) document that debt crises are associated with substantial GDP losses. Furceri and Zdzienicka (2012) report that debt crises are more costly than banking and currency crises and are typically associated with output declines of 3–5 percent after one year and 6–12 percent after eight years. Gupta, Mishra, and Sahay (2007) find that currency crises are often contractionary.

The combination of financial system restructuring costs and a slow economy can lead public debt to rise sharply during financial crises. Reinhart and Rogoff (2009a) document that crisis episodes are often associated with substantial declines in tax revenues and significant increases in government spending. For example, government debt rises by 86 percent, on average, during the three years following a banking crisis. Using a larger sample, Laeven and Valencia (Chapter 2, this volume) report the median increase in public debt to be about 12 percent for their sample of 147 systemic banking crises. Including indirect fiscal costs, such as those resulting from expansionary fiscal policy and reduced fiscal revenues as a consequence of a recession, makes the overall fiscal costs of the recent crises in advanced economies actually greater than those in emerging markets, 21.4 percent as compared with 9.1 percent of GDP.

Although empirical work has not been able to pinpoint the exact reasons, sudden stops are especially costly. Using a panel data set for 1975–97 and covering

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29 Reinhart and Rogoff (2011) provide further statistical analysis of the links between debt and banking crises.
24 emerging markets, Hutchison and Noy (2006) finds that while a currency crisis typically reduces output by 2–3 percent, a sudden stop reduces output by an additional 6–8 percent in the year of the crisis. The cumulative output loss of a sudden stop is even larger, about 13–15 percent over a three-year period. Edwards (2004) finds sudden stops and current account reversals to be closely related, with reversals, in turn, having a negative effect on real growth, an effect that is more pronounced for emerging markets. Cardarelli, Elekdag, and Kose (2010) examine 109 episodes of large net private capital inflows to 52 countries during 1987–2007 and report that the typical post-inflow decline in GDP growth for episodes that end abruptly is about 3 percentage points lower than during the episode, and about 1 percentage point lower than during the two years before the episode. These fluctuations are also accompanied by a significant deterioration of the current account during the inflow period and a sharp reversal at the end.

**Financial Effects of Crises**

Crises are associated with large downward corrections in financial variables. A sizable research effort has analyzed the evolution of financial variables around crises. Some of the studies in this literature focus on crisis episodes using the dates identified in other work; others consider the behavior of the financial variables during periods of disruptions, including credit crunches and house and equity price busts. Although results differ across the types of crises, both credit and asset prices tend to decline or grow at much lower rates during crises and disruptions than they do during tranquil periods, confirming the boom-bust cycles in these variables discussed in previous sections (Figure 1.8). In a large sample of advanced economies, credit declines by about 7 percent, house prices fall by about 12 percent, and equity prices drop by more than 15 percent during credit crunches and house and equity price busts, respectively (Claessens, Kose, and Terrones, 2012). Asset prices (exchange rates, equity and house prices) and credit around crises exhibit qualitatively similar properties in their temporal evolution in advanced and emerging market countries, but the duration and amplitude of declines tend to be larger for the latter than for the former.

The most notable drag on the real economy from a financial crisis is the lack of credit from banks and other financial institutions. Dell’Ariccia, Detragiache, and Rajan (2008) and Klingebiel, Kroszner, and Laeven (2007) show how after banking crises, sectors that naturally need more external financing grow more slowly, likely because banks are impaired in their lending capacity. Recoveries in aggregate output and its components following recessions associated with credit crunches tend to take place before the revival of credit growth and turnaround in

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30 Of course, this and other analyses can suffer from reverse causality. That is, private agents see events that lead them to predict future drops in a country’s output and, as a result, these agents pull their capital from the country. In this view, anticipated output drops drive sudden stops, rather than the reverse. Although possible and reasonable, it is hard to prove or refute this view quantitatively.
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These temporal patterns are similar to those for house price busts, that is, economic recoveries start before house prices bottom out during recessions coinciding with sharp drops in house prices.

