



Banking Crises: A Review

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Abstract

This review surveys the theoretical and empirical literature on the causes and consequences of banking crises, and summarizes the lessons learned from policy interventions to resolve banking crises. Despite their different origins, banking crises display similar patterns. Their causes lie in unsustainable macroeconomic policies, market failures, regulatory distortions, and government interference in the allocation of capital; they are frequently characterized by boom-bust cycles in credit and asset prices; and they are generally resolved through large-scale government intervention. When not handled effectively and swiftly, banking crises tend to impose enormous costs to society by curtailing the flow of credit to the real economy. The article concludes with a review of proposals to enhance financial stability in an increasingly integrated financial system, which include making banking regulation more macroprudential—focusing on the cycle and systemic risk rather than the risk of individual banks—and improving market discipline by limiting explicit and implicit government insurance of bank liabilities.

1. INTRODUCTION

The global financial crisis that started in the summer of 2007 took many by surprise. What initially seemed to be a localized crisis in the market for U.S. subprime mortgages, quickly spread to financial markets around the world, prompting large-scale government rescue operations in the financial sector. Memories of past crises had faded under a prolonged economic boom period. When the crisis erupted, it evolved with breakneck speed, infecting most financial markets around the globe.

Banking crises are like periodical cicadas that unexpectedly emerge from the earth. Much like the cicada has represented insouciance in classical literature¹ banking crises often call an end to a period of exuberance. And while cicadas inflict damage to crops and trees, banking crises ruin the real economy by curtailing credit and causing costly liquidations.

A key difference with cicadas is that banking crises occur at unknown intervals. Yet, banking crises have been a common phenomenon throughout history. Reinhart & Rogoff (2009) count 268 banking crises over the period 1800 through 2008, whereas Bordo et al. (2001) show that the frequency of banking crises has increased in recent decades following financial liberalization in the 1980s to reach a level not seen since the Great Depression in the 1930s.

There are indeed many commonalities between the current crisis and past crisis episodes. Banking crises are typically preceded by credit booms and asset price bubbles, and followed by government action to save the financial system. Although the timing of the implosion of such bubbles is uncertain—of course, with the benefit of hindsight, each crisis is obvious—the implosion itself is unavoidable, as bubbles are by definition an unsustainable pattern of price changes or cash flows. Although some had warned against the looming dangers resulting from excessive credit expansion (e.g., Rajan 2005), such warnings were ignored by many until it was too late.

The purpose of this article is to review the literature on banking crises. My emphasis is on the causes and consequences of banking crises, and on the policy actions that such crises trigger. My survey of the literature takes a global perspective, drawing on the empirical evidence and experience from a broad cross section of countries. (For detailed accounts of banking panics and crises in the United States, see Calomiris & Gorton 1991 and Calomiris 2010.) Although my treatise of banking crises highlights the main theoretical contributions to the literature on the origins of banking crises, my emphasis is on the empirical literature on banking crises. (For a comprehensive account of the theoretical work on banking crises, I refer to Calomiris & Gorton 1991, Allen & Gale 2007, and Allen et al. 2009a.) My focus is on banking crises because banks are often found at the center of financial crises, although banking crises often coincide with other financial crises, such as collapses in asset prices, currency crises, and sovereign debt crises. (I refer to Flood & Marion 1999, Krugman 2000, and Dooley & Frankel 2003 for detailed surveys of currency crises; to Sturzenegger & Zettelmeyer 2007 for a comprehensive account of sovereign debt crises; and to Kaminsky & Reinhart 1999 for an account of the interdependence of banking and currency crises.) Given the special role that banks play in the allocation of funds in the economy, banking crises have the potential of inflicting serious

¹For example, in “The Cicada and the Ant,” the opening story of Jean de La Fontaine’s famous collection of fables, the cicada wastes her summer singing while the ant stores away food, and as a consequence the cicada finds herself starving when the cold weather sets in.

damage to the economy, causing collapses in output and increases in unemployment. Laeven & Valencia (2010) find that output losses following a typical banking crisis average approximately 37% of potential output.

The review proceeds as follows. Section 2 reviews the origins and causes of banking crises, drawing on theory and empirical evidence. Section 3 considers the real effects of banking crises, including the impact on output and employment. Section 4 discusses the policy responses to preventing and resolving banking crises. Section 5 concludes with policy considerations and directions for future research.

2. THE CAUSES OF BANKING CRISES

The causes of banking crises have long been debated. A first set of theories regards banking crises as depositor panics characterized by unwarranted depositor withdrawals that place undue pressure on the liquidity position of the bank (Friedman & Schwartz 1963). Such depositor runs can cause illiquidity at banks that are intrinsically solvent. When severe, such liquidity pressures will force the bank to sell assets, possibly at fire sale prices, and might render the bank insolvent.² Banking failures can become systemic, if not prevented through policy, and can create panics and contagion, with negative externalities.

Bank runs may or may not be related to changes in the real economy. For example, in traditional models of bank runs by Bryant (1980) and Diamond & Dybvig (1983), bank runs are self-fulfilling prophecies in an environment where consumption needs are unknown and long-term investments are costly to liquidate. Bank runs occur when depositors fear others will withdraw as well. Such models view banks as inherently unstable because they finance long-term, illiquid assets with demandable debt in the form of first-come-first-serve deposits. In these models, deposit withdrawals are unrelated to changes in the real economy.

Bank runs can also be triggered by depositors withdrawing funds in anticipation of economic downturns that will reduce the value of bank assets and raise the possibility that banks will not be able to meet their obligations (Jacklin & Bhattacharya 1988, Chari & Jagannathan 1988, and Allen & Gale 1998). Such crises are particularly likely when there is asymmetric information across depositors about looming bank distress. Importantly, Diamond & Rajan (2005), building on their 2001 model (Diamond & Rajan 2001), show that when illiquidity stems from the bank's asset side, bank runs can start and propagate systemic crises even when depositors do not panic, that is, even if depositors' actions are coordinated and they do not run simply because they fear others will run.

Depositor panics are most damaging when they result in contagion, with liquidity pressures spreading through the banking system as failures of individual banks create network externalities for the banking system as a whole. Contagion can arise from direct contractual linkages between banks, such as through interbank loans, or from indirect linkages, such as through balance sheet exposures to common shocks (Bhattacharya & Gale 1987, Allen & Gale 2000b).

