19

The Global Financial Crisis

Overview

In this chapter, we learn:

● how a boom-bust cycle developed in the US

● how the housing boom collapse led to a financial crisis in the US

● how the economic downturn crossed borders

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> *The situation is severe…and the Fed is out of tools. … We are headed for the worst financial crisis in the nation's history….We're talking about a matter of days.* -- Ben Bernanke, Chairman of the Federal Reserve Board, September 18th, 2008.

19.1 Introduction

In September 2008, the oldest investment bank on Wall Street, Lehman Brothers, declared bankruptcies. Immediately, the world's financial system seized up. Hundreds of billions of dollars' worth of financial assets were frozen in place, the value of securities made uncertain, and the solvency of seemingly rock-solid financial institutions called into question. By the end of 2008, the United States' economy was in free fall, shrinking at an annualized rate of 8%. Growth rates in other major industrialized economies also plummeted as well. The recession was so deep, and the recovery so labored that it took more than a decade for output to return to full employment levels. Figure 19.1 illustrates the situation rather dramatically.

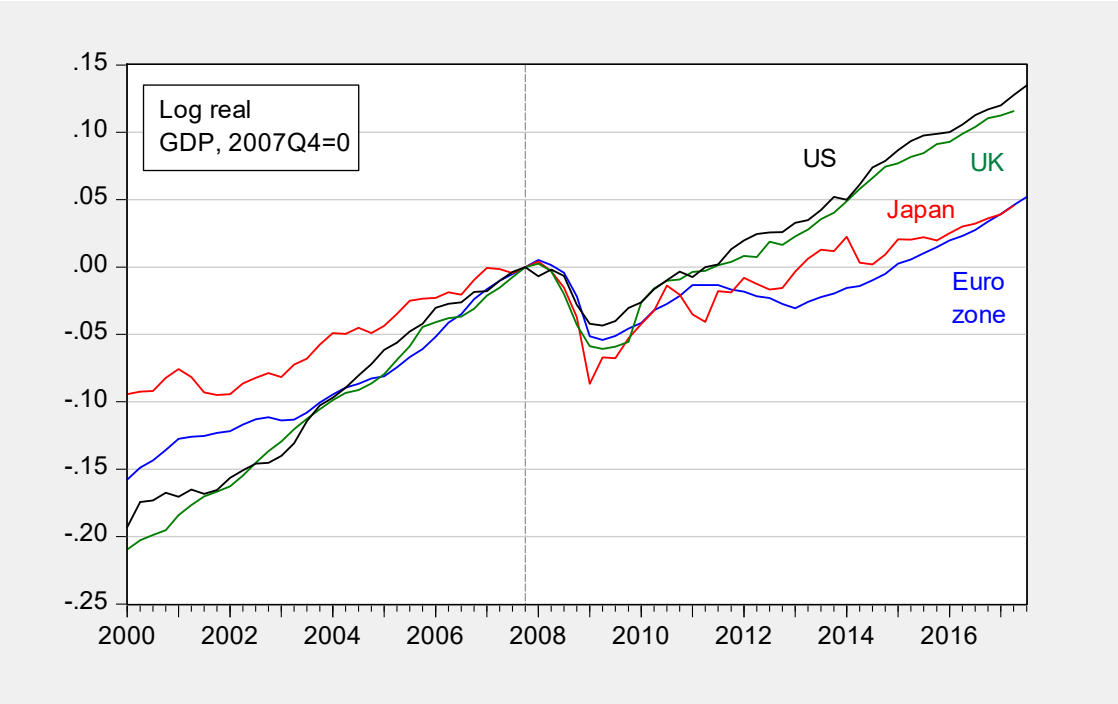

Figure 19.1: Log real GDP for U.S. (black), eurozone (blue), UK (green) and Japan (red), normalized to 2007Q4=0. Vertical line at Lehman Brothers bankruptcy. Source: IMF, *International Financial Statistics*, and OECD.