Both advanced and emerging market countries have experienced the phenomenon of “creditless recoveries.” Creditless recoveries are quite common in financial...
crises associated with sudden stops in many emerging market economies (Calvo, Izquierdo, and Talvi, 2006). Abiad, Dell’Arco, and Li (Chapter 10, this volume), using a large sample of countries, show that about one out of five recoveries is creditless. Creditless recoveries are, as expected, more common after banking crises and credit booms. The average GDP growth during these episodes is about
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a third lower than during “normal” recoveries. Furthermore, sectors more dependent on external finance grow relatively less, and more-financially dependent activities (such as investment) are curtailed more (see also Kannan, 2009). Micro evidence for individual countries also shows that financial crises are associated with reductions in investment, research and development, and employment, and firms pass up on growth opportunities. Collectively, these issues suggest that the supply of credit following a financial crisis can constrain economic growth.

PREDICTING FINANCIAL CRISSES

It has long been a challenge to predict the timing of crises. Knowing whether and when a crisis may occur would obviously have great benefits: measures can be put in place to prevent a crisis from occurring in the first place or to limit the damage if it does happen. Therefore, much can be gained from better detecting the likelihood of a crisis. Yet, despite significant effort, no single set of indicators can explain the various types of crises, or can do so consistently over time. Periods of turmoil often arise endogenously, with possibilities of multiple equilibria and many nonlinearities. And although it is now easier to document vulnerabilities, such as increasing asset prices and high leverage, predicting the timing of crises with some accuracy remains difficult. This section presents a short review of the evolution of the empirical literature on prediction of crises.

Early-warning models have evolved from the first generation of models that concentrated on macroeconomic imbalances. Early crisis prediction models, mostly aimed at banking and currency crises, focused largely on macroeconomic and financial imbalances, and often in the context of emerging markets. Kaminsky and Reinhart (1999) show that growth rates in money, credit, and several other variables exceeding certain thresholds made a banking crisis more likely. In a comprehensive review, Goldstein, Kaminsky, and Reinhart (2000) report that a wide range of monthly indicators help predict currency crises,

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31 The fact that the economy recovers without credit growth and increases in asset prices reflects a combination of factors. First, consumption is typically the key driver of recovery. In particular, private consumption is often the most important contributor to output growth during recoveries. Investment (especially investment other than residential housing) recovers only with a lag, with the contribution of fixed investment growth to recovery often relatively small. Second, firms and households may be able to get external financing from sources other than commercial banks that have been adversely affected by the crisis. These sources are not captured in the aggregate credit series most studies focus on. Third, there can be a switch from more to less credit-intensive sectors in such a way that overall credit does not expand, yet, because of productivity gains, output increases. The aggregate data used in many studies hide such reallocations of credit across sectors, including between corporations and households that vary in their credit intensity.

32 Campello, Graham, and Harvey (2009) review evidence for the United States.

33 The slow movement of the financial system from stability to crisis is something for which Hyman Minsky is best known, and the phrase “Minsky moment”—the sudden occurrence of an open financial crisis—refers to this aspect of his work (Minsky, 1992).

34 Babecky and others (2012) present a detailed review of the empirical studies of early-warning models.
including the appreciation of the real exchange rate (relative to trend), a banking crisis, a decline in equity prices, a decline in exports, a high ratio of broad money (M2) to international reserves, and a recession. Among annual indicators, the two best were both current account indicators, namely, a large current account deficit relative to both GDP and investment. For banking crises, the best monthly indicators (in descending order) were appreciation of the real exchange rate (relative to trend), a decline in equity prices, a rise in the money (M2) multiplier, a decline in real output, a decline in exports, and a rise in the real interest rate. Among eight annual indicators tested, the best were a high ratio of short-term capital flows to GDP and a large current account deficit relative to investment.35

In the next generation of models, still largely geared toward external crises, balance sheet variables became more pronounced. Relevant indicators include substantial short-term debt coming due and the level of reserves (Berg, Borensztein, and Pattillo, 2005). The ratio of broad money to international reserves in the year before the crisis was found to be higher (and GDP growth slower) for crises in emerging markets. In these models, fiscal deficit, public debt, inflation, and real broad money growth, however, were often found not to be consistently different between crisis and noncrisis countries before major crises. Neither did interest rate spreads or sovereign credit ratings generally rank high in the list of early-warning indicators of currency and systemic banking crises. Rather, crises were more likely to be preceded by rapid real exchange rate appreciation, current account deficits, domestic credit expansion, and increases in equity prices.

