HOW HAS SEPTEMBER 11 INFLUENCED THE GLOBAL ECONOMY?

This Chapter analyzes the channels through which the terrorist attacks on September 11 could affect the global economy, and hence the underlying issues that have helped to mold the forecast and policy advice. The multiplicity of the channels—ranging from the direct loss of life and property to the impact on commodity markets—reflects the complex web of relationships that make up the world economy.

Before examining the channels in more detail it is useful to review the economic environment in which the terrorist attacks occurred. The global slowdown that had started most prominently in the United States in 2000 had, by mid-2001, become a synchronized downturn across almost all major regions of the world. This left the global economy particularly vulnerable to a negative impulse through, among other things, an erosion of the financial position of consumers, corporations, and governments. Such difficult times are also those in which sentiment can be particularly affected by unexpected negative shocks, leading to relatively abrupt reductions in private spending. The room for policy maneuver may have also been constrained by earlier policy easing and, particularly in emerging market economies dependent on external financing, lower investor appetite for risk. In short, the underlying impact of the terrorist attacks was probably magnified by the particular circumstances in which it occurred.

Bearing this in mind, the chapter focuses on four relatively distinct channels through which the attacks affect the global macroeconomic situation in the short term:

- *The destruction of life and property.* This includes the tragic loss of human life, the costs of replacing the buildings and equipment destroyed in the attack, and the disruption of activities in the immediate aftermath of September 11. Also included are the somewhat longer-term disruptions to specific industries, most notably to the global airline industry and related services, such as hotels, local transportation, tourism, civilian aircraft manufacture, and restaurants, as well as the postal service in the wake of the anthrax scare in the United States.
- *The confidence channel.* An unexpected event of the magnitude of the September 11 attacks alters the assessment of economic risks by both consumers and businesses in a negative way. The resulting deterioration in confidence about the future can reduce the incentive to spend as opposed to save, a process that can spread through the economy and the rest of the world through normal business cycle and trade channels.
- *Financial market responses.* By their nature, financial instruments involve commitments across time, and thus are affected by perceptions of the future. For example, equity and bond markets trade securities involving future dividend or coupon payments by corporations or governments. In addition, derivative markets can provide information about the level of uncertainty in traded markets, an issue of particular interest after such an unexpected event as the terrorist attack. The initial generalized fall in asset prices has now been reversed, although borrowing costs for riskier borrowers remain high.
- *Commodity markets.* Slowing activity will reduce the demand for commodities and other goods sold in similar markets, such as computer chips, while initial concerns that supply might also be disrupted (most notably in the oil market) have not thus far transpired. As a result, commodities prices (particularly for oil) have weakened sharply,

reducing the impact of the fall in aggregate demand in industrial countries by transferring part of these losses to commodity producers through the terms of trade.

The importance of the channels varies by country. For the major industrial countries, the main impact is likely to depend primarily on the fall in demand generated by the loss in confidence about the economy and its impact on output, together with the direct effect on some industries. This reaction is most notable in the United States. Slowing external demand (including tourism) is the major factor for many emerging market economies, particularly in Asia, central America, and the Caribbean, while elsewhere in Latin America the main channel is likely to be through a flight to quality in financial markets, which increases the cost of borrowing for emerging markets, as they are seen as relatively risky borrowers. Finally, both the trade and financial channels will matter for central Europe and Russia. For other developing countries, including many of the poorest, the main impact is likely to come through commodity markets.

There is also the question of whether the attacks are likely to have a long-term impact on long-term productive potential around the world by raising the costs of transactions through, for example, significantly increased security and higher insurance premiums, as discussed in Box 2.1. While any assessment of the long-term impact is inevitably speculative at this stage, and views differ markedly, two points are worth highlighting:

- *The impact will probably not be large in comparison to existing growth trends.* Over the last decade, real GDP has been rising at a rate of some 2¾ percent a year in the advanced economies and double that in developing countries. If the impact on the level of potential output were relatively sizable, say 1 percent of GDP, its impact on medium-term growth would be significantly smaller than current estimates of the impact of information technology on U.S. growth since the mid-1990s, a matter of continuing contro-

versy given the natural variation in growth trends due to cyclical events. As such, the shock is probably best characterized as a temporary disturbance.

- *Real GDP (the conventional measure of output) is a good cyclical indicator of the state of the economy, but in current circumstances may overstate economic welfare.* In particular, the increased awareness of the possibility of terrorist actions reduces people's welfare through great concern about security, but has no impact on real GDP. By contrast, the resulting increases in demand for security services to relieve these concerns are counted in real GDP.

Direct Impact of the Attacks

Like all major disasters, natural or manmade, the terrorist attacks of September 11 resulted in a tragic loss of life and destruction of property, as well as a short-term disruption of activity more generally. In addition, because of the size and premeditated nature of the attack, there are likely to be more lasting effects in some industries, most notably airlines, civilian aircraft manufacture, hotels, insurance, leisure activities, and the postal service (taking into account the subsequent anthrax attack). The analysis indicates that while the human toll and property damage are likely to have a limited macroeconomic impact, the short-term losses through specific industries could be significant.

The U.S. National Income and Product Accounts (NIPA) estimate the losses to property from the September 11 attack at about $16 billion, just over 0.15 percent of annual GDP and an even smaller percentage of the U.S. capital stock—see Table 2.1 (U.S. Bureau of Economic Analysis 2001a, b). The property damage is somewhat smaller than from the earthquake in Northridge, California in early 1994 and Hurricane Andrew in 1992. In addition, the horrific loss of life and injuries are estimated to lead to other insurance costs of approximately $5 billion (0.5 percent of annual GDP, excluding the recent anthrax attack through the postal

Table 2.1. Direct Costs of September 11 Attacks
(Billions of U.S. dollars)

Loss	Cost
Structures, Equipment, and Software	
Private	14.0
State and local government[1]	1.5
Federal government	0.7
Subtotal	16.2
Other Insurance Losses	
Life and related costs	2.6
Workers compensation	1.8
Homeowners and other	0.6
General government	0.2
Subtotal	5.2
Total	**21.4**

Source: U.S. Bureau of Economic Analysis (2001a, b).
[1]Largely NYC subways.

system), although the timing of these payouts is difficult to determine.[1] Total costs are hence around ¼ percent of annual GDP.

Even including the injury costs, the damage inflicted by Japan's Kobe earthquake in 1995—which had little impact on the path of the Japanese economy in either the short or longer term—was much greater than that caused by the September 11 attacks in both absolute terms and relative to GDP (see Box 1.3 of the October 2001 *World Economic Outlook*). One reason that such disasters have a smaller macroeconomic impact is that they boost demand in a number of sectors, most notably construction, and, in the case of September 11, defense spending. In addition, insurance claims are transfers from one person to another and hence do not reduce overall incomes—indeed, as many of the policies were reinsured abroad, there will be a net inflow to the United States estimated to be $11 billion (0.1 percent of GDP).