A problem with theories based on depositor panics is that the traditional bank runs have been infrequent since the onset of deposit insurance. In principle, credible deposit

²The difference between illiquidity and insolvency is often blurred in practice. Morris & Shin (2009) define illiquidity risk as the probability of the bank defaulting on its obligations due to a bank run when the bank would otherwise have been solvent, and insolvency risk is the probability of default conditional on there being no bank run.

insurance can rule out bank runs (Diamond & Dybvig 1983) and need not displace market discipline (Martinez Peria & Schmukler 2001), although several studies have found that by reducing debtholder discipline, deposit insurance has made banking systems less stable (Keeley 1990, Calomiris 1999, Demirguc-Kunt & Detragiache 2002, Demirguc-Kunt et al. 2008). Indeed, although banking crises have been frequent since the adoption of deposit insurance, aggregate deposit withdrawals have rarely exceeded 10% of total deposits, with the most severe case in Argentina during the 1989 crisis when monthly deposit withdrawals from the system reached 26% during a single month (Laeven & Valencia 2008a). With banks increasingly funding themselves in wholesale markets through uninsured nondeposit liabilities, modern bank runs typically involve the withdrawal of liquidity from uninsured debtholders in advance of traditional depositor withdrawals, and the recent global financial crisis can be characterized as having been triggered by such a wholesale bank run (Gorton 2008).

A second set of theories regards banking crises as stemming from widespread losses on the asset side of banks' balance sheets that render banks insolvent. Losses generally follow a protracted deterioration in asset quality and stem from adverse macroeconomic shocks, market failures, government interference, or fraud. Most of these theories are based on changes in economic fundamentals, and regard banking crises as a natural consequence of business cycles, with credit growing procyclically (Minsky 1982, Gorton 1988). Credit grows rapidly when the economy is booming, as investors turn more optimistic about the future and lending standards deteriorate. When economic conditions slow, a flight to quality causes a collapse in credit. This procyclicality of the financial system makes it fragile and vulnerable to crises. Temin (1976), Wicker (1980, 1996), and Calomiris & Mason (2003b) report evidence in support of these theories that U.S. bank failures during the Great Depression were mostly driven by economic fundamentals rather than panics or contagion from failures. More recent theories view banking crises as an outcome of asset price bubbles not based on economic fundamentals. Such theories require an ingredient of irrational behavior or information asymmetry.

The macroeconomic origins of banking crises lie in unsustainable macro policies, global financial conditions, and exchange rate misalignments (Lindgren et al. 1996). Overly expansionary monetary and fiscal policies have spurred lending booms, excessive debt accumulation, and overinvestment in real assets, causing deterioration in the quality of bank assets. Indeed, Reinhart & Rogoff (2009) find that banking crises are typically preceded by credit booms and asset price bubbles. Such macroeconomic shocks can cause particularly severe bank distress in emerging markets that have a tendency to borrow abroad using short-term foreign currency denominated debt. Indirect credit risk arising from currency or maturity mismatches in firms' balance sheets can easily translate in losses for banks following exchange rate depreciations or increases in world interest rates, and large shifts in the terms of trade will impair the capacity of exporting firms to service their debts.

A good example is the Latin American debt crisis of the 1980s, which followed a period during which Western banks loaned large amounts of dollars to Latin American countries with promising growth opportunities and large current account deficits. The large inflow of foreign funds led to a sharp real exchange rate appreciation in the borrowing countries, forcing many borrowers to default. The crisis ended with a debt reduction of U.S. \$250 billion, out of a total debt outstanding of approximately U.S. \$800 billion.

Banking crises often follow collapses in asset prices after what appears to have been a bubble. Such sudden changes in prices cannot be explained on the basis of standard

neoclassical theory or the efficient markets hypothesis. They require an ingredient of irrational behavior, information asymmetry, market failure, or government intervention. Asset price bubbles can arise for many reasons (Brunnermeier 2001). An important factor driving asset price bubbles is the amount of liquidity provided by the central bank as money or credit (Kindleberger 1978). Indeed, banking crises often follow episodes of high inflation or low interest rates. Smith (2002) finds that lowering inflation, while reducing banking crises, causes banks to hold excess cash reserves at the expense of investments in higher yielding assets. Diamond & Rajan (2006) show that this problem can be alleviated through monetary intervention if the central bank buys bonds with money, allowing banks to fund more long-term projects than would otherwise be possible. In Diamond & Rajan (2009), liquidity shocks force banks to sell illiquid assets to repay short-term funds, leading to a sharp increase in interest rates and resulting in a decline in the net worth of the bank, ultimately leading to bank runs. By raising interest rates when low, authorities can offset incentives for banks to make more illiquid loans. Similarly, De Nicolò et al. (2010) and Dell'Ariccia et al. (2010) argue that low interest rates resulting from lax monetary policy induces banks to take on more risk, as banks shift to higher yielding assets, and increases bank leverage, thereby increasing bank fragility. Farhi & Tirole (2011) and Diamond & Rajan (2009) have examined the role of monetary bailouts and collective moral hazard on banks' liquidity decisions. When banks expect a strong policy response by the monetary authorities should a large negative shock occur, they will tend to take on excessive liquidity risk. This behavior, in turn, will increase the likelihood that the central bank will indeed respond to a shock by providing the necessary liquidity to the banking system.

Distortions from government intervention, including intervention in the allocation or pricing of credit, rapid financial liberalization, and weak supervisory or regulatory policies, have often been the culprit of banking crises (Rochet 2008, Caprio & Honohan 2010, Calomiris 2010). For example, underpriced deposit insurance, by removing depositor discipline, has been a particularly important factor in causing banks to take excessive risks, and the moral hazard from bank bailouts have frequently planted the seed for the next crisis (Bhattacharya & Thakor 1993, Boot & Greenbaum 1993, Laeven 2002, Hovakimian et al. 2003, Demirguc-Kunt et al. 2008). The inability or unwillingness of governments to intervene in large and complex financial institutions, referred to as the too-big-to-fail problem, has also generated moral hazard, and has proven to be particularly difficult to correct.

Similarly, government subsidized housing policies have often generated real estate booms, resulting in banking crises (Herring & Wachter 2003). The U.S. mortgage crisis of 2007 also followed active government policy toward increasing home ownership. Another good example is the real estate and banking crisis in Japan in the 1990s that followed a decade during which real estate prices increased tenfold.