Later models show that a combination of variables can help identify situations of financial stress and vulnerabilities. Frankel and Saravelos (2012) perform a meta analysis based on reviews of crisis prediction models and seven papers published since 2002. The growth rates of credit, foreign exchange reserves, the real exchange rate, GDP, and the current account to GDP ratio are the most frequent significant indicators in the 83 papers reviewed; Lane and Milesi-Ferretti, 2011). Crises are typically preceded by somewhat larger current account deficits relative to historical averages, although credit trends more than external imbalances appear to be the best predictor (Alessi and Detken, 2011; Schularick and Taylor, 2012; and Taylor, Chapter 6, this volume).

Global factors can play important roles in driving sovereign, currency, balance of payments, and sudden stop crises. A variety of global factors are often reported to trigger crises, including deterioration in the terms of trade and shocks to world interest rates and commodity prices. For example, the sharp rise in U.S. interest rates has been identified as a trigger for the Latin American sovereign debt crises of the 1980s. More generally, crises are often preceded by interest rate hikes in advanced economies and by sudden changes in commodity prices, especially oil. But low interest rates can matter as well. For example, Jordà, Schularick, and Taylor (2011) report that global financial crises often take place in an environ-

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35 Crespo-Cuaresma and Slacik (2009) report that most of the early-warning variables for currency crises in the literature are quite fragile, whereas the extent of real exchange rate misalignment and financial market indicators appear to be relatively robust determinants of crisis in certain contexts.
ment of low interest rates. Other studies argue that the global imbalances of the 2000s and the 2007–09 crisis are intimately connected (Obstfeld and Rogoff, 2009; and Obstfeld, 2012). International trade and other real linkages can be channels of transmission, and contagion in financial markets is associated with crises (Forbes, 2012). Studies highlight, for example, the role of a common lender in particular in spreading the East Asian financial crisis (Kaminsky and Reinhart, 2001). These global factors can themselves be outcomes, as in the 2007–09 crisis, when interest rates and commodity prices experienced sharp adjustments following the onset of the crisis.

Overall though, rapid growth in credit and asset prices is found to be the factor most reliably related to increases in financial stress and vulnerabilities. Borio and Lowe (2002) document that out of asset price, credit, and investment data, a measure based on credit and asset prices is the most useful: almost 80 percent of crises can be predicted on the basis of a credit boom at a one-year horizon, whereas false positive signals are issued only about 18 percent of the time. Building on this, Elekdag, Cardarelli, and Lall (2009) find that banking crises are typically preceded by sharp increases in credit and house prices. Many others have found the coexistence of unusually rapid increases in credit and asset prices, large booms in residential investment, and deteriorating current account balances, to contribute to the likelihood of credit crunches and asset price busts.

Recent studies confirm that credit growth is the most important, but still imperfect, predictor. Many of the indicators, such as sharp asset price increases, a sustained worsening of the trade balance, and a marked increase in bank leverage, lose predictive significance once one conditions for the presence of a credit boom. Still, there are both Type I and Type II errors. As Bakker and others (Chapter 11, this volume) show, not all booms are associated with crises: only about a third of boom cases end up in financial crises. Others do not lead to busts but are followed by extended periods of below-trend economic growth. And many booms result in permanent financial deepening and benefit long-term economic growth. Although not all booms end up in a crisis, the probability of a crisis increases with a boom. Furthermore, the larger the increase in credit during the boom, the more likely the episode is to result in a crisis. Bakker and others (Chapter 11, this volume) find that half or more of the booms that either lasted longer than six years (4 out of 9), exceeded 25 percent of average annual growth (8 out of 18), or started at an initial credit-to-GDP ratio higher than 60 percent (15 out of 26) ended up in crises.