The attacks also resulted in a series of temporary disruptions to the complex web of transactions that make up a modern economy. In the United States, consumption fell significantly in September as people followed the

news (TV viewership surged by almost half immediately after the attacks) and some avoided public places (average shopping mall traffic fell by 5 percent or more). Somewhat smaller effects appear to have occurred elsewhere in the world. In addition, the closure of U.S. airports for four days was a blow to airlines in the United States and elsewhere, with knock-on effects on related industries. The closure of the U.S. stock exchanges for four days and other financial disruption (see Box 2.2) reduced revenues, but higher volume thereafter probably largely offset these losses. The overall impact on GDP was small, about 0.1 percent of monthly GDP.[2]

Looking beyond the short term, the fact that the attack was premeditated and therefore could be repeated has had a significant impact on three specific areas of activity—airlines and other industries associated with travel, postal services, and insurance. In most cases the effects are largest in the United States and for small countries particularly specialized in certain industries:

- *Airlines*. In the United States, the airline industry was already in a weak financial position before the attacks, with rising debt ratios and falling returns on investment. Even with cutbacks in service of the order of 20 percent and significant government support, airline passenger traffic has apparently remained below normal, 100,000 layoffs have been announced, and employment in October and November fell by 81,000 (almost 8 percent). These problems extend to other countries, as the near bankruptcy of Swissair followed by the actual bankruptcy of the Belgian airline Sabena illustrate. Equity valuations compared to the overall market illustrate these difficulties (Figure 2.1). The U.S. airline sector has lost around 20 percent of its relative value since

[1]The direct impact on human capital will be miniscule given the size of the U.S. labor force of 140 million.
[2]NIPA estimates are that in the third quarter consumer spending fell by $0.7 billion and temporary layoffs lowered wages by $3.3 billion, partially offset by $0.8 billion in additional pay for emergency service workers (all figures quarterly at annualized rates).
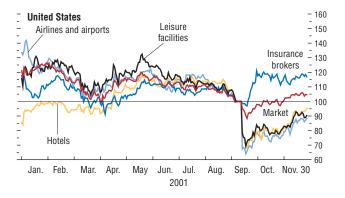
September 10, while in Europe and Japan the reduction is around 15 percent.

- *Other service industries* have also been badly affected, such as hotels, tourism, car hire, travel agents, restaurants, and civilian aircraft manufacturers, while postal use fell after recent anthrax scares. For example, hotels have reported higher vacancy rates, and employment in the sector as a whole in the United States fell by 58,000 (about 3 percent) in October and November. Tourism has been particularly affected in regions of the world dependent on foreign visitors, such as the Caribbean (see Chapter III, Box 3.3), parts of the Middle East, and portions of Asia. Relative equity values for hotels and leisure facilities are off by around 15 percent in the United States and Europe, although they have gained slightly in Japan, possibly reflecting the more limited need for air travel.

- *Insurance.* The industry will be affected by large claims resulting from the attacks, but gain from heightened uncertainty and interest in security. Anecdotal evidence largely from the United States indicates that insurers have been able to raise premiums, while it remains unclear how far governments will get involved in covering losses from terrorism and war. The market assessment is that the benefits of higher premiums will dominate, as relative equity prices for insurance brokers (and the reinsurance subsector that was particularly affected by the attack) have risen by around 10 percent in the United States and in Europe.

Significant disruption in these sectors could have an impact on real GDP in the short term. In the United States, for example, air travel, hotels, and leisure activities comprise about 2¾ percent of GDP, so a temporary 20 percent fall in such activities would reduce output by around ½ percent, although this would be partially offset by increases in demand for substitute products—less air travel may well raise the demand for other forms of communication, such as railroads and telephone calls.
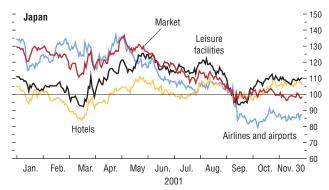
Figure 2.1. Stock Market Indices by Industry
(September 10, 2001 = 100)

The relative equity price of the airline, airport, hotel, and leisure facility sectors has generally fallen since September 11, while prices for insurance brokers have improved.

Source: Thomson Financial Datastream.

Box 2.1. The Long-Term Impact of September 11

The main channel through which the continual threat of terrorism could affect the long-term potential of the global economy is by raising transactions costs, resulting in a reduction in potential output. These costs can be broken down as follows:

- *Higher operating costs.* Businesses may experience higher operating costs, owing to increased spending on security, higher insurance premiums, and longer wait times for activities.
- *Higher levels of inventories.* Businesses may be required to hold larger inventories than previously, owing in part to less reliable air and rail transportation. There is anecdotal evidence from the auto industry that production was interrupted because components were not immediately available from suppliers after the September 11 attacks, owing to delays in shipments crossing the U.S.–Canada border.
- *Higher risk premium.* As a result of the attack, lenders' appetite for risk may decline, leading to higher risk premiums that may be passed on to businesses in terms of higher interest rates and lower equity prices, with an adverse effect on investment, and a smaller capital stock.
- *Shift of resources away from the civilian labor force toward the military.* More resources may be diverted toward the military for use in the containment of terrorism. In addition, research and development (R&D) resources may be shifted away from productive activities toward the development of new devices to thwart terrorism (although such devices may have beneficial spillover effects elsewhere).
- *Shift away from globalization.* The attack may have effects on firms' investment decisions—in particular, whether to invest domestically or abroad, in part because of potential disruption of cross-border flows of goods and assets. Costs for such transactions may rise owing to closer inspection of transactions and higher insurance premiums. However, if a new impetus is given to negotiations for a new trade round, other trade barriers could be reduced.

The debate on the impact of the September 11 terrorist attacks on productive potential focuses on two issues on which, given the existing levels of knowledge, people hold widely differing opinions. The first is the extent that "transaction" costs will rise, an issue that depends heavily upon whether further attacks occur, forcing constant high levels of vigilance, or whether September 11 turns out to be a relatively isolated incident, implying a smaller long-term change in behavior. The second is the degree to which a rise in transaction costs will disrupt economic activity, with many arguing that the impact will be limited as firms adapt to new conditions by relatively simple changes in procedures—for example, using more facsimiles and fewer letters if delivery times for the postal service lengthen. Others, however, believe that small transactions costs can lead to significant changes in behavior—for example, the level of trade within countries is much larger than it is between them, presumably reflecting various transactions costs.