Growth in the emerging market and less developed countries also fell, though less drastically and with somewhat of a lag. For the world overall, the period of negative growth lasted only three quarters, but the long-term effect was essentially the same as the one shown in Figure 19.1: output was put on a seemingly permanent lower growth path.

The precise origin of this series of events is difficult to identify, because the global crisis of 2008 was such an all-encompassing and wide-ranging phenomenon. It's clear, however, that the episode started in the U.S., where fiscal, monetary, and regulatory policy created a combustible situation.[1]

19.2 Why Did the Global Crisis Start in America?

The global financial crisis of 2008 began as a crisis in the American financial sector a year earlier. The stage was set by the excessive degree of **leverage** in the global financial system. When a firm borrows money to buy a capital asset, the leverage of the transaction is the ratio of the amount of borrowed to the value of the asset purchased. This concept can be extended to firms and even to entire economies by comparing total debt to total assets.

A highly leveraged position, where debt greatly exceeds present asset value, can make sense if the leveraged firm expects to earn a large future return off its asset or assets. Thus in any enterprise, the greater the amount of leverage, the more the owners of the firm benefit from asset price appreciation, because this is a form of return. But if assets do not appreciate as expected, or if an appraised value turns out to be inflated, a highly leveraged position can quickly threaten the firm's stability. This is true whether the firm is a manufacturer or a retailer—or a financial institution, such as an investment bank.

Overleveraging came about because of a confluence of tax cuts and low interest rates in the early 2000s, and by under-regulation of the financial industry.

Interest Rates and Tax Policy

In the wake of the dot-com bust of 2001, when many high-tech companies founded in the 1990s ran out of capital and closed up shop, the Fed dropped the Fed Funds rate quickly and kept it low for an extended period, in order to keep the U.S. economy from relapsing into recession. By the end of 2002, the Fed's benchmark interest rate was approaching 1 percent, at a time when inflation was between 2 percent and 3 percent per year. Interest rates were kept at this extremely low level through 2004 and only went above 2 percent in early 2005.

The Fed's policy of extended monetary ease led to a prolonged period of negative real interest rates that contributed to a dramatic increase in household borrowing. Easy financing, combined with tax cuts pushed through Congress in 2001 and 2003, led to a surge in housing prices (Figure 19.2). Rising house prices meant that the likelihood of mortgage default was perceived as being low, because the borrowing homeowners quickly built up equity wealth as their homes gained in value. This further reinforced the ease of lending. The feedback loop moved house prices moved far beyond previous historical highs—a classic bubble that was bound to deflate eventually.

[1] A comprehensive examination of the causes of the global financial crisis can be found in Chinn and Frieden (2011). Council of Economic Advisers (2009) provides an alternative analysis, namely that a surplus of financial capital, or in other words a saving glut, on the part of East Asian nations and oil exporting nations caused excess capital to be pushed in the direction of the United States, where it induced the events that will be described shortly. Even so, however, the fundamental problem was the combination of American policies that made the U.S. the natural recipient of those capital inflows. In other words, the saving glut in other nations is something of a distraction.