Financial liberalization and deregulation has been a common precursor to lending booms and banking crises (Drees & Pazarbasioglu 1998, Kaminsky & Reinhart 1999). The amount of credit provided by the financial system is an important determinant of asset prices. Domestic financial liberalization, by expanding the volume of credit, can lead to a bubble in asset prices when banks do not observe the quality of the investments they fund (Allen & Gale 2000a). Similarly, capital account liberalization, by inviting capital inflows, can generate credit booms and asset price bubbles (Ranciere et al. 2008). The post-1970 period during which many countries liberalized their financial markets and capital accounts has been unprecedented in terms of the frequency and severity of banking crises.

According to data from Laeven & Valencia (2010), the number of countries being hit by banking crises since the 1970s reached a high of 21 in 2008 following the U.S. mortgage crisis, after a momentary lull of zero banking crises in 2006.

Recent work also investigates concerns about the potential procyclical nature of fair value accounting, which could magnify fluctuations in bank lending and economic activity. Laux & Leuz (2010) find little evidence that such effects are the result of fair value accounting, whereas Huizinga & Laeven (2009) show how banks use discretion in accounting rules to underprovision for loan losses and to overstate regulatory bank capital at times of financial distress. Allen & Carletti (2008) argue that when banks need to liquidate long-term assets in illiquid markets, it may not be desirable to value such assets according to market values as it reflects the price volatility needed to induce liquidity provision, thereby questioning the use of mark-to-market accounting and calling for a relaxation of fair value accounting rules at times of crises.

Fraud has also been at the root of several large bank failures, some of which culminated in banking crises (Caprio & Honohan 2010). High leverage of banks implies that even relatively small incidents of fraud can cause insolvency. Famous examples of fraudulent behavior by banks include Venezuela in 1994 and the Dominican Republic in 2003. In both cases, insiders diverted depositor funds at systemically important banks. Another example is the closure of Bank of Credit and Commerce International, a large international banking group operating in 78 countries. Its failure was of systemic importance in some African countries where it had attained a sizeable market share. The largest bank loss attributed to fraud recorded thus far was by French bank Société Générale in 2008. Rogue trader Jerome Kerviel was recorded to have lost the bank a total of U.S. \$7 billion.

The collapse of U.S. investment bank Lehman Brothers was in part also caused by accounting fraud. It used repurchase agreements to temporarily remove securities from the firm's balance sheet at each filing date, thereby overstating the value of the firm. The firm filed for bankruptcy on September 15, 2008, marking the largest bankruptcy in U.S. history, with gross debt outstanding of U.S. \$768 billion. Its collapse sent shock waves through international banking markets, as many banks had significant exposures to Lehman Brothers and investors feared that other banks may have been mismanaged as well.

Large loan losses are often associated with lending to related parties on preferential terms. Famous examples are Chile in 1981 (Sanhueza 2001), Mexico in 1994 (La Porta et al. 2003), and Russia in 1998 (Laeven 2001). As a result of such loan losses, banking crises typically see a surge in nonperforming loans, running as high as 75% of total loans and averaging approximately 25% of loans. In some cases, surges in nonperforming loans in part reflect a tightening of prudential requirements during the aftermath of the crisis. The bank failure recording the single largest corporate loss was the U.K. banking group Royal Bank of Scotland, which recorded a loss of U.S. \$34.9 billion after being nationalized in 2008. This raises questions about the quality of governance of banks more generally (Saunders et al. 1990, Caprio et al. 2007, Laeven & Levine 2009).

Given these different origins and causes of banking crises, it is not surprising that there is much disagreement about the proper definition of a banking crisis. To make matters worse, many banking crises are not observed due to preventive policy action on the part of governments. Caprio & Klingebiel (1996), Laeven & Valencia (2008a), and Reinhart & Rogoff (2009) define banking crises as situations in which "a large fraction of banking system capital has been depleted," whereas Calomiris (2010) defines banking crises as "panics or waves of bank failures." A broader definition of a banking crisis is a situation

in which actual or potential bank runs or failures induce banks to suspend the internal convertibility of their liabilities or that compels the government to intervene by extending assistance on a large scale (IMF 1998, chapter 4). Laeven & Valencia (2010) quantify what entails large-scale government intervention. They define banking crises as situations in which there are significant signs of financial distress in the banking system—as evidenced by significant bank runs, bank losses, and bank liquidations—or significant policy intervention measures directed toward banks. They apply quantitative thresholds to determine whether such intervention was significant, and using this approach they identify a total of 144 banking crises since 1970 (see **Table 1** for a complete list).

Although the recent global financial crisis has some new elements, it has many commonalities with previous crises in advanced and emerging market economies. (Comprehensive reviews of the events preceding and during the current financial crisis can be found in Gorton 2008, Laeven & Valencia 2008a, Brunnermeier 2009, and Adrian & Shin 2010.) What originated the mortgage credit boom and upward trend in real estate prices in the United States over the decade prior to the crisis is still a source of debate, though there appears to be broad agreement that financial innovation in the form of asset securitization, government policies to increase homeownership, global imbalances, expansionary monetary policy, and weak regulatory oversight played important roles (Obstfeld & Rogoff 2009, Taylor 2009, Claessens et al. 2010a, Keys et al. 2010). The boom was exacerbated by financial institutions' ability to exploit loopholes in capital regulation by moving assets off balance sheet and by funding themselves increasingly short term and in wholesale markets (Gorton 2008, Brunnermeier 2009, Acharya & Richardson 2009). Higher asset prices led to a leverage cycle by which increases in home values led to increases in debt (Adrian & Shin 2008, Mian & Sufi 2009). The asset price boom was further fueled by lax lending practices that caused an explosion of subprime mortgage credit (Dell'Ariccia et al. 2008b).

With losses being widespread and hard to locate because of asset securitization, banks no longer trusted each other, leading to a confidence crisis that threatened the liquidity of the financial system. Authorities initially responded with massive liquidity support to banks and by lowering interest rates. The panic intensified after the collapse of Lehman Brothers, a major investment bank with global financial linkages. By the end of 2008, many economies around the world suffered from a collapse in international trade, reversals in capital flows, and sizable contractions in real output.