Views of the long-term impact divide roughly into three camps:

- *The most commonly held view is that there will be few consequences for the long-term outlook for the United States amd elsewhere.*[1] This assumes that the persistence of the disruptions caused by the terrorist attack will be limited, registering as a small downward shift in productive potential. A useful parallel to assessing the impact may be the assassination of U.S. President John F. Kennedy in 1963. In the days following the murder there was some of the same widespread disbelief that a U.S. President could be assassinated as there has been to the September 11 terrorist attack. Despite the uncertainty following the assassination of President Kennedy, the economy and the equity market strengthened following an initial decline.
- *A significant minority believes that the terrorist attack will have a noticeable impact on productive potential, particularly if additional terrorist activity oc-*

[1]This view was supported by the testimony of Federal Reserve Chairman Alan Greenspan to Congress on October 17, 2001 (Greenspan, 2001).

Box 2.1 *(concluded)*

curs on a sustained basis.[2] This pessimistic view is based on the assumption that the threat of terrorism will create considerable uncertainty, instability, and significantly higher transaction costs. This negative scenario can be compared to the effects of the 1970s oil crises. In both instances there was a shock to the global economy that necessitated a major adjustment in the allocation of resources. In the 1970s, it took several years for productivity to approach its new, somewhat lower, trend.

- *A few argue that the attack will benefit the economy in the long run.* This "creative destruction" view holds that the setback in the economy will enable producers to shed much of their unproductive activities, leading them to adopt newer technologies to become more competitive and thereby enabling the economy to grow at rates in excess of those that prevailed earlier. This positive scenario can be compared to the effects of the Y2K project. In the Y2K case, companies were required to update and improve existing software, which increased their flexibility in adopting new technologies more rapidly.

It is impossible at this stage to provide firm evidence on all of the channels by which the September 11 terrorist attacks could affect long-term potential. That said, rough orders of mag-

[2]For example, a study of the economic effect of conflicts, using the terrorist conflict in the Basque region as a case study, estimates a 10 percentage point decline in real GDP, increasing as terrorist activity rises. See Abadie and Gardeazabal (2001). However, it should be noted that in this case it was relatively easy and cheap to move activities from the Basque region to other places in Spain.

nitude can be provided. For example, one private sector analysis estimates the increase to business costs of higher security costs at $1.6 billion per year, the extra financing burden of carrying 10 percent higher inventories at $7.5 billion per year, and an increase in commercial insurance premiums of 20 percent at about $30 billion per year (UBS Warburg, 2001). The total represents about ⅓ percent of nominal GDP. In addition, airlines, hotels, and leisure activity comprise around 2¾ percent of GDP. If the long-term net fall in output in these sectors (i.e., taking into account that spending may rise in other sectors) were a relatively large 10 percent, the loss would be another ¼ percent of GDP. In addition, simulations using MULTI-MOD, the IMF's macroeconomic model, indicate that a half percentage point increase in the costs of capital could reduce the capital stock by 0.2 percent and output by 0.1 percent after five years. The loss in output from all of these sources could be as much as ¾ percent of GDP. Other costs are more difficult to quantify.

To put these costs in perspective, consider the case where long-term potential output in the United States was lowered by 1 percent (about $100 billion)—a relatively generous estimate in the light of the calculations above—while the growth rate of potential remains unchanged. The impact on the five-year average growth rate would be about 0.2 percent, considerably smaller than most estimates of the much-debated impact of information technology on growth since 1996. In short, the impact on potential output would have to be extremely large to be clearly visible when compared to the natural variation in these statistics caused by cyclical phenomena.
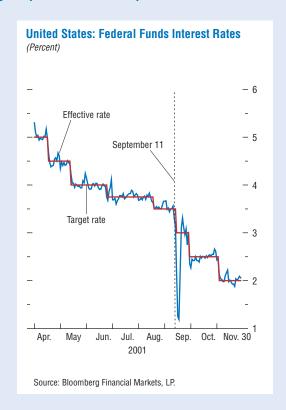
The Confidence Channel

Confidence is a major channel through which the September 11 attacks feed through to the global economy. An unforeseen event of the magnitude of the September 11 terrorist attack can radically alter the view of the future (including the level of uncertainty) for both consumers and businessmen. This provides an incentive to postpone or cancel spending, which, through Keynesian multiplier and trade channels, can reduce aggregate demand and output at home and in other countries. In addition, data and confidence are available considerably earlier than estimates of activity, and hence can provide

Box 2.2. Financial Market Dislocations and Policy Responses After the September 11 Attacks

The attacks on September 11 damaged some key trading infrastructure and financial intermediaries, resulting in a surge in the demand for liquidity by the U.S. (and to a lesser extent other) financial systems. Concerted policy responses by the United States and other authorities to provide such liquidity were effective in quickly restoring market stability and heading off systemic concerns. In the United States, equities trading was suspended for the week following September 11 and resumed on September 17. Bond trading was suspended September 12 but resumed the next day. Settlements moved from one day to three days that week for Treasury and agency notes, and then were extended to five days for the week starting September 17, but returned to normal thereafter. Early market closure characterized several trading sessions during the crisis period. Policy responses by the U.S. Federal Reserve included, in addition to cuts in interest rates, liquidity injections through the discount window, increases in overnight repos, and augmentations in swap arrangements with other central banks. The injection of liquidity was most evident in the deviation of the federal funds effective rate from its target rate (see the Figure). The U.S. Securities and Exchange Commission also supported the markets' return to normalcy by modifying existing rules on securities lending and share repurchases.

The biggest disruptions to trading infrastructure resulted from damage to the computer and communications systems of the world's largest custodian and settlement bank, the Bank of New York. Manual processing of securities and payment transactions resulted in significantly slower clearing and settlement, generating uncertainty about completion of trades, and demand for liquidity by the financial system. The destruction of the offices of Cantor Fitzgerald, a leading U.S. bond market interdealer broker, and other smaller brokers also led to uncertainty about the settlement of outstanding trades and significant difficulties in brokering new trades.

More broadly, most financial firms located in downtown New York took several days to revert

United States: Federal Funds Interest Rates
(Percent)

Source: Bloomberg Financial Markets, LP.

to offsite back-up systems, and perceived or actual delays in transaction settlements reduced the supply of and increased the demand for liquidity in the financial system, even as risk averse investors sought to liquidate positions and increase their cash holdings. While the CHIPS payment system for cross-border foreign exchange transactions was reportedly disrupted for only a few hours on September 11, feared delays in settling the dollar end of cross-border transactions in some instances disrupted overseas trades with a dollar leg. The extraordinary market volatility, and inability to accurately price assets, caused some counterparts to be unable to meet their margin requirements with banks. Recognizing the extraordinary situation, however, banks did not force closing out of these positions, as these were not seen as having the potential of becoming a systemic threat to the financial system.

The U.S. repo market suffered particularly severe dislocations after the September 11 attacks.

Besides being crucial for Treasury bond dealers to finance positions and conduct daily transactions amounting to some $500 billion, the repo market is also the main supplier of short-term liquidity for much of the rest of the financial system, and hence is crucial for orderly financial markets.