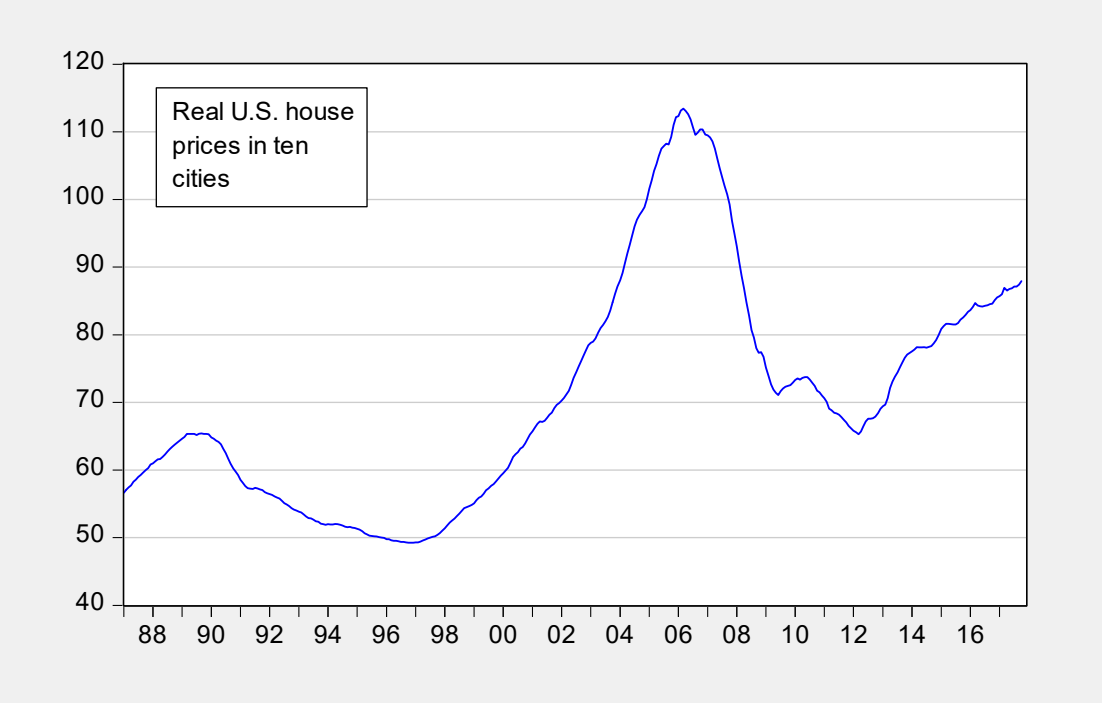

Figure 19.2: House prices in ten U.S. cities, deflated by CPI. Source: Standard & Poors Case-Shiller Index, and BLS.

Under-regulation and Financial Innovation

During the 2000's, financial engineering – the creation of complex derivatives ultimately based on income streams generated by mortgages, credit cards, and auto loans – developed. Of these, **mortgage backed securities (MBSs)** experienced the most rapid growth. These securities were further securitized into what were called **collateralized debt obligations**.

These bonds were unlike traditional ones, in two senses. First, the interest payments were funded not by firm revenues based on sales, but income streams from other bonds. Second, there was no real track record for these securities, especially during times of stress. Consequently, the credit ratings on these derivatives (i.e., how likely default was) were based, not on historical performance, but complicated statistical models. These attributes led to an under-estimate of the amount of risk banks took on when they held these securities.

The understatement of risk meant that banks could borrow more, and hold less shareholder capital, for a given amount of asset holdings than was safe. In other words, the banks could acquire more leverage, which boosted returns to the shareholders, at the cost of higher likelihood of bankruptcy in difficult times. Investment banks – financial firms that borrowed on short term capital markets instead of from depositors – were subject to different, less stringent, rules than deposit taking banks. Consequently, they were even more leveraged on the eve of the financial crisis. This is why the first banks to fail were investment banks – Bear Stearns and Lehman Brothers.

This phenomenon is illustrated in Box 19.1.

Box 19.1 Leverage, Liquidity, and Financial Crisis

Leverage is the ratio of borrowed money to a firm's own money; a highly leveraged firm has a great deal of debt compared to its equity (the value of its capital). For banks, leverage is the company's business: financial institutions do have their own capital, but the money they lend comes from money they borrow. That is, banks intermediate, channeling money from people from whom they borrow (savers) to people to whom they lend (debtors). The more a financial institution borrows, the more it can lend.

For a given amount borrowed and lent, the more the lending rate exceeds the borrowing rate, the greater the banks' return to equity. From the perspective of the owners, a financial institution would like to have none of its own money at risk at all. However, financial institutions, particularly commercial banks and savings banks, are required by regulatory authorities to hold a certain minimum of capital relative to assets, to limit the risk that unavoidably accompanies the greater earnings associated with higher degrees of leverage.