Although some aspects of this crisis appear new, such as the role of asset securitization in spreading risks across the financial system, it broadly resembles earlier boom-bust episodes, many of which followed a period of financial liberalization (Reinhart & Rogoff 2009, Laeven & Valencia 2010). One commonality among these crises is a substantial rise in private sector indebtedness, and when banking crises erupt, they generally trigger losses that spread rapidly throughout the financial system by way of downward pressures on asset prices and interconnectedness among financial institutions.

3. THE CONSEQUENCES OF BANKING CRISES

Banks collect private information from borrowers to make valuable relationship loans, thereby enhancing borrowers' welfare (Bhattacharya & Chiesa 1995, Boot 2000). This information would be lost if banks fail. For example, Bae et al. (2002) show that firms with closer relationships to their banks benefited from easier access to credit from their banks

Table 1 Banking crisis episodes over the period 1970–2009^a

Country	Year	Output loss	Country	Year	Output loss	Country	Year	Output loss	Country	Year	Output loss
Albania	1994		Congo, Rep.	1992	47%	Kazakhstan	2008	0%	Romania	1990	0%
Algeria	1990	41%	Costa Rica	1987	0%	Kenya	1985	24%	Russia	1998	
Argentina	1980	58%	Costa Rica	1994	0%	Kenya	1992	50%	Russia	2008	0%
Argentina	1989	13%	Croatia	1998		Korea	1997	58%	São Tomé-Príncipe	1992	2%
Argentina	1995	0%	Czech Rep.	1996		Kuwait	1982	143%	Senegal	1988	6%
Argentina	2001	71%	Denmark	2008	36%	Kyrgyz Rep.	1995		Sierra Leone	1990	34%
Armenia	1994		Djibouti	1991	43%	Latvia	1995		Slovak Rep.	1998	0%
Austria	2008	17%	Dominican Rep.	2003		Latvia	2008	116%	Slovenia	1992	
Azerbaijan	1995		Ecuador	1982	98%	Lebanon	1990	102%	Slovenia	2008	37%
Bangladesh	1987	0%	Ecuador	1998	25%	Liberia	1991		Spain	1977	59%
Belarus	1995		Egypt	1980	1%	Lithuania	1995		Spain	2008	39%
Belgium	2008	23%	El Salvador	1989	0%	Luxembourg	2008	47%	Sri Lanka	1989	20%
Benin	1988	15%	Equatorial Guinea	1983	0%	Macedonia	1993	0%	Swaziland	1995	46%
Bolivia	1986	49%	Eritrea	1993		Madagascar	1988	0%	Sweden	1991	33%
Bolivia	1994	0%	Estonia	1992		Malaysia	1997	31%	Sweden	2008	31%
Bosnia-Herzegovina	1992		Finland	1991	70%	Mali	1987	0%	Switzerland	2008	0%
Brazil	1990	62%	France	2008	21%	Mauritania	1984	8%	Tanzania	1987	0%
Brazil	1994	0%	Georgia	1991		Mexico	1981	27%	Thailand	1983	25%
Bulgaria	1996	60%	Germany	2008	19%	Mexico	1994	14%	Thailand	1997	109%
Burkina Faso	1990		Ghana	1982	45%	Mongolia	2008	0%	Togo	1993	39%
Burundi	1994	121%	Greece	2008	29%	Morocco	1980	22%	Tunisia	1991	1%
Cameroon	1987	106%	Guinea	1985	0%	Mozambique	1987	0%	Turkey	1982	35%
Cameroon	1995	8%	Guinea	1993	0%	Nepal	1988	0%	Turkey	2000	37%

(Continued)

Table 1 (Continued)

Country	Year	Output loss	Country	Year	Output loss	Country	Year	Output loss	Country	Year	Output loss
Cape Verde	1993	0%	Guinea-Bissau	1995	30%	Netherlands	2008	25%	Uganda	1994	0%
Central African Rep.	1976	0%	Guyana	1993	0%	Nicaragua	1990	11%	Ukraine	1998	0%
Central African Rep.	1995	9%	Haiti	1994	38%	Nicaragua	2000	0%	Ukraine	2008	5%
Chad	1983	0%	Hungary	1991	0%	Niger	1983	97%	United Kingdom	2007	24%
Chad	1992	0%	Hungary	2008	42%	Nigeria	1991	0%	United States	1988	0%
Chile	1976	20%	Iceland	2008	42%	Norway	1991	5%	United States	2007	25%
Chile	1981	9%	India	1993	0%	Panama	1988	85%	Uruguay	1981	38%
China, Mainland	1998	19%	Indonesia	1997	69%	Paraguay	1995	15%	Uruguay	2002	27%
Colombia	1982	47%	Ireland	2008	110%	Peru	1983	55%	Venezuela	1994	1%
Colombia	1998	43%	Israel	1977	76%	Philippines	1983	92%	Vietnam	1997	0%
Congo, Dem. Rep.	1983	1%	Jamaica	1996	38%	Philippines	1997	0%	Yemen	1996	16%
Congo, Dem. Rep.	1991	130%	Japan	1997	45%	Poland	1992	0%	Zambia	1995	31%
Congo, Dem. Rep.	1994	79%	Jordan	1989	106%	Portugal	2008	37%	Zimbabwe	1995	10%

^aSource: Laeven & Valencia (2010). Year is the starting year of the banking crisis. Output losses are computed as the cumulative difference between actual and trend real GDP, expressed as a percentage of trend real GDP for the period [T, T+3], where T is the starting year of the crisis. Trend real GDP is computed by applying an Hodrick-Prescott filter (with smoothing parameter $\lambda = 100$) to the GDP series over [T-20, T-1]. No output losses are computed for transition economies. Output losses for post-2007 crises are based on growth forecasts from the International Monetary Fund's World Economic Outlook database.

during the Korean financial crisis of 1997. Bank failures therefore create negative externalities for the failed bank's customers in the form of an increase in borrowing cost. Problems in the banking system thus change production decisions of borrowers, which has real effects.