Repo transactions were initially affected by damage to trading infrastructure, as well as to firms' absence or lack of full capacity. Consequently, many trades were either "special" (trading near zero percent instead of near the federal funds rate) or "fails" (where both parties were simply unable to complete the trade). As normal trading volumes began to resume and normal settlement rules were re-imposed, fails increased and market participants were increasingly reluctant to lend out securities, further threatening the market. Moreover, many investors actively

purchased Treasuries to position their portfolios in safer havens. Weekly fails averaged $45 billion in the second quarter, but reached $400 billion in the week ended September 12, and $1.4 trillion in the week ended September 19. Fails tapered off afterwards, but continued to run at very high levels even after the end of the quarter. The shortage spilled over into the trading of Treasury spot yields, and thereby affected the quoted spreads in markets for swaps and agency and corporate paper. The lack of supply was particularly acute for 5- and 10-year Treasuries. Consequently, the Federal Reserve Bank of New York began pumping an average of $8.5 billion of these securities into the market (while it usually would do less than $1.5 billion), and the Treasury took the unprecedented step of holding an unscheduled auction of $6 billion 10-year Treasury notes on October 5.

useful advanced warning of current cyclical conditions.

While the mechanism through which a reduction in confidence could affect the macroeconomic situation is clear, an assessment of the size of this effect is more complex. Confidence, being a feeling rather than an action, is intrinsically difficult to quantify. In the major industrial countries confidence is measured through surveys that include questions both about the present and next few months, producing a headline figure and separate sub-indices, generally including one that measures future expectations. These surveys differ significantly from country to country in the nature of the questions and the method of compiling the results, but the relative impact of an event can be measured by comparing the change in the index to the "average," defined by the standard deviation of the change in the particular series. The remain-

der of this section examines how confidence indicators responded to the terrorist attack in comparison to earlier unanticipated events and the predictive value of such confidence indicators for domestic output. In this discussion, the United States is given somewhat more prominence than other countries, reflecting both the location of the terrorist attack, the size of the U.S. economy in the world, and the potential role of an acceleration in U.S. activity in assisting a global recovery.
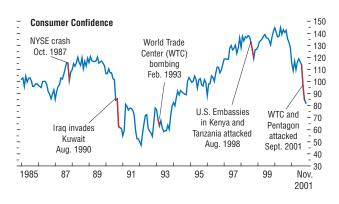
Figure 2.2 shows the path of U.S. consumer and business confidence since 1985, with the timing of particularly important events marked.[3] As might be expected, confidence is closely linked to the economic cycle, and was declining before September 11. It can also be significantly affected by noneconomic events. The dramatic fall in confidence after the September 11 attacks is clearly one of these events, with consumer and business

[3]Conference Board Surveys are used for both consumer and business confidence. Broadly similar results are seen in other series, in particular the National Association of Purchasing Managers (NAPM) survey of business sentiment and the University of Michigan survey of consumer sentiment, although these surveys indicate some recovery of confidence in November, while the Conference Board data do not.

confidence between August and October falling by between 2½ and 5 standard deviations—amongst the highest readings—in both cases. These falls are comparable to the impact of the Iraqi invasion of Kuwait (a similarly unpredicted political event that rapidly led to a military response during a period of slowing activity), and considerably larger than other less dramatic terrorist attacks (such as the bombings of the World Trade Center, the U.S. military barracks in Saudi Arabia, U.S. embassies in Africa, or the U.S.S. Cole). Turning to components of the series, the fall in the overall value is somewhat larger (in terms of standard deviations) than the fall in expectations, indicating that the impact may be expected to lessen somewhat over time.

Turning to the rest of the world, business confidence through much of Europe appears to have been hit hard both by the deteriorating economic situation and by the aftermath of the attacks (business confidence in France, Germany, Italy, and, to a somewhat lesser extent, the United Kingdom fell rapidly between August and October, with declines of between ½ and 4 standard deviations), and the forward-looking elements do not appear to have been performing consistently better than assessment of current conditions. The size of the negative impact on consumer sentiment in Europe is generally smaller and more mixed, although, as discussed below, these series generally also have low predictive power. Finally, the September *Tankan* quarterly business survey in Japan and a similar quarterly survey in Canada, whose responses spanned the September 11 tragedy, also plummeted.

The synchronicity of the drops in confidence measures across the major industrial countries, particularly business confidence, probably reflects a range of factors. Underlying business conditions were deteriorating even before the September 11 attacks, especially in Europe and Japan. In addition, changes in business confidence in the United States are often associated with a fall in business confidence elsewhere, presumably reflecting the systemic importance of the United States for other countries (see Box 2.1 of the October 2001 *World Economic Outlook*).

Figure 2.2. United States: Indicators of Consumer and Business Confidence
(Index numbers)

The fall in consumer and business confidence in the United States after the September 11 attacks is similar to that after Iraq invaded Kuwait.

Source: The Conference Board.

Finally, although the attack was on the United States, the terrorist network appears to have existed in many countries, and hence can be construed as a common shock.

There are several analyses of the impact of consumer confidence on spending in the United States and United Kingdom, most of which conclude it has some impact, but much less work has been done on continental Europe or business confidence.[4] To quantify these effects, the staff undertook an analysis of consumer and business sentiment indices using real GDP for Canada, France, Italy, Japan, the United Kingdom, and the United States since 1985 and Germany since unification.[5] The analysis looked at four issues:

- *Which confidence series are most useful for charting the likely path of the real economy?* The headline figures appear to be the most robust, and are generally a better predictor of trends in output since 1985 than the expectations components (even for future periods) or specific subindices often pointed to as providing superior information.
- *Are changes in confidence rapidly reversed?* When adjusted for the cycle, the lagged change in consumer and business sentiment is rarely important for current levels of confidence, implying that there is no historical reason to expect confidence to improve until recovery starts. However, confidence is likely to be affected by the outcome of noneconomic events, just as U.S. confidence improved after the victory in the Gulf War. In addition, such regressions can be used to examine how much of the recent changes in confidence are a surprise given the cycle. To date, the relevant data are only available for the United States, and indicate that little of the recent falls in confidence are cyclical.
- *How much information do confidence indicators on their own provide about current and future*

output? In the United States, both the business and consumer confidence indicators appear to provide useful information about growth both in the current quarter and the following few quarters. Elsewhere, the business confidence series also provide useful information about the path of growth, but the consumer confidence numbers are less useful (except in Canada). The results imply that, if the fall in confidence since the September attacks in the United States is sustained, output could fall by a percentage point or so, with effects of the order of half of this size elsewhere (Table 2.2).
- *How much additional information do confidence indicators add to simple models of growth?* When other factors that might affect growth in the current period—growth last period, changes in stock prices, and movements in real interest rates—are taken into account, the short-term impact of confidence on growth is generally diminished. However, business confidence in general and consumer confidence in the United States remain useful predictors of movements in real GDP in the future.