Risk arises on both the asset and the liability sides of the leverage ledger. On the asset side, assets such as mortgage loans, or assets backed by mortgage loans – can go bad, i.e., the debtor may turn out to unable to repay the loan. If the resulting losses exceeds the lending bank's capital, it will be forced to go bankrupt. Hence, the more highly leveraged a financial institution is, the more exposed it is to problems if some of the assets sour.

To see the dangers imposed by high leverage, consider two banks: one with low leverage (and a high ratio of capital to assets) and one with high leverage (and a low capital-to-assets ratio). A $9 million loss leaves the low-leverage bank (ratio 1 to 10, left side of Figure 19.4) still solvent, because capital remains in positive territory.

Commercial Bank (Before)			
Assets		Liabilities	
Reserves	$10M	Deposits	$90M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	$90M	Bank Capital (or "equity"	$10M

Commercial Bank (After)			
Assets		Liabilities	
Reserves	$10M	Deposits	$90M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	$81M	Bank Capital (or "equity")	$01M

Figure 19.5 – A low-leverage bank, before and after the writeoff of $9 in bad loans

However, the high-leverage bank (ratio 1 to 20, Figure 19.6) is not so fortunate. A $9 million loss wipes out bank capital – the bank is **insolvent**. Since the loss exceeds the capital, the rest of the loss is incurred by the depositors. The more

highly leveraged the firm is – the more it owes to others – the more exposed it is to the risk of this kind of outcome.

Commercial Bank (Before)			
Assets		Liabilities	
Reserves	$10M	Deposits	$95M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	$90M	Bank Capital (or "equity"	$5M

Commercial Bank (After)			
Assets		Liabilities	
Reserves	$10M	Deposits	$91M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	$81M	Bank Capital (or "equity")	$0M

Figure 19.6 – A high-leverage bank, before and after a $9M bad-loan writeoff

The reason why banks, if unregulated, tend toward high leverage is shown by comparing the **return on equity** (ROE):

$$\text{(19.1)} \qquad \text{ROE} = \frac{\text{Income on Assets} - \text{Payments on Liabilities}}{\text{Bank Capital}}$$

Suppose the two banks each earn 5% interest on loans (their assets) and pay 2% on deposits (their liabilities). The low-leverage bank's ROE is ((0.05 × 90) – (0.02 × 90))/10 = 2.7/10 = 0.27 (27%), while the high-leverage bank's ROE is ((0.05 × 90) – (0.02 × 95))/5 = (4.5 – 1.9)/5 = 2.6/5 = 0.52 (52%). Clearly, the profitability is much greater with high leverage, providing a tremendous incentive to minimize capital. Unhindered by regulation – as was the case for pre-2008 investment banks and hedge funds – the financial system will tend toward low capital ratios, and hence toward high fragility.

Moving from the asset side of the balance sheet to the liability side, problems can arise if depositors fearing a bank failure begin withdrawing their money. If withdrawals snowball into a bank run, the bank will indeed fail—precisely because depositors feared it might. In most advanced economies, deposit insurance provided by the government reduces the likelihood that depositors will panic in this way. However, if commercial paper holders and other short-term lenders to the bank become anxious and refuse to roll over loans, the financial institution may simply run out of money and not be able to honor its commitments. That outcome is called a **liquidity crisis**.

While solvency and liquidity problems can be thought of as independent concepts, in practice they are difficult to disentangle. For instance, in the 2008

financial crisis, some financial institutions encountered difficulties borrowing because of concerns over solvency.

The elevated leverage of the global financial system was centered in the U.S., particularly in the under-regulated **shadow banking sector**—investment banks, hedge funds, and special entities that repackaged home mortgages into securities—and the housing sector. Excessive leveraging was not restricted to the U.S., however. Because of a misappraisal of the riskiness of assets, banks in all the developed countries were over-leveraged, and susceptible to a downturn.

The Feedback Loop

As the housing market boomed, a self-reinforcing circle was established. With housing prices rising, mortgages were easily paid or refinanced. This led to banks lending even more readily to the housing market, further pushing up house prices. This dynamic pushed house prices to record heights, peaking in 2006.