A large empirical literature has shown that financial conditions of banks matter for lending decisions with real consequences (Rajan & Zingales 1998, Levine 2005). Bernanke (1983) and Calomiris & Mason (2003a) find that the U.S. banking crisis during the Great Depression reduced the efficiency with which credit was allocated, and that the resulting higher cost and reduced availability of credit acted to reduce domestic output by depressing aggregate demand. Bernanke & Lown (1991), Peek & Rosengren (1995), and Hancock & Wilcox (1994), using U.S. banking data, each present evidence consistent with the hypothesis that bank lending is curtailed when bank capital is low or when the banking sector has suffered significant capital losses. Klein et al. (2002) and Peek & Rosengren (1997, 2000) exploit the losses faced by Japanese banks from the collapse of the Japanese stock market as an exogenous shock to the United States. They show that this shock had real consequences by curtailing credit and estimate an important economic effect transmitted through lending by Japanese banks' subsidiaries in the United States. Ashcraft (2005) uses the closures of healthy subsidiaries of a failed banking holding company as an exogenous disruption in the supply of credit and finds important economic effects in the corresponding local county income. Peek et al. (2003) identify loan supply shocks using internal credit ratings of U.S. banks and find that bank health has economically significant effects on the U.S. economy. Moreover, they also find that their loan supply measure is particularly important for understanding movements in inventories. In a cross-country setting, Kroszner et al. (2007) and Dell'Ariccia et al. (2008a) examine the real effects of banking crises and find that economic sectors more dependent on external finance suffer more during banking crises. Kroszner et al. also find that these effects are more pronounced in developing countries, in countries with deeper financial systems, and in countries with more severe banking crises. Finally, Raddatz (2006) finds that sectors with larger liquidity needs are more volatile and experience deeper crises in financially underdeveloped countries, suggesting that changes in financial development can generate important differences in aggregate volatility.

Bank failures also generate negative externalities for other banks in the form of a loss of confidence in the stability of the financial system as a whole, losses from interbank exposures to failed banks, and losses from assets that the failing bank is forced to sell. This is different in other industries, where competitors generally gain from the failure of another firm. These negative externalities associated with bank failures offer the main rationale for financial regulation: to prevent socially costly bank failures (Bhattacharya et al. 1998; Dewatripont & Tirole 1999, chapter 2; Gorton & Winton 2003; Freixas & Santomero 2004). For example, Allen & Gale (2004) show that bank failures have important welfare implications as banks provide consumers with insurance against idiosyncratic liquidity shocks, a role that markets generally do not perform. The recent global financial crisis is a prime example of intensified counterparty risk placing undue stress on interbank markets, with negative ramifications for the flow of bank funds.

Banking crises are often associated with a collapse in the value of collateral, triggering sharp declines in the supply of credit. This can lead to credit crunch or a credit freeze. Bernanke & Gertler (1989) and Bernanke et al. (1996) show that credit market conditions can propagate and amplify negative shocks to a borrower's wealth in the presence of

asymmetric information between borrowers and lenders. Kiyotaki & Moore (1997) show that shocks to asset prices that lower the value of collateral can lead to downward spirals in asset prices by reducing the amount that can be borrowed against this collateral, further lowering asset prices and so on in a downward spiral. Caballero & Krishnamurthy (2001) argue that such downward spirals can be particularly severe in emerging markets because the collateral they can put to use domestically is often limited because they need to maintain large amounts of collateral to borrow internationally.

An overhang of illiquid assets, often associated with banking crises, can also cause a credit market freeze. Banks that hold large quantities of illiquid assets may trigger sales at fire sale prices when faced with negative liquidity shocks. Diamond & Rajan (2010) argue that although the prospect of such fire sales depresses the bank's current value, banks may actually prefer to hold on to the illiquid assets because the bank's survival is positively correlated with a recovery in asset prices. This creates high demand by banks for liquid assets, causing banks to cut back on loans. Holmstrom & Tirole (1998) show that economies may suffer efficiency losses when credit markets are disrupted, such as during banking crises, and are no longer able to provide funds to entrepreneurs that are hit by liquidity shocks and need to raise funds to avoid bankruptcy. Such bankruptcies cause a significant loss in welfare.

Banks suffering severe losses tend not only to see rising costs but also to experience liability rationing, either because they must contract deposits to satisfy their regulatory equity capital requirement, or because depositors at risk of loss prefer to place funds in more stable intermediaries. Banks, in turn, will transmit those difficulties to their borrowers in the form of a contraction of credit supply (Valencia 2008). Credit will become more costly, making financial distress of borrowers and banks more likely.

Banking crises often have important distributional consequences, as government actions that attempt to save the financial sector generally imply wealth transfers from taxpayers to banks and from savers to creditors. For example, recapitalizations of insolvent banks constitute a wealth transfer from taxpayers to banks, and generalized debt relief through inflation or currency depreciation constitutes a transfer of the costs of the crisis to nominal creditors.

Finally, banking failures and crises in one country can also pose externalities on other countries, through interbank markets. Such contagion risk has increased due to the internationalization of banking and the growth of cross-border banking (Laeven & Valencia 2008a). Regulatory arbitrage across countries and competition for safety nets across countries also creates negative externalities.

Yet, there is a trade-off between growth and financial stability. By funding risky investments, banks contribute to growth, and although financial liberalization may have made economies more susceptible to financial crises, there are also significant benefits to the free flow of capital. Moreover, banking crises may also have a cleansing effect, forcing the exit of unviable banks. For example, Calomiris & Kahn (1991) argue that bank runs can be beneficial in that they salvage some of the bank value.

The real costs of banking crises can be measured in terms of output losses, increases in unemployment, fiscal costs associated with bank support measures, and increases in public debt. Output losses and the increase in public debt capture the overall real and fiscal implications of the crisis. Laeven & Valencia (2010) find that the average banking crisis since 1970 cost the taxpayer a staggering 13.1% of GDP in terms of fiscal outlays committed to the financial sector, with a high of 56.8% in the case of Indonesia in 1997. They estimate average output losses of 33.7% of GDP, with output losses for Ireland and Latvia in 2008 standing out at more than 100% of potential GDP, and the average increase in

public debt amounts to 26.2% of GDP, with a high of 82.9% of GDP in the case of Iceland in 2008. They compute output losses as deviations of actual GDP from its trend, and the increase in public debt as the change in the public debt-to-GDP ratio over the four-year period beginning with the crisis year.

These cost estimates are conditional on potential policy action taken and therefore not directly comparable in a strict sense. Such estimates also do not include taxpayer money put at risk to contain the crisis, nor do they capture any wealth transfers associated with accommodative macroeconomic policies to save the banking system. Output losses will differ depending on the size of the initial shock, differences across countries in how the shock was propagated through the financial system, and the intensity of policy interventions.

4. POLICIES TO PREVENT AND RESOLVE BANKING CRISES

Because banks play a crucial role in the economy, a key question is the extent to which governments should intervene to prevent and resolve banking crisis.