In summary, a fall in confidence is a potentially important factor in reducing activity in industrial countries. In the baseline projections, it is assumed that confidence gradually recovers through 2002, so only a portion of the long-run effects on activity are incorporated. More pessimistic assumptions are discussed as part of the alternative scenarios, reported in the appendix to Chapter III.

Financial Market Reaction

Financial markets provide valuable information about how investors perceive the future that both reflects and affects the global outlook. In what follows, it is useful to make a distinction be-

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[4]On consumer confidence see Acemoglu and Scott (1994); Carroll, Fuhrer, and Wilcox (1994); Bram and Ludvigson (1998); and Macroeconomic Advisors (2001).

[5]More specifically, the change in real GDP was related to current and past changes in confidence, and the coefficients used to calculate the response of output to a downward movement in confidence.

Table 2.2. Impact of Confidence Indices on the Growth of Real GDP
(Percent of GDP, unless otherwise indicated)

	Current Quarter	One Quarter Lag	Two Quarter Lag	Cumulative Impact	Fall in Confidence August to October (Standard Deviations)	Impact on Real GDP If Fall in Confidence Is Sustained
	Impact of a one standard deviation fall in the monthly change in business confidence on real GDP					
United States						
Conference Board	−0.18***	−0.08*	−0.07*	−0.31	3.2	−1.0
NAPM	−0.10**	−0.04	−0.09**	−0.23	4.2	−1.0
Japan	−0.14*[1]	−0.07[1]	−0.06[1]	−0.27[1]	n.a.[2]	n.a.[2]
Germany	−0.10***	−0.05	−0.05	−0.20	3.7	−0.7
France	−0.12***	−0.02	−0.01	−0.15	1.9	−0.3
Italy	−0.11**	−0.09*	−0.02	−0.22	3.0	−0.7
United Kingdom	−0.11**	−0.08*	−0.04*	−0.23	0.5	−0.1
Canada	−0.05[1]	−0.11*[1]	−0.06[1]	−0.22[1]	n.a[2]	n.a.[2]
	Impact of a one standard deviation fall in the monthly change in consumer confidence on real GDP					
United States						
Conference Board	−0.14***	−0.08*	−0.15***	−0.37	5.0	−1.9
University of Michigan	−0.09*	−0.09*	−0.09**	−0.27	2.8	−0.8

Notes: Three asterisks indicate the results are significant at the 1 percent level, two asterisks at the 5 percent level, and one asterisk at the 10 percent level. The coefficients were calculated in such a way that they would be cumulated over time.

[1]As the Japanese and Canadian business confidence data are only available on a quarterly basis, the standard deviations were adjusted down by one-third to reflect the fact that standard deviations of quarterly data tend to be larger than those of monthly data.

[2]Data only available on a quarterly basis.

tween a change in the price of more risky assets caused by an increase in investor risk aversion and a generalized increase in perceived risk. At this time, investor risk aversion, although lower than in the immediate aftermath of September 11, remains evident for high-risk borrowers, most notably emerging market economies but also high-risk borrowers in mature markets. By contrast, broader effects are no longer evident, after a marked rebound in global equity markets.

The terrorist attacks occurred against a backdrop of increasing concerns about global economic activity and corporate earnings, weakening equity markets, and widening high yield and emerging market spreads. They increased what was already an unusually high degree of uncertainty about the near-term outlook and amplified downside risks. Given this backdrop, the global financial market infrastructure showed significant resilience in the immediate aftermath of the attacks despite significant damage to some of the largest U.S. financial institutions and high levels of uncertainty and market volatility.

The main financial market response was a flight to quality that increased borrowing costs for riskier borrowers (Table 2.3). Given the clo-

sure of U.S. equity markets, the immediate market reaction was seen in the credit and currency markets, and in equity markets outside the United States. As in other recent financial crises, including the 1987 stock market crash, the global currency crises in 1997, and the Russian default and LTCM crisis, investors' demand for low-risk assets and cash increased sharply—generally attributed to falling investor risk appetite (see Box 2.3). However, the main beneficiary in this case was cash, seen in the sharp steepening of the U.S. yield curve (which also reflects monetary easing), while U.S. government paper served as less of a safe haven than in past crises as the attacks were on the United States.

The flight to quality affected borrowing costs of high-risk borrowers (Figure 2.3). Spreads on high-yield bonds widened sharply and, compared to high-grade corporates, have remained high. In addition, many smaller companies have been unable to access credit, and the EMBI+ spread on emerging market bonds rose by some 2 percentage points. Initially, the correlation of spreads across emerging market economies rose, indicating a broad based sell-off. More recently, however, these correlations have fallen again, appar-

Table 2.3. Developments in Financial Markets
(Changes in percent, or basis points)

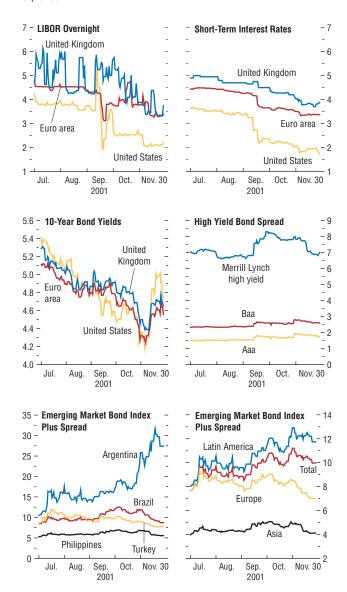|	July 1 Sep. 10	Sep. 11 Sep. 21	Sep. 22 Nov. 27
Equity market (percent)			
S&P 500	−11.7	−11.6	19.0
NASDAQ	−21.1	−16.1	36.0
TOPIX	−17.9	−5.5	8.2
Euro STOXX	−18.2	−17.3	27.6
FTSE 100	−11.9	−11.9	18.8
MSCI Asia	−7.8	−14.4	26.8
MSCI Latin America	−15.4	−13.8	17.5
Credit market (basis points)			
Fed funds target	−25	−50	−100
LIBOR o/n	−56	−120	−25
T-bill, 3-month	−38	−102	−37
Prime lending	−25	−50	−100
T-bond, 10-year	−51	−12	−23
Moody's AAA spread	5	23	−53
Moody's BAA spread	6	24	−52
Merrill Lynch's high yield spread	−21	104	−149
Bloomberg junk bond spread	62	95	−26
EURIBOR, 3-month	−19	−55	−31
EURO bond, 10-year	−24	0	−15
Currency markets (percent)			
Yen/US$	−2.5	−3.7	6.3
US$/Euro	5.9	1.9	−3.4
SF/US$	−5.9	−6.5	4.9
US$/BP	2.8	0.0	−2.9

Sources: Bloomberg; and Datastream.

ently reflecting increasing investor discrimina-
tion, while, with the important exception of
Argentina, spreads have started to narrow. In
short, there appears to have been less of a broad-
based financial contagion across industrial and
emerging markets and across asset classes than in
earlier crises, reflecting the relatively healthier
position of financial intermediaries and timely
provision of liquidity by central banks.