In practical terms, recent early-warning models typically use a wide array of quantitative leading indicators of vulnerabilities, with a heavy focus on international factors. These indicators capture vulnerabilities that stem from or are centered in the external, public, financial, nonfinancial corporate, or household sectors, and combine these with qualitative inputs (IMF, 2010). Because international financial markets can play multiple roles in transmitting and causing, or at least triggering, various types of crises, as with the 2007–09 crisis, several international linkage measures are typically used. Notably banking system measures, such as exposures to international funding risks and the ratio of noncore to core
liabilities, have been found to help signal vulnerabilities (Shin, Chapter 4, this volume). International markets can also help with risk sharing and can reduce volatility, and the empirical evidence is mixed, so the overall relationship of international financial integration and crises is much debated (Kose and others, 2010; and Lane, 2012).

CONCLUSION

This chapter presents a survey of the literature on financial crises to answer three specific questions. First, what main factors explain financial crises? Although the literature has clarified some of these factors, it remains a challenge to definitively identify the causes of crises. Many theories have been developed about the underlying causes of crises. These theories have recognized the importance of booms in asset and credit markets that turned into busts as the driving forces behind most crisis episodes. Given their central roles, the chapter briefly summarizes the theoretical and empirical literature analyzing developments in credit and asset markets around financial crises.

Second, what are the major types of crises? Although financial crises can take various shapes and forms, the literature has focused on four major types: currency crises, sudden stop (or capital account or balance of payments) crises, debt crises, and banking crises. Crises can be classified in other ways, too, but the types still often overlap. A number of banking crises, for example, are also sudden stop episodes and currency crises. The chapter examines the literature on the analytical causes and empirical determinants of each type of crisis. In addition, it reviews studies of various approaches to the identification of crises and their frequency over time and across different groups of countries.

Third, what are the real sector and financial sector implications of crises? Large output losses are common to many crises, and other macroeconomic variables (consumption, investment, and industrial production) typically register significant declines. Financial variables like asset prices and credit usually follow qualitatively similar patterns across crises, albeit with variations in duration and severity. The chapter summarizes the literature on the macroeconomic and financial implications of crises.

The chapter also briefly reviews the literature on the prediction of crises. Although there are many benefits to knowing whether and when a crisis may occur, predicting crises remains a challenge. Vulnerabilities, such as increasing asset prices and high leverage, are easily documented, but it remains difficult to predict with any accuracy the timing of crises. No single set of indicators has proved to predict the various types of crises. The chapter reviews how the empirical literature on the prediction of crises has evolved and analyzes its current state.

36 In Chapter 4, Shin compares the predictive power from price-based measures (credit default swaps and other spreads, implied volatility, value at risk, and others), the gap of the credit-to-GDP ratio from a trend, and monetary aggregates and other bank liability aggregates, and shows that the last group has the most predictive power.
Is This Time Really Different?

One of the main conclusions of the literature on financial crises is that it has been hard to beat the “this-time-is-different” syndrome. This syndrome, as aptly described by Reinhart and Rogoff (2009b), is the belief that “financial crises are things that happen to other people in other countries at other times; crises do not happen to us, here and now. We are doing things better, we are smarter, we have learned from past mistakes” (p. 15). Although often preceded by similar patterns, policymakers tend to ignore the warnings and argue that “the current boom, unlike the many booms that preceded catastrophic collapses in the past (even in our country) is built on sound fundamentals” (p. 15). Leading up to every crisis, claims are made that developments appear to be different from those before earlier episodes. Before the 2007–09 crisis, for example, the extensive diversification of risks and advanced institutional frameworks were used to justify the belief that “this time is different.”

As the literature reviewed here makes abundantly clear, there are many similarities in the run-ups to crises. In the 2007–09 crisis, increases in credit and asset prices were similar to those observed in earlier crises. Given these commonalities, it should be possible to prevent crises. Yet, that seems to have been an impossible task. This suggests that future research should be geared to beating the “this-time-is-different” syndrome. This is a very broad task requiring that two major questions be addressed: How can financial crises be prevented? How can their costs be mitigated when they take place? In addition, more intensive efforts are needed to collect the necessary data to guide both empirical and theoretical studies. The rest of this section takes each of these issues in turn and points to future research directions.

How Can Financial Crises Be Prevented?