As housing prices fell, mortgage defaults rose, uncovering the riskiness of new financial instruments. The Fed's process of raising interest rates further diminished the availability of funds for home loans. The newfound reluctance to lend further depressed demand for homes and thus accelerated the decline in home values.

As home prices in some cases fell below the value of mortgages, increasing numbers of homeowners now found it advantageous to default. As the derivatives backed by mortgages on bank balances sheets lost value, the solvency of financial firms went further and further in doubt, dousing the willingness of financial institutions to lend.

The shadow financial system was critical to the unfolding of the crisis. Essentially, the development of an unregulated financial sector circumvented the system of banking regulation developed in the wake of the Great Depression. This made the financial system vulnerable to traditional bank panics. The absence of regulatory oversight (particularly in allowing high leverage), in the presence of too many institutions "too big to fail"—that is, too important to the economy for the government to *let* them fail—meant the buildup of implicit financial liability on the part of the government.

Financial innovation and lack of regulation also played a role in allowing for the buildup of such governmental "contingent liabilities" in the form of institutions "too interconnected to fail." The insurance company AIG was a prime example. AIG's financial products division was heavily involved in the trading of **credit default swaps**, essentially contracts that reimbursed the holder of an asset declared in default. The insolvency of AIG would have caused a cascade of firm defaults that would have threatened the entire financial system.

The return to earth of sky-high house prices meant a dramatic loss in value of securities backed by home values, which in turn struck at the solvency of financial institutions, mainly in the United States, but also around the rest of the world. The debt crisis of 2008 would have occurred in the absence of credit default swaps and other exotic financial instruments. But these factors greatly magnified the impact of the debt crisis and significantly complicated the policy response to the ensuing events.

19.3 The Crisis Goes Global

Lehman Brothers' September 2008 declaration of bankruptcy sparked an evaporation of trust in the solvency of other financial institutions, not just in the United States but around the world. Remember, the now toxic mortgage backed derivatives had been sold around the world, so they ended up on balance sheets in European banks. With would-be lenders now worried about loans not being repaid, lending dried up. In general, such lenders' anxiety shows up in the form of a spread between an interest rate on risky

loans and a risk-free interest rate. An often-used risky rate is the London Inter-Bank Offered Rate, or **Libor**, which is the average rate at which private banks in London offer to lend to each other. The U.S. Treasury yield is a convenient risk-free rate, since the U.S. government is unlikely to default on its debts. The difference between the two rates, called the **TED spread**,[2] measures the amount of fear on the part of lenders. Figure 19.3 shows the evolution of this spread from 2006 through 2009.