That said, financing flows to emerging mar-
kets in the primary markets have remained weak
amidst restricted access to global financial mar-
kets. In the emerging markets segment of inter-
national bond markets, which has been the most
important source for capital account financing
for these countries, there had been a sharp re-
duction in bond issuance beginning in mid-
August, although recent data indicate some re-
vival. International equity placements, which had
also slowed to a trickle earlier this year, show no
indications of recovering, while net syndicated
loan flows remain almost flat.

Figure 2.3. Credit and Bond Markets
(In percentage points)

There has been a generalized flight to quality in financial markets since
September 11.

Source: Bloomberg Financial Markets, LP.

Box 2.3. Investor Risk Appetite

There is increasing evidence that developments in financial markets are affected as much by changes in risk as in investors' appetite for or aversion to risk (Shiller, 1998). When investors' appetite for risk falls, they reduce their exposure to risky assets, which consequently fall in value together. When investors' appetite for risk rises, risky assets are in increased demand and rise in value together. A fall in risk appetite can also lead to contagion via the portfolios of international investors. A crisis in one country can lead investors to reduce their appetite for risk, which in turn leads them to reduce their exposure to other risky assets as they re-balance their portfolios in terms of risk or liquidity requirements. This phenomenon, labelled the "common creditor," has found some support especially in the Asian and Russian crises (Calvo, 1999; and Allen and Gale, 1999).

A variety of indicators can be used to assess risk appetite. However, most of them appear to proxy for the level of risk, so changes do not necessarily reflect risk appetite. For instance, one commonly used measure is the yield spread between AAA corporate bonds and BBB or lower rated bonds. But this spread may simply reflect the level of risk rather than indicate risk appetite. For instance, the sharp increase in telecom credit spreads since late 1999, given the size of this sector, impacted credit spreads more generally. This could have reflected a combination of an increase in industry specific risk only, an increase in default risk in general, or a decrease in risk appetite. Measures of risk appetite that are based on spreads may therefore also be capturing a combination of changes in risk as well as in risk appetite.[1]
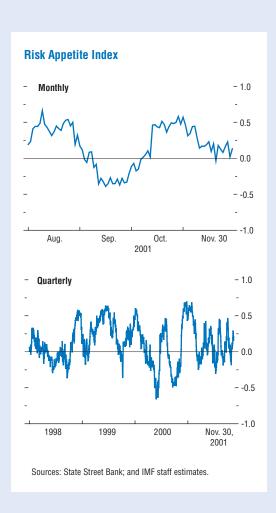
In order to compute a measure of risk appetite, it is important to separate shifts in risk from shifts in risk appetite. One possible procedure is based on the premise that if investors like risk, they will buy assets that have been risky in the past; if they are risk averse, they will sell them. In other words, *if there is a shift in risk ap-*

petite, then we would expect to see the prices of all assets move in proportion to past riskiness. However, *if the level of risk changes,* then movements in prices should not be related to past riskiness. Rather, asset prices will move in tandem with current and expected risk.

To compute a measure based on this procedure, the rank correlation of excess returns and past riskiness for the currencies of the major industrial and emerging market economies are calculated (although other assets would do). The excess returns are computed by examining the returns from holding a currency over a given period relative to expectations, as incorporated in the currency's forward exchange rate; the riskiness of the currencies is proxied by the volatility of excess returns over the preceding 12 months. If the rank correlation is high, changes in excess returns are likely to be due to risk appetite; if low, they would more likely reflect a change in risk (see Persaud, 2001; and Kumar and Persaud, 2001). Such a measure was empirically estimated using daily data for monthly returns and underlying risk for the past decade for 17 currencies. These risk returns correlations provided an index with a value ranging between −1 and +1, with a value closer to −1 indicating low risk appetite, and a value closer to +1 indicating high risk appetite.

The figure shows the daily path of the index measure for the past three months. It indicates that investor risk appetite, which had been weakening prior to the September 11 events, plummeted immediately afterwards. The earlier weakening coincided with increasing concerns about the timing of the recovery in the world economy, and a slew of downgrades for corporate earnings, which would also of course have led to increased risk. Investor risk appetite began to pick up, however, toward the end of September, reflecting in part the prompt policy response, and coincided with the beginning of the rebound in global equity markets. The index then plateaued in mid- to late October, and began to fall in early November (although it has remained positive), possibly reflecting renewed uncertainties about the global economy. The fig-

[1]See, for instance, the global risk aversion index regularly published by J.P. Morgan. See also IMF (2001).

Risk Appetite Index

Monthly

Aug.   Sep.   Oct.   Nov. 30
2001

Quarterly

1998   1999   2000   Nov. 30,
2001

Sources: State Street Bank; and IMF staff estimates.

ure also shows the evolution of a less volatile version of the index over the past three years. The index hit lows on four occasions corresponding to the Russian–LTCM crisis, ahead of the Y2K concerns, around the collapse of the tech bubble in April 2000, and in the third quarter of last year when uncertainties about rising oil prices and possible global stagflation began to mount.

A comparison of the evolution of the index and EMBI+ spread shows that a fall in the risk

appetite measure generally precedes an increase in emerging market spreads. Late last year, however, there was some difference in the relative magnitude of the movement in these two, with the risk appetite index rising more than the fall in spreads would imply, indicating a rise in risk. In the immediate aftermath of September 11, a sharp fall in risk appetite and a rise in emerging market risk led to a sharp increase in spreads. More recently, with risk appetite improving but perceived risks for emerging market remaining high, spreads have begun to ease. Similarly, there is a close relationship between changes in this index and changes in corporate credit spreads in the United States, with some evidence that often the appetite measure leads the change in spreads. Over the past month or so, both the increase in risk appetite and some stability in investors' perception of risk in this sector have led to a fall in these credit spreads. More broadly, econometric analysis also shows that the risk appetite index also has a significant power in explaining global financial crises, defined as contemporaneous currency crises in two or more countries, over the past decade.

From a policy perspective, it is useful to distinguish between market sell-offs and financial crisis arising primarily from bad fundamentals and those arising from abrupt shifts in investors' preferences. If crises are due to a falling risk appetite, contagion effects arising from them should be treated differently from those arising from the weakness in fundamentals. In circumstances where a crisis occurs in the wake of declining risk appetite, the financial markets will have a high propensity to react adversely to events that might not otherwise warrant major reaction. In these instances, responding quickly to a crisis could substantially reduce its magnitude and potential spillovers.
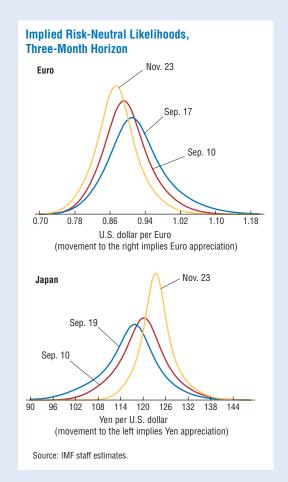
In the major currency markets, the currencies of capital exporting countries like Japan and Switzerland initially strengthened as the home bias in investors' decisions appeared to be more

pronounced compared to earlier episodes. Subsequently, the major currencies stabilized relatively quickly, reflecting in part the synchronized global business cycle under way as well as

Box 2.4. How Did the September 11 Attacks Affect Exchange Rate Expectations?