In light of the lessons from the 2007–09 crisis, asset price bubbles and credit booms can entail substantial costs if they deflate rapidly. Many now agree on a number of issues with respect to asset price bubbles and credit booms. First, rapid increases in asset prices and credit can lead to financial turmoil and crises with significant adverse macroeconomic effects. Second, it is important to monitor vulnerabilities stemming from such sharp increases, and to determine whether they could be followed by large and rapid declines (crashes, busts or crunches, capital outflows). Third, the subsequent busts and crunches are likely to be more harmful if bubbles arise from “distortions.” Fourth, even if not caused by distortions, evidence of irrationality can be interpreted as a sign of inefficiency and a potential source of welfare loss. Thus, bubbles and credit booms can warrant intervention.

The challenge for policymakers and researchers is twofold: when to intervene and how to intervene. First, they need to determine when (and to what extent) increases in asset prices and credit represent substantial deviations from those that can be explained by fundamentals. Second, if the behavior of credit and asset markets suggests signs of risk, they need to determine the optimal
The debate on whether, and how, monetary policy should respond to movements in asset prices and credit remains active. The consensus before the 2007–09 crisis was that the formulation of monetary policy only needed to consider asset prices to the extent that they were relevant for forecasting the economic outlook and inflation, but not otherwise. However, the crisis has made clear (again) that both financial stability and economic activity might be affected by asset price movements, and a view has emerged that monetary policy should take into account, to some degree, developments in asset prices (Bernanke, 2009, 2010; Trichet, 2009; and Blanchard, Dell’Ariccia, and Mauro, 2010, 2013). A way to make this objective operational remains under discussion (Eichengreen, 2011; and Mishkin, 2011). The case for policy intervention is considered to be stronger when the banking system is directly involved in financing the bubble (whereas other asset price bubbles can more justifiably be left to themselves (Crowe and others, Chapter 12, this volume), but the exact adjustment of monetary policy remains unclear (Bean and others, 2010; and King, 2012).

Important lessons are still to be learned about the design of microprudential regulations and institutional structures for the prevention of crises (see also Claessens and others, 2012b). The 2007–09 crisis once again exposed flaws in microprudential regulatory and institutional frameworks. The global nature of the crisis has also shown that financially integrated markets have benefits, but also present risks, because the international financial architecture still is far from institutionally equal to the policy demands of closely integrated financial systems. Elements of existing frameworks provide foundations, but the crisis has forced regulatory policies to be rethought, with many open questions. Although rules calling for well-capitalized and liquid banks that are transparent and adhere to sound accounting standards are being put in place (e.g., Basel III), clarity on how to deal with large, complex financial institutions that operate across many borders is still needed. In addition, what types of changes to the institutional environments—for example, changes in the accounting standards for mark-to-market valuation, adaptations of employee compensation rules, transfers of some derivatives trading to formal exchanges, greater use of central counterparties—would best help to reduce financial markets’ procyclicality and the buildup of systemic risks remain elusive. The crisis has also shown that fiscal policies, both micro, such as deductibility of interest payments, and macro, as in the amount of resources available to deal with financial crises, can play a role in creating vulnerabilities, but which adaptations are needed is not always apparent.

Although there is also a call for the use of macroprudential policies, the design of such policies and their interactions with other policies, especially monetary policy, remain unclear. By constraining financial market participants’ behavior in advance, macroprudential policies can reduce the impact of externalities and

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market failures that lead to systemic vulnerabilities. In that way, they can reduce the risks of financial crises and help improve macroeconomic stability (de Nicolò, Favara, and Ratnovski, 2012). But the exact design of such policies is yet to be formulated. Although it is evident that multiple tools are needed, complications abound. Different financial distortions, for example, can lead to different types of risks, which, in turn, imply the use of multiple intermediate targets. Moreover, the relevant distortions can change over time and vary by country circumstances. Excessive leverage among corporations may give way, for example, to excessive leverage in the household sector. Factors such as the development of the financial sector and the exchange rate regime can greatly affect the types of risks economies face. Much is still unknown about these factors and their implications for the formulation of macroprudential policies. As new macroprudential frameworks are established, policymakers have also been increasingly turning their attention to the complex dynamics between macroprudential and monetary policies. These dynamics hinge on the side effects that one policy has on the other, but conceptual models and empirical evidence on these issues are still in the early stages (see IMF, 2013, for an overview).