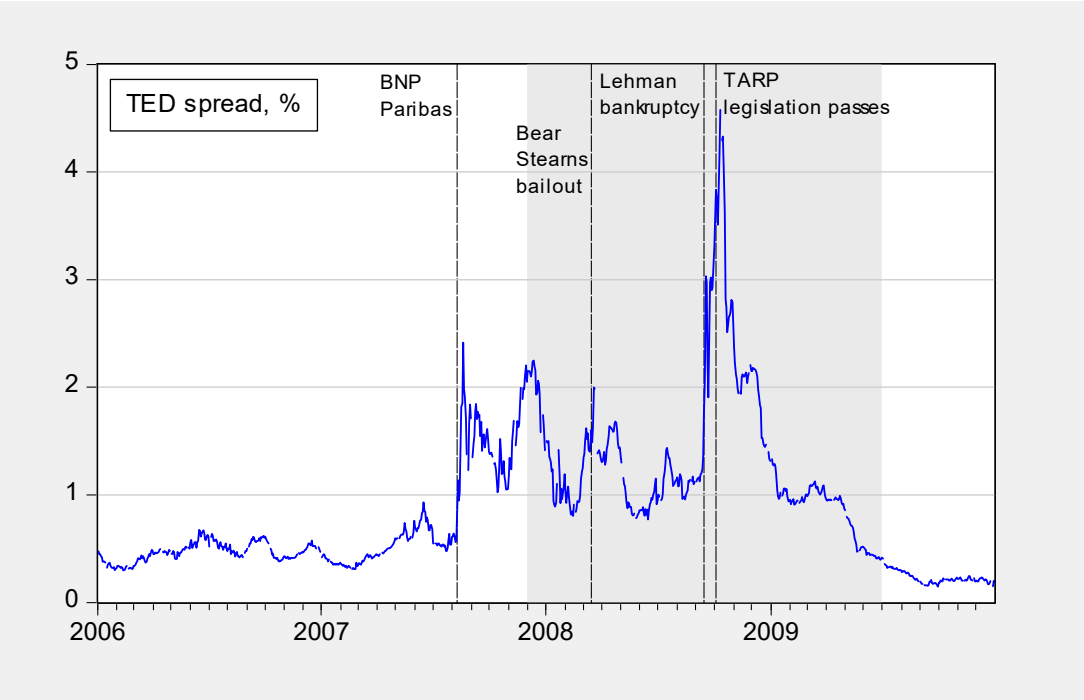

Figure 19.3: TED spread, %. Recession dates shaded gray.

Notice that the amount of perceived risk was quite low – historically unnaturally low, in fact – until it climbed dramatically in 2006. Risk jumped sharply in 2007, and then waxed and waned until the full-fledged crisis hit in September 2008. But the late-2008 spike in the TED spread probably understates, if anything, the amount of perceived risk in the financial system at that point. Libor is an indicative rate – that is it's a nonbinding statement of the interest rate major banks in London say they would be willing to lend at; at the height of the crisis it's unlikely they actually made any loans at all at these rates. In other words, the true spread was probably infinite.

As lending collapsed, so did economic activity. In the fourth quarter of 2008, after the financial crisis, GDPs in leading industrialized nations declined dramatically, as shown in Figure 19.2. U.S. real GDP plunged at annualized rate of over 8%, while that in the eurozone fell by a slightly smaller 7%. Japan's GDP plummeted by over 12.5%.

The GDP drop was synchronized to a remarkable degree among the major advanced economies. What linkages pulled the advanced economies together, causing their synchronized crisis response? The first linkage was finance, the second was trade.

Financial linkages

[2] The name comes from the two specific three-month rates being compared: T-bills and so-called EuroDollars, whose rate is derived from the Libor rate.

Economies around the world were bound together by banks and other financial institutions – hedge funds, investment banks, mutual funds -- that borrowed and lent to each other across borders. When Lehman Brothers declared bankruptcy, that borrowing and lending ceased. Figure 19.4 illustrates how lending peaked in late 2008/early 2009.