The immediate impact of the September 11 attacks in the United States on major exchange rates was moderate and dissipated within a month of the attacks. In the first week after the attacks, the dollar depreciated 3 to 4 percent against the yen and the euro, exacerbating the decline that began in July. However, amid growing confidence that relative performance during a global slowdown would favor the United States, in part due to policy stimulus, the dollar has rebounded since mid-September to levels above those prevailing just prior to the attack.

Information extracted from currency option prices can be used to infer market expectations about the likelihood that different values of future exchange rates will occur.[1] These probabilities can be interpreted as the market's view of the (risk-neutral) likelihood of different exchange rate values at a given future date (three months in the analysis below) around the forward rate.[2]

There are several main conclusions that can be drawn from comparing market expectations at several points in time since the attacks (see the figure). The decline of the dollar in the spot market in the week following the attacks prompted currency derivatives traders to center their dollar expectations on more pessimistic levels. For example, whereas on September 10 the market attached virtually no weight to the euro-dollar rate reaching parity three months out, a week later the market was placing considerable weight on that possibility. Spreading uncertainty and the rising potential for large changes in the weeks after the attack initially resulted in a wider dispersion of beliefs about future yen and euro values, and thus a larger variance of extracted probability distributions. By October, amid receding exchange rate uncertainty, on average dealers priced in a slight dollar appreciation with a higher precision compared to pre-attack levels.

Implied Risk-Neutral Likelihoods, Three-Month Horizon

Euro

U.S. dollar per Euro
(movement to the right implies Euro appreciation)

Japan

Yen per U.S. dollar
(movement to the left implies Yen appreciation)

Source: IMF staff estimates.

[1]This box uses the smoothed method proposed by Malz (1997).

[2]Risk-neutral probabilities combine the "true" expected probability with the market's equilibrium attitude toward risk.

The attacks heightened previously existing expectations among currency option traders that the likelihood of a sharp dollar depreciation was greater than that of an equally sharp appreciation over the following three months. While the forward premium offered little information on market sentiment that was not also embedded in the spot exchange rate, expectations extracted from currency options had been skewed toward a declining dollar against the yen and the euro since July 2001. For example, the price of options that insure against an appreciation relative to the price of options that insure against a depreciation (the so-called risk reversal price) had already implied a dollar depreciation since August. In the wake of the attacks, risk reversal prices reached a 10-month peak in the yen-dollar market and a 36-month

peak in the euro-dollar market. The sudden decline of these prices in October as the dollar recaptured its safe haven role reflects the markedly lower risk of a dollar depreciation that has been priced in currency option markets since that time. Thus, the effect of the attack on exchange rate expectations was considerable but very short-lived and was reversed within one month, as traders quickly regained confidence in the dollar amid higher political uncertainty and indications of increasing synchronicity in business cycles.

the safe haven effect (see Box 2.4). However, increased risk aversion had a negative impact on emerging markets, and those with high external financing requirements in particular saw their currencies come under sustained pressure as access to international capital markets was expected to be severely curtailed. The currencies of commodity exporting countries also weakened sharply on the expectation that slower world growth would further weaken commodity prices.

In global equity markets, there was a sharp increase in price volatility and transactions volumes, as expectations of future risks and returns went through a major reappraisal, amidst heightened uncertainty about fundamentals. All major stock markets experienced rapid, sharp price declines, reflecting expectations about the adverse impact of the tragedy on corporate profitability and portfolio reshuffling, as investors' demand for liquid, less risky assets increased. The emerging equity markets followed the industrial country markets, with a clear increase in cross-country correlation between industrial and emerging market economies, and among emerging market economies. However, equity price indices began to rise again on September 24 in all major and emerging country stock markets, and by October 11, broad stock price indices in mature markets were back at the levels registered prior to September 11, generally continuing to rise thereafter (see Chapter I, Figure 1.2). In emerging markets, however, the recovery has generally been less vigorous.

This rebound is faster than in earlier episodes of crisis, such as Iraq's invasion of Kuwait in mid-1998 or the LTCM crisis in late 1998, and may appear surprising given the generalized increase in uncertainty and weakening global prospects. However, the rebound could be explained by the benefits to profits from the vigorous policy response or by the impact of lower short-term interest rates on the speed with which future expected rates are discounted. In view of these changes in fundamentals, a key question is, given the decline in nominal interest rates, what changes in earnings growth are consistent with roughly unchanged or slightly higher stock prices? Illustrative scenarios based on a standard present-value approach widely used in the valuation of equities can be used to gauge changes in investors' earnings expectations after September 11 in four major stock markets.[6] The September 11 event is treated as a shock, which temporarily affects nominal interest rates and earnings growth for a period of one year. After that, future earnings growth is assumed to return to the medium-term values considered sustainable by investors on September 10.

Results were calculated for three dates, September 21 (when broad price indices for all major stock markets reached their low), October 11 (when price indices surpassed their September 10 levels), and November 26 (Table 2.4). The calculations take the change in the price-earnings ratio and short and long-term interest rates to estimate the implied change in expected earnings on the next year. For the United States, although

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[6]In the model, future dividend growth is assumed proportional to future earning growth (see Campbell, Lo, and Mackinlay, 1997).

Table 2.4. Change in the Implied Earnings Growth Rates over the Next Year[1]
(Percent over the next year)

	Deviations from September 10 values		
	Sept. 21	Oct. 11	Nov. 26
United States			
S&P 500	−11.1	−5.2	−0.6
Datastream index	−11.7	0.3	13.1
Japan			
Topix	−7.0	−1.6	0.8
Datastream index	−5.3	0.8	7.0
Germany			
DAX	−18.0	4.8	25.6
Datastream index	−21.3	0.0	14.8
United Kingdom			
Financial Times SE100	−11.9	1.2	6.7
Datastream index	−11.2	3.3	9.2

Sources: Datastream; and IMF staff calculations.
[1]See text for calculation of implied earnings growth rates.

the precise results are sensitive to the index used in the calculations, they demonstrate how investors expected a substantial temporary decline in earnings growth immediately after the attacks. However, investor pessimism did not last long, and by November 26 investors had priced in only a small temporary decline in the average earnings growth rate during the next four quarters (the broader DataStream index indicates investors were significantly more positive). In Japan, markets have also priced in either no change or an increase in earnings growth, and in Germany and the United Kingdom expected earnings growth for the next four quarters is now substantially above the September 10 baseline. This suggests that the aggressive monetary easing

after September 11 may not be the only reason for the rebound in stock prices, and investors expect the adverse effects of the September 11 attack to be largely confined to the United States.