In terms of crisis prevention, regulatory measures such as increases in capital requirements and limits on credit growth have been met with some success in limiting the buildup of excessive credit growth, whereas limits on credit concentration and on maturity and currency mismatches have frequently strengthened banks' balance sheets (Kraft & Jankov 2005). For example, Morrison & White (2005) show that capital requirements can play an important role in preventing banking crises by improving the quality of banks. However, in many cases banks were able to circumvent rules or activity flowed to nonregulated parts of the financial sector, causing risks to be built up outside the regulatory perimeter. For example, in Thailand much of the consumption boom in the 1990s was financed by finance companies that faced lighter regulation than commercial banks. When the crisis hit, these finance companies faced large losses that were in part absorbed by the banks that had large ownership stakes in these companies. Similarly, banks in Croatia set up nonbank subsidiaries and started to lend directly from abroad to circumvent speed limits on domestic bank credit (Kraft & Jankov 2005). Regulations aimed at preventing banking crises also face a tradeoff between financial stability and not stymieing innovation and economic growth.

Once the crisis hits, policy response is warranted to restore confidence and limit the negative externalities associated with bank failures. Countries' policy responses to banking crises have been found to display common patterns (Calomiris et al. 2005, Laeven & Valencia 2010). All crises share a containment phase during which liquidity pressures are contained through liquidity support and in some cases guarantees on bank liabilities. This phase is followed by a resolution phase during which a broad range of measures is taken to restructure banks, encourage bank lending, and reignite economic growth.

Initially, the government's policy options are limited to those policies that do not rely on the formation of new institutions or complex new mechanisms (Calomiris et al. 2005). Immediate policy responses include emergency liquidity support to banks, a government guarantee of depositors, the suspension of convertibility of deposits, and regulatory capital forbearance. Each of these immediate policy actions are motivated by adverse changes in the condition of banks.

The appropriate policy response will depend on whether the trigger for the crisis is a loss of depositor confidence, regulatory recognition of bank insolvency, or the knock-on effects of financial market disturbances outside the banking system, including exchange

rate and wider macroeconomic pressures. For example, attempts to reassure depositors through confidence-building measures will not work if the crisis is not triggered by panic and lack of coordination (Diamond & Rajan 2005).

Deposit withdrawals are generally addressed by emergency liquidity loans, usually from the central bank when market sources are insufficient, by an extension of government guarantees of depositors and other bank creditors, or by a temporary suspension of depositor rights using deposit freezes or bank holidays. Each of these techniques is designed to buy time, and in the case of the first two, that depositor confidence can soon be restored. The success of each technique will crucially depend on the credibility and creditworthiness of the government.

Liquidity support is clearly the most common first line of response in systemic crises episodes, as initially it is often unclear whether illiquidity or insolvency is the reason for the crisis. Liquidity pressures frequently surface in the interbank market during the initial phase of a crisis, as counterparty risks increase and banks have lost confidence in the ability of other banks to repay their obligations in a timely manner. Such interbank pressures can be successfully addressed through intervention by the central bank. For example, Allen et al. (2009b) show that inefficiencies arising from excess price volatility in the interbank market can be addressed by the central bank acting as the lender of last resort and conducting open market operations through the purchases and sale of bonds to banks to influence the short-term interest rate.

Extensive guarantees on bank liabilities, including blanket guarantees, are frequently announced even when previous explicit deposit insurance arrangements are already in place. Laeven & Valencia (2008b) find that blanket guarantees tend to be effective in restoring confidence of domestic depositors but that outflows by foreign creditors are virtually unresponsive to the announcement of such guarantees. Moreover, Honohan & Klingebiel (2000) find that such guarantees tend to be fiscally costly, though this is in large part driven by the fact that guarantees are usually adopted when crises are severe.

When liquidity injections fail to avoid bank runs, governments sometimes resort to more extreme measures, including bank holidays and a temporary freeze of deposit withdrawals. Examples of deposit freezes include Argentina in 1989 and 2001, Brazil in 1990, Ecuador in 1999, and Uruguay in 2002. In each of these cases, except in Brazil, the deposit freeze was preceded by a bank holiday and implemented in response to bank runs.

Regulatory capital forbearance allows banks to avoid the cost of regulatory compliance by temporarily allowing banks to overstate their regulatory equity capital to facilitate a gradual recovery of the banking system over time, or a gradual transitioning toward stricter prudential requirements. The latter is a common outcome whenever modifications to the regulatory framework are introduced. For example, in Ecuador in 1998, banks were given two years to fully comply with new loan classification rules, among other requirements. Laeven & Valencia (2008a) find that regulatory forbearance is a common feature of crisis management. For example, U.S. regulators allowed large U.S. banks to grow out of the Latin American debt crisis of the 1980s by temporarily not enforcing capital regulatory rules. A common form of regulatory forbearance is to relax accounting rules for banks. For example, Japanese bank regulators allowed banks to use deferred tax accounting to bolster their banks' regulatory capital levels when their economic circumstances deteriorated during the Japanese banking crisis (Skinner 2008). During the U.S. mortgage crisis of 2007, regulators relaxed the fair valuation of mortgage-backed securities held by banks on the basis that market prices no longer reflected fundamentals, as markets had become

illiquid. Regulatory forbearance, by preventing a complete restructuring of banks, artificially restores banks to health but does not solve underlying problems.

To prevent gambling for resurrection by insolvent or near insolvent banks, authorities may resort to administrative measures, such as the temporary assumption of management powers by a regulatory official, or may force banks to close or merge with other financial institutions. The latter may include a subsidized compulsory sale of a bank's good assets to a sound bank, together with the assumption by that bank of all or most of the failed entity's banking liabilities.

Adopting the correct approach to an emerging banking crisis calls for a clear understanding of what the underlying cause of the crisis is, as well as a quick judgment as to the likely effectiveness of the alternative tools that are available. The actions taken at this time will have a possibly irreversible impact on the ultimate allocation of losses in the system. In addition, the longer-term implications in the form of moral hazard for the future also need to be taken into account.

Containment measures are frequently put in place in haste, with governments erring on the side of caution to prevent a major meltdown of the financial system. Central banks generally privilege stability over cost in the heat of the containment phase, with the risk of extending loans too liberally to an illiquid bank that is likely to prove insolvent. Also, closure of a nonviable bank is often delayed for too long, even when there are clear signs of insolvency (Lindgren 2005). Because bank closures face many obstacles, there is a tendency to rely instead on blanket government guarantees which, if the government's fiscal and political position makes them credible, can work albeit at the cost of placing the burden on the budget, typically squeezing future provision of needed public services.