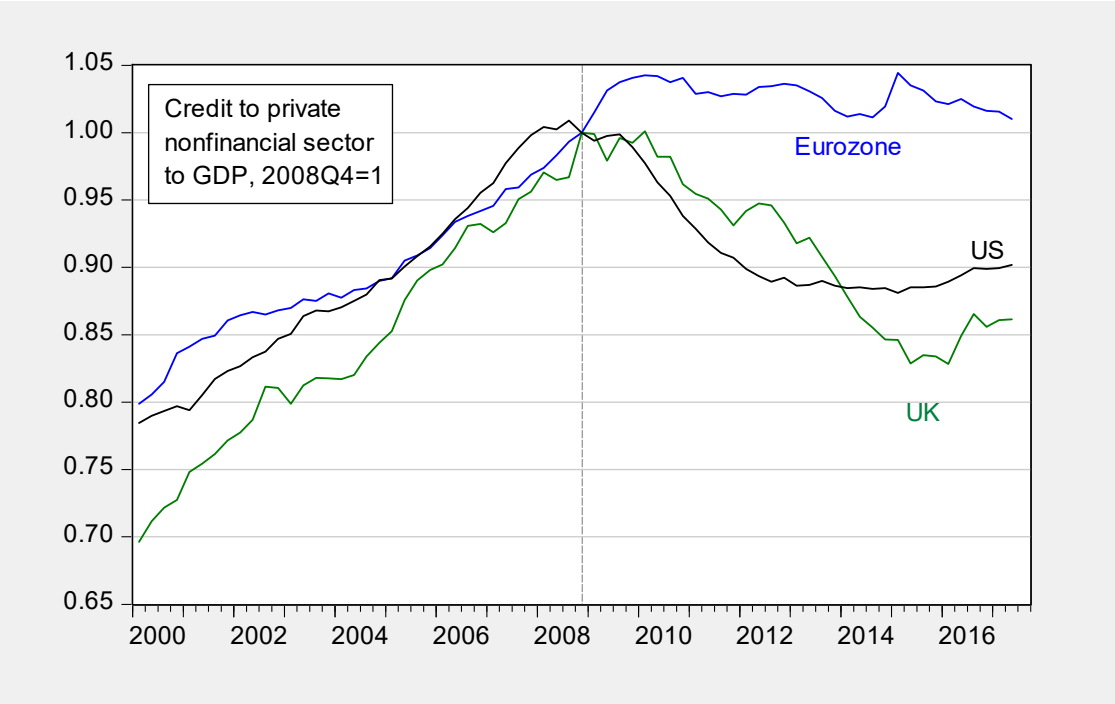

Figure 19.4: Total credit to the private nonfinancial sector as a ratio of GDP for U.S. (black), Eurozone (blue), UK (green), normalized to unity at 2008Q4=1. Source: Bank for International Settlements.

The extent to which institutions were unable to access capital markets depended on several factors. In part, it depended upon the institutions' holdings of mortgage backed securities and collateralized debt obligations. As the value of those securities plummeted the solvency of banks came into question. But institutions' inability to borrow also depended upon the fact that many institutions had excessively relied upon short-term borrowing. When the short-term loans become difficult to roll over into new loans, the institutions' cash flow problems made them less attractive to potential longer-term lenders. This is explained in more detail in Box 19.1.

Linkage Through Trade

Heading into the crisis, economies were also linked through trade. As shown in Figure 19.7, world exports dropped much more precipitously than world GDP: while world GDP fell by 3% relative to peak, world exports fell by 24%. The sharp decline in trade can be attributed to several factors. The first is the contraction in income when the crisis hit, which led to commensurate decline in consumption, part of which is imports. A second reason is that trade credit – lending specific to facilitating trade – became more difficult to obtain. But perhaps the most important reason is that a large portion of trade is in durable goods, and durable goods are particularly sensitive to movements in income – more so than food or clothing.