The review here clearly shows that further analytical research and empirical work on these issues are needed. Macroeconomic models need to reflect the roles of financial intermediaries better. Current models are often limited in the way that they capture financial frictions. With regard to financial stress, they often assume that available instruments can fully offset financial shocks and abstract from effects, such as those of monetary policy on financial stability. More realistic modeling of the channels that give rise to financial instability and the actual transmission of policies and instruments is needed. In particular, the supply side of finance is not well understood and models with realistic calibrations reflecting periods of financial turmoil are still missing (Brunnermeier and Sanikov, 2012). The roles of liquidity and leverage in such periods have yet to be examined using models better suited to addressing the relevant policy questions. More insights, including from empirical studies, are necessary to help calibrate these models and allow the formulation of policy prescriptions that can be adapted to different country circumstances. Only with progress in modeling financial crises can one hope to not only avoid some of these episodes and be prepared with better policies when they occur, but also to minimize their impacts.

From an applied perspective, better early-warning models are needed. An issue extensively discussed in policy forums and receiving substantial attention from international organizations is the need to improve the prediction of the onset of crises (IMF, 2010). As the review in this chapter shows, the predictive power of available models remains limited. The historical record indicates that asset price busts have been especially difficult to predict. Even the best indicator failed to raise an alarm one to three years ahead of roughly one-half of all busts since 1985. This was the case again for the 2007–09 crisis. Although a number of recent papers that analyze the ability of various models to predict the latest crisis come to negative conclusions as well, others have found some predictive patterns. Regardless, there is scope to improve these models.
While known risks are being addressed, new risks can emerge. The limited strength of crisis prediction models arises in part because countries do take steps to reduce vulnerabilities. In response to increased financial globalization and sudden stop risks, many emerging markets increased their international reserves beginning in the late 1990s, which may have helped some countries avoid the impact of the 2007–09 crisis (Kose and Prasad, 2010; and De Gregorio, Chapter 5, this volume). Similarly, improvements in institutional environments that many countries have put in place during the last decades likely helped reduce some vulnerabilities. At the same time, however, new risks have emerged: the explosion of complex financial instruments, greater balance sheet opaqueness, and reliance on wholesale funding in highly integrated global financial markets increased the risks leading to the 2007–09 crisis.

How Can the Costs of Financial Crises Be Mitigated?

Examining the substantial real costs associated with crises has been a challenge. Various theories attempt to explain the channels by which different types of crises affect the real economy. Many descriptions of the empirical patterns around crisis episodes can also be found. Yet, why crises cause large costs remains an enigma. Many of the channels that lead to macro-financial linkages during normal times also “cause” the adverse effects of crises, but other dynamics are also clearly at work. Normal lending seems undermined for an extended period as evidenced by creditless recoveries following crises. Fiscal policy and public debt dynamics can be affected for decades, in part because governments often end up directly supporting financial systems (by injecting liquidity or providing recapitalization) or suffer from expansionary policies undertaken to mitigate the costs of crises.

The major challenge is to explain the sharp, nonlinear behavior of financial markets in response to “small” shocks. Although the procyclicality of leverage among financial institutions, as highlighted by its increase during the run up to the 2007–09 crisis followed by the sharp deleveraging in its aftermath, has been extensively documented (Adrian and Shin, 2011), the exact causes of this behavior have yet to be identified. Why crises involve liquidity hoarding to such a degree that aggregate liquidity shortages occur and transmission of monetary policy is disrupted remains a puzzle. Although credit crunches are, in part, attributable to capital shortages at financial institutions, shortages do not seem to fully explain the phenomena of lenders becoming overly risk averse following a crisis. This lack of knowledge of the forces shaping the dynamics before and during periods of financial stress greatly complicates the design of proper policy responses.

It is also important to explore why financial spillovers across entities (institutions, markets, countries, and so on) are much more potent than most fundamentals suggest (in other words, why is there so much contagion?). Financial crises often generate effects across markets and have global repercussions. The 2007–09 episode is a case in point; its global reach and depth are without precedent in the post-World War II period. This underscores the value of having a better grasp of


the mechanisms through which such episodes spill over to other countries. In addition to trade and cross-border banking linkages, research needs to consider the roles played by new financial channels, such as commercial paper conduits and shadow banking, and new trade channels, such as vertical trade networks, in the transmission of crises across borders. Given their adverse impact, the exact nature of these spillovers matters for the appropriate design of both crisis-mitigation and crisis-management responses. For example, in light of their cross-border implications, pooling resources (regionally or globally) to provide ample liquidity proactively becomes more important because it can prevent liquidity runs from escalating into self-fulfilling solvency crises and help break chains of contagion.