Once emergency measures have been put in place to contain the crisis, the government faces the challenge of crisis resolution, which entails the resumption of a normally functioning financial system and the rebuilding of banks' and borrowers' balance sheets. At this point, the crisis has left banks and nonfinancial firms insolvent, and many are in government ownership or under court or regulatory administration.

Crisis resolution involves inherently complicated coordination problems between debtors and creditors. The fate of an individual corporation or financial institution and the best course of action for its owners and managers will depend on the actions of many others and the general economic outlook. Because of these coordination problems, as well as a lack of capital and the importance of the financial system to economic growth, governments often take the lead in systemic restructuring, especially of the banking system. In the process, governments often incur large fiscal costs, presumably with the objective to accelerate the recovery from the crisis.

The main policy approaches employed in the resolution phase of recent crises include workouts of distressed assets, debt restructuring, distressed asset purchases, and nationalizations and recapitalizations of banks. Countries typically apply a combination of resolution strategies (Hoelscher & Quintyn 2003, Calomiris et al. 2005).

The government can facilitate the workout of distressed loans through government subsidies to distressed borrowers, conditional on the borrower's shareholders injecting some new capital, as an attempt to let the market determine which firms are capable of surviving given some modest assistance. Likewise there have been schemes offering injection of government capital funds for insolvent banks whose shareholders were willing to provide matching funds. To the extent that such schemes are discretionary, they carry the risk of moral hazard as debtors stop trying to repay in the hope of being added to the list of beneficiaries.

Generalized debt restructuring programs can offer relief to a large cross section of borrowers and are most effective when debt overhang is widespread. Debt restructuring programs typically reduce the debt burden through a combination of a reduction in loan principal and a postponement of interest payments (Laeven & Laryea 2009). Generalized debt relief can also be effectively provided by inflation and currency depreciation, and such forms of relief may be among the limited choices available to a government that finds itself constrained to offer support through the injection of public funds, albeit at the cost of transferring part of the cost of the crisis to nominal creditors.

The government can also choose to carve out bad assets from banks' balance sheets through the setting up of a government-owned asset management company, or to set up special bank restructuring agencies to restructure distressed banks. The effectiveness of such agencies in resolving assets have been mixed, and have generally been better for assets that can easily be sold in secondary markets, such as real estate assets (Klingebiel 2000).

In resolving banking crises, governments often take control of systemically important, troubled banks. Before such banks can be sold into private hands, such banks need to be adequately capitalized, otherwise they may resume reckless behavior (Sheng 1996, Dziobek & Pazarbasioglu 1998, Enoch et al. 2001). Although nationalization of banks may be necessary if private capital is scarce, government-owned banks have a bad track record in allocating capital efficiently (La Porta et al. 2002, Sapienza 2004). Economic growth is unlikely to resume on a secure basis until productive assets and banking franchises are back in the hands of solvent private entities.

Recapitalization costs constitute the largest fraction of fiscal costs associated with banking crises, averaging 6.0% of GDP (after deducting recovery proceeds from the sale of assets) across a cross section of crisis countries, according to estimates from Laeven & Valencia (2010), with a high of 37.3% in the case of Indonesia in 1997. Recapitalization programs are usually accompanied with some conditionality. For instance, in the case of Chile in 1981, recapitalized banks could not distribute dividends, and all profits and recoveries had to be used to repurchase the capital injected by the government.

When banks fail, governments often find it difficult to impose losses on the bank's creditors for political economy reasons. The recent global financial crisis was no exception. With the onset of deposit insurance, losses have been imposed on depositors in only a minority of cases. Famous examples, both from Argentina, are the forced exchange of time deposits for bonds under the Bonex plan in 1989 and the forced exchange of dollar-denominated bank deposits into local currency-denominated bonds ("Corralon") in 2001, both of which imposed large losses on depositors by converting dollar deposits into local bonds denominated in domestic currency at an exchange rate below the prevailing market rate (Collins & Kincaid 2003). Whenever governments did impose losses on creditors, the fiscal costs of the crisis were significantly reduced (Laeven & Valencia 2010).

The scope and success of government resolution programs will also depend on a country's initial macroeconomic and institutional conditions, and on the government's ability to alter its macroeconomic policy to manage the crisis and reduce its negative impact on the real sector (Claessens et al. 2003). Macroeconomic conditions are often weak prior to a banking crisis. Fiscal balances tend to be negative, current accounts tend to be in deficit, and inflation is often high. Initial conditions shape the policy response during a banking crisis. If macroeconomic conditions are weak, then policymakers have limited buffers to cushion the impact of the crisis. Moreover, sudden changes in market

expectations may gather strength rapidly depending on how weak initial conditions of the country are.

The scope and intensity of intervention measures will be a function of a country's ability to support its financial system indirectly by stimulating aggregate demand through expansionary monetary and fiscal policy and by sustaining asset prices through the direct purchases of assets. Emerging market economies may not have the fiscal space to support accommodative fiscal policy, and their exchange rate policy may limit the role of accommodative monetary policy to support the financial sector. For example, Laeven & Valencia (2010) find that the countries that were affected the most by the global financial crisis used a much broader range of policy measures compared to past crisis episodes, including unconventional monetary policy measures, asset purchases and guarantees, and significant fiscal stimulus packages, and argue that this in part reflects the better macroeconomic and institutional setting of the countries involved, enabling a more effective and speedy crisis resolution.

Empirical evidence on the effectiveness of government measures to resolve banking crises is sparse and largely inconclusive. For example, Klingebiel et al. (2001), Claessens et al. (2005), Dell'Ariccia et al. (2008a), and Detragiache & Ho (2009) each find no support for the hypothesis that standard government intervention policies such as blanket guarantees and bank recapitalizations were successful in mitigating the effects of the crisis in terms of output losses and stock market responses. However, Giannetti & Simonov (2009) find that government recapitalizations during the Japanese crisis increased returns for borrowers of recipient banks. Similarly, using data from a broader sample of countries, Laeven & Valencia (2011) find that government recapitalization of banks has mitigating effects on the fallout from a banking crisis on the real economy.