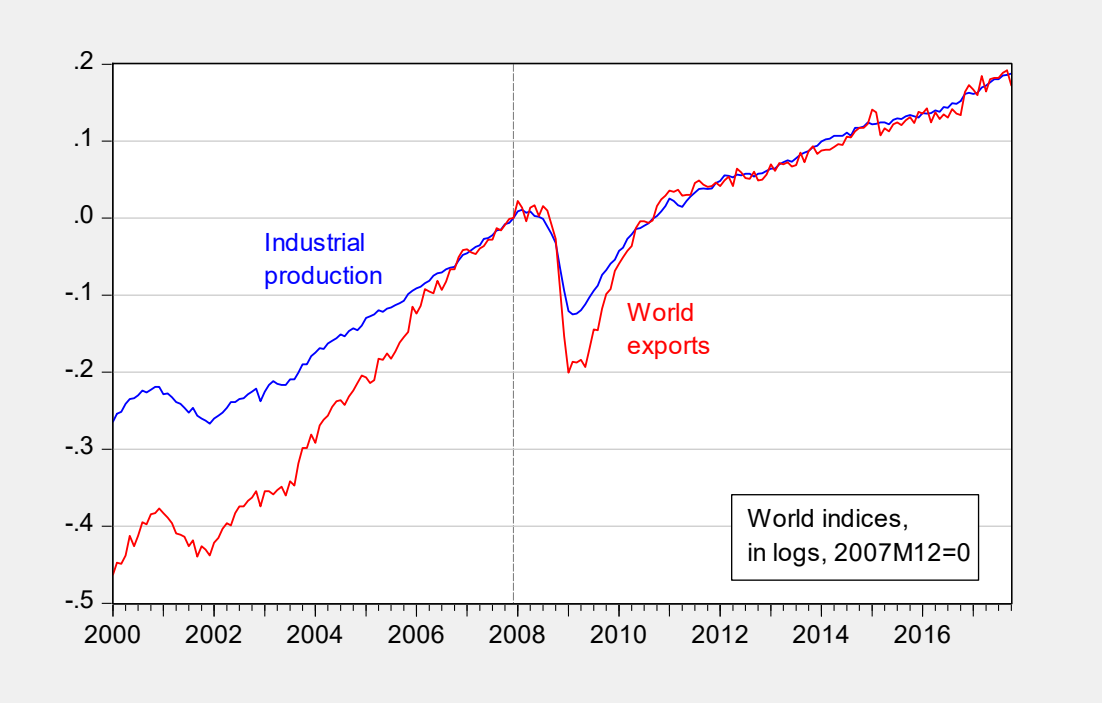

Figure 19.5: Log real GDP (blue), and log real exports (red), both normalized to 2007Q4=0. Vertical line at Lehman Brothers bankruptcy. Source: Netherlands Bureau of Economic and Policy Analysis, *World Trade Monitor* (October 2017).

A drop in trade propagates a worldwide contraction in output by way of reducing aggregate demand. So, for instance, a decline in U.S. imports is also a decline in the rest of the world's exports. But this means a drop in aggregate demand for the rest of the world, which then reduces their imports, which are in turn U.S. exports, and so the income decline compounds. Thus, trade flows are both a cause and an effect of the global recession. But the cycle begins with exogenous events: a decline in autonomous consumption and in autonomous investment. The consumption declines as perceived wealth, in the form of home values and securities based on them, erodes. Investment collapses because banks cease to lend.

As shown in the two-country Keynesian model in Chapter 13, the multiplier for a change in autonomous spending is larger with feedback effects than without them. For instance, if the marginal propensity to consume is 0.8 and the marginal propensity to import is 0.3, then the multiplier is nearly 3, whereas the multiplier would be 2 in the case where all the import effects leaked out completely.[3] Hence, trade both propagates a contractionary impulse across borders and magnifies the contractionary impact on the source country.

19.6 Conclusions

The global financial crisis and the eurozone crisis highlight the importance of excessive leverage (i.e., overborrowing), feedback loops, and international linkages. In the global crisis, deregulation and financial innovation, combined with an asset price boom, led to a collapse that threatened the international financial system. The ensuing global recession occurred because of trade linkages as well as the fact that the toxic assets that lost value precipitously were held by financial institutions around the globe. In the eurozone crisis, the seeming disappearance of risk, along with an overly loose monetary policy in the

[3] The calculation assumes zero interest rate effects, which is consistent with being at the zero lower bound, as was the case in 2008–2009.

GIIPS countries—a policy associated with Economic and Monetary Union—led to overborrowing, and an asset boom and then collapse. The response to the bust was hampered by the fact that the currency union prevented adjustment by way of nominal devaluation. In both cases, the smooth adjustment to restore full employment was hampered by frictions, either in the financial system, in prices, or both.

Summary Points

1. The global financial crisis of 2008 occurred because financial institutions had become overleveraged.
2. The overleveraging resulted in a financial system susceptible to losses in asset values arising from the downturn in housing prices.
3. Doubts about the solvency of the financial system led to a freeze in lending, which in turn resulted in an economic downturn.
4. The downturn was propagated across borders due to the fact that mortgage backed securities and other derivatives based on upon real estate assets were held by banks around the world.
5. Downturns in each country were transmitted to other countries by reduced export demand.

Key Concepts

collateralized debt obligation

credit default swap

insolvent

leverage

Libor

liquidity crisis

mortgage backed security

return on equity

shadow banking sector

shock absorber

TED spread

Review Questions

Exercises

Worked Exercise

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