Although many stylized facts are already available, work on the implications of interactions among different crises and sovereign debt defaults is still limited. This review documents that various types of crises can overlap in a single episode, but research on the implications of such overlapping has been lagging. Although default on domestic debt tends to be less frequent than that on external debt, it still takes place quite often, suggesting that the usual assumption of risk-free government debt needs to be revisited. Furthermore, domestic and foreign debt defaults seem to touch on each other. Although domestic debt tends to account for a large share of the total debt stock in both advanced economies and emerging markets, many emerging market economies default on their external debt at seemingly low debt levels. This suggests that, for a given level of unsustainable debt, the cost of defaulting on external debt appears less than the cost of defaulting on domestic debt. More generally, trade-offs that depend on country circumstances likely come into play, maybe because the risk of high inflation varies. With the rising public debt stocks in many advanced economies, more work on this would be very useful.

Many questions are left about the best policy responses to financial crises. The 2007–09 global crisis and associated recessions have shown the limits of policy measures in dealing with financial meltdowns. It has led to an extensive discussion about the ability of macroeconomic and financial sector policies to mitigate the costs stemming from such episodes. Some research shows that countercyclical policies might mitigate the cost and reduce the duration of recessions (Kannan, Scott, and Terrones, Chapter 8, this volume). Others argue that such policies can worsen recession outcomes (Taylor, 2009, 2011). And some others find limited effects associated with expansionary policies (Claessens, Kose, and Terrones, 2009; and Baldacci, Gupta, and Mulas-Granados, Chapter 14, this volume). The discussion on the potency of policies clearly indicates fertile ground for future research as well.

Although valuable lessons have been learned about crisis resolution, countries are still far from adopting the “best” practices to respond to financial turmoil. It is clear now that open bank assistance without proper restructuring and recapitalization is not an efficient way of dealing with an ailing banking system (Laeven and Valencia, Chapter 13, this volume; and Landier and Ueda, Chapter 16, this volume). Excessive liquidity support and guarantees of bank liabilities cannot substitute for proper restructuring and recapitalization either, because most
banking crises involve solvency problems, not just liquidity shortfalls. For banking crises, the sooner restructuring is implemented, the better the outcomes will be. Such a strategy removes residual uncertainty that can trigger precautionary contractions in consumption and investment, which, in turn, can further exacerbate recessions. Still, in spite of this understanding, many countries do not adopt these policy responses, including in the crises since 2007 (Claessens and others, Chapter 16, this volume), suggesting that there are deeper factors that research has not been able to uncover or address. Moreover, issues related to restructuring of both household debt and sovereign debt require more sophisticated theoretical and empirical approaches (Laeven and Laryea, Chapter 17, this volume; Das, Papaioannou, and Trebesch, Chapter 19, this volume; and Igan and others, Chapter 18, this volume).

What Additional Data and Methods Are Needed?

As the review in this chapter illustrates, new data series need to be put together and new methodologies need to be designed to gain a better understanding of crisis episodes. The review lists several recent studies that constructed new data series on financial crises. However, more research is clearly needed to collect additional cross-country data on aspects relevant to financial crises. Better data on domestic debt and house prices are urgently needed to provide a richer understanding of domestic debt dynamics and fluctuations in housing markets. Better international data are also needed for both surveillance and early-warning exercises (see Heath, 2013; and Cerutti, Claessens, and McGuire, forthcoming, for data needs). For a deeper understanding of crises and the policy issues surrounding these episodes, another requirement is for new methods to be designed to classify crises more robustly. Moreover, it would be important to examine periods of financial disruptions that are not necessarily crises. Although good luck or adequate policy measures may have prevented financial crises following such disruption episodes, there are lessons to be learned because these are the types of periods that can provide case studies of counterfactuals to analyze the macroeconomic outcomes and implications of policy responses.

REFERENCES


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