5. CONCLUDING REMARKS AND DIRECTIONS FOR FUTURE RESEARCH

The recent global financial crisis, although unprecedented in the complexity of financial products involved and the breadth of policy measures taken, shares many commonalities with previous crises in terms of its underlying causes and responses. As in most crises of the past, the recent crisis was preceded by a long boom period during which risk became underpriced, and was followed by aggressive policy action that bailed out banks and their financiers to save the financial system at the expense of taxpayers and those that had invested more prudently. Although there are many questions about the role of macroeconomic policies, including those regarding the impact of monetary policy on bank risk taking and asset prices, in causing this crisis, government interventions and regulatory shortcomings also appear to have played an important role, raising questions about the need to reform the regulatory framework for banks to enhance financial stability (Laeven 2010).

First, financial regulation has been largely microfocused on the risk of individual financial institutions rather than the system as a whole. Under current capital regulations, capital adequacy levels are set on the implicit assumption that by creating buffers to absorb unexpected shocks at individual banks, the system as a whole is safer. Yet, by responding to capital regulations with only their own interest in mind, banks can potentially behave in ways that collectively undermine the system as a whole (Rajan 2009). To correct such behavior, regulation will need to become more macroprudential, concerning itself with

the stability of the financial system as a whole. To be effective, macroprudential regulation will also need to counter incentives of regulated banks to shift activities to lightly regulated or unregulated parts of the financial sector. Research will need to guide policymakers on the best course of action in this area.

Second, a related problem with the current regulatory framework for banks is its procyclical nature, with banks expanding their business and increasing leverage during economic booms on the back of rising asset values and increased risk appetite, and with banks shrinking their balance sheets during economic busts when a collapse in asset prices and an increase in measured risk makes capital scarce and expensive (Kashyap & Stein 2004, Repullo & Suarez 2008). Regulation will need to dampen this procyclical behavior by restraining bank expansion and the buildup of systemic risk in the upswing, and by providing support against the downfall of the system as a whole (Claessens et al. 2010b). Proposals to counter such procyclical behavior include countercyclical capital requirements (Brunnermeier et al. 2009) and dynamic loan loss provisioning rules (Laeven & Majnoni 2003), which force banks to build up cushions during good times that can be drawn on to absorb losses during bad times, yet the effectiveness of such countercyclical measures is not without doubts. By forcing banks to maintain larger cushions during booms than the market demands, countercyclical measures may shift activity to unregulated intermediaries and work counterproductively (Rajan 2009). Other proposals include contingent capital arrangements that would infuse new capital into banks when the institution or the system as a whole is in trouble. For example, banks could be forced to issue debt that can be converted into equity, based on supervisory assessments or objective indicators such as the bank's capital ratio or market prices (Hart & Zingales 2009). Yet, designing contingent capital arrangements that are incentive compatible is challenging, as supervisory assessments are prone to regulatory forbearance and market prices can become erratic during banking crises.

Third, the regulatory framework suffers from the lack of a credible mechanism to intervene early on in failing banks to minimize the cost to taxpayers of bank failures. This problem is particularly pronounced for large banks that are deemed too big to fail on the presumption that the failure of any of these large institutions would create havoc in financial markets and cause a loss of confidence in the banking system, with disastrous effect on the health of other banks and the economy as a whole (O'Hara & Shaw 1990, Stern & Feldman 2004). The problem is that by allowing problems in large banks to linger and by using a piecemeal approach to crisis management, the ultimate fiscal and economic costs associated with a banking crisis can increase significantly (Honohan & Laeven 2005). In an ideal world, this problem would be solved by appointing benevolent regulators that strictly enforce rules. However, in reality such regulators are hard to find (Boot & Thakor 1993; Barth et al. 2006, chapter 4). Alternative approaches include reducing the temptation of regulatory forbearance by making regulation more rules-based rather than left to discretion, requiring prompt corrective action should banks fail to conform to minimum rules, or introducing contingent capital instruments to enhance debtholder discipline of banks and thus reduce the probability of failure.

Fourth, the global financial crisis has raised questions about the optimal financial structure—the mix of banks and markets—in a market economy. Some hold the view that banks should be reduced to size, or should reduce the number of activities they engage in, though much remains unknown about the trade-offs involved in allowing banks to diversify and grow to size (Laeven & Levine 2007). Others have questioned the benefits of

financial innovation and the risks originating from an increasingly integrated financial system (Rajan 2005, Michalopoulos et al. 2009). The role of banks going forward will very much depend on the changes that will be made to the current regulatory framework for banks.

Fifth, financial regulation and market failures have rendered market discipline of banks to be weak. Shareholders, protected on the downside by limited liability, do not internalize the cost of bank failures and will encourage bank managers to take more risk than is socially optimal. Efforts to better align the interests of bank managers with those of bank shareholders, such as managerial shareholdings and pay-for-performance packages, are therefore unlikely to restore financial stability. Debt holders, who in principle stand to lose the most from bank failure, can also not be relied upon to ensure that the bank takes prudent risk, as deposit insurance and implicit government protection from government bailouts have reduced debt holder discipline (Calomiris 1999, Demirguc-Kunt et al. 2008). Moreover, market discipline is often complacent during boom times when asset prices explode and may overreact during busts as illiquidity problems surface (Santos 2009). At the same time, although market discipline may be effective in monitoring individual bank behavior (Flannery & Sorescu 1996) and can help supervisors by producing an alternative set of information about bank performance (Berger et al. 2000), prudential regulation is justified by the market's failure to deal with aggregate risks and financial instability (Rochet 2004). More research is needed to improve our understanding of the appropriate balance between market discipline and regulation.

Finally, the recent crisis has reinvigorated a debate about whether banks are properly governed. Traditional models of banks and financial regulation assume benevolent regulators and no governance problems, while largely ignoring how owners, managers, and debt holders interact to influence bank risk. Recent work by Laeven & Levine (2009) suggests that private governance mechanisms interact with bank regulation to shape bank valuation and risk taking. More research is needed in this area.

When banks efficiently mobilize and allocate funds, this lowers the cost of capital to firms and accelerates capital accumulation. Of course, banks are double-edged: Banks that gamble, protected on the downside by a generous government safety net, can spark devastating crises that have exacted enormous cost on society. The task of policymakers is to strike the right balance between financial stability and economic growth. Although policymakers can reduce the incidence of financial crises, crises will recur. Knowing the history of financial crises can save you money.

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