Buoyant market expectations appear to have been a stabilizing factor in stock market developments after an initial period of turbulence. However, this optimism could also increase the vulnerability of equity markets to disappointment, both with regard to the timing of the recovery and the medium-term outlook. In particular, the consensus forecast for pre-tax profits in the United States and elsewhere has been revised downward significantly for this year and the next, and continues to be highly uncertain (Table 2.5). This is in marked contrast with the widespread expectations by equity analysts of a rapid recovery, as reflected in the double-digit earnings growth rate projected in 2002 for the U.S. S&P 500 index by analysts. Regarding the medium-term earnings outlook, equity analysts forecast an average five-year growth in earnings per share for the S&P 500 index of about 12.5 percent, roughly 4 percent above the average rate during 1996–2000. There appear to be downside risks to this outlook given the persistence of a weaker business environment in the major advanced economies, with continuing excess capacity, intense competition, and further declines in corporate profit margins.

Commodity Markets

Commodity markets provide a way of cushioning the impact of the fall in activity in industrial

Table 2.5. United States: Consensus Forecasts During January–October 2001 for Pre-Tax Profits[1]
(Annual change in percent)

Forecast of	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.[2]	Oct.	Nov.
2001 average	2.2	0.0	−1.9	−3.8	−3.4	−4.6	−8.6	−10.7	−11.7	−15.9	−15.5
(Standard deviation)	3.1	3.6	4.2	3.4	3.7	2.6	1.7	4.8	2.1	2.5	2.8
2002 average	6.6	5.8	5.9	5.2	5.6	4.8	5.8	4.6	3.9	2.1	0.4
(Standard deviation)	3.7	4.2	2.6	3.2	3.1	3.0	3.4	5.2	3.8	6.6	8.0

Source: Consensus Forecast.
[1]Average and standard deviation of monthly forecasts for annual earnings growth in 2001 and 2002 by 19 participants in the survey conducted by Consensus Forecast.
[2]Survey conducted before September 11, 2001.

countries, but at the cost of worse prospects for many developing countries dependent on such exports. Prices of primary commodities, which were already weakening in the face of lower world growth, fell further in the wake of the September 11 terrorist attacks. World oil prices declined to around $18 per barrel by late November from over $25 prior to the attacks and the peak of over $30 reached in 2000, and the baseline path is around 25 percent below that in the October 2001 *World Economic Outlook* for 2002. For nonfuel commodities, a weaker demand outlook has reinforced the effects of secular increases in supply for some key commodities.

Recent Developments

After fluctuating around $20 per barrel through early November, oil prices softened further in response to OPEC's difficulties in coordinating global production cuts, particularly among non-OPEC producers. Most significantly, Russian commitments fell short of the 200,000 barrels per day cut envisaged by OPEC. While discussions among producers continued, the futures price for 2002 delivery fell to $18 per barrel in late November and futures markets project relatively weak prices through 2002. The near-term outlook for prices clearly depends on the willingness of exporters to agree on production limits. Even if agreement is reached, however, the scope for significant price increases is limited by weak global demand and incentives for producers to circumvent agreed limits if prices rise.

Prices of most nonfuel commodities have also fallen since the terrorist attacks. The IMF's aggregate index of nonfuel prices dropped by a further 6 percent from September to November 2001, bringing the overall decline since the beginning of 2000 to 14 percent, largely reflecting weaker world demand. For several agricultural commodities, notably coffee and cotton, this has reinforced existing imbalances arising from expanding supply. Coffee prices have dropped to less than half their end-1999 levels, as producers such as Brazil and Vietnam have continued to raise production by more than the normal ex-

pansion of world consumption. For cotton, prices have fallen by about 30 percent over the past two years, and are at one-third of their 1995 peaks. Technological changes have boosted supply and competition has increased from synthetic fibers, while U.S. agriculture subsidies have made U.S. cotton prices highly competitive, resulting in a sharp increase in U.S. cotton exports that have further depressed world prices. The slump in metals prices has been compounded since September 11. Copper, aluminum, tin, and nickel prices have dropped by between 25 and 50 percent since the end of 1999, as inventories have accumulated. Timber prices surged in 1999 and early 2000 as the U.S. housing market boomed, but subsequently fell back as demand prospects deteriorated; market conditions remain vulnerable to the outcome of a trade dispute on lumber products between the United States and Canada.

Global semiconductor prices, production, and sales weakened through the third quarter, led by the collapse in the market for memory chips. The dollar value of DRAM shipments in the third quarter was only 20 percent of the same period of 2000, reflecting sharply lower prices and volumes, while shipments of other semiconductors fell by about one-half over the same period. Sales of final products, particularly computers, have remained sluggish in recent months, although DRAM prices have stabilized somewhat lately and inventories are falling, indicating the downturn may be ending. However, two key ratios—capital investment to revenues and new orders to recently completed orders—indicate the bottom of the cycle has probably not been reached and will occur sometime during 2002. For 2002 as a whole, industry analysts are forecasting a modest increase in both prices and unit sales that, while an improvement over 2001, would be well below historical norms.

Lower Prices and Commodity Exporters

Declines in commodity prices have lowered overall prices in major countries, increasing real incomes and creating scope for more aggressive

monetary easing in response to the global down-turn. On the whole, this is beneficial for global growth, as the propensity to consume of oil consumers is higher than that for oil producers.[7] For commodity exporters, however, lower prices cause a deterioration in the terms of trade. This shock is likely to negatively affect real activity in exporters through both direct and indirect linkages. The direct relationship between the price and volume of commodity production is ambiguous, depending on whether lower prices reflect lower demand or higher supply. A demand decrease—of the type experienced in the wake of the September 11 attacks—would reduce output; a supply increase, in contrast, would raise it. These direct relationships between prices and activity are likely to occur fairly contemporaneously. The indirect effects reflect the impact of changes in the terms of trade on real incomes and spending, and are unambiguous. A deterioration in the terms of trade will reduce spending in the producing country on both domestic and imported goods. Domestic output will fall unless some other factor, such as policy settings, adjusts in a way that more than offsets the shock to private demand. These indirect effects are likely to occur with a lag, as domestic spending exhibits inertia in response to changes in income.

To assess the importance of these effects for developing countries, regressions were estimated relating growth in real output in developing country commodity producers to changes in the terms of trade due to commodity price movements. For this purpose, a series was constructed for each exporting country that reflected the effect of commodity price changes on the trade balance, expressed as a percent of GDP. These effects are static, or "first-order," in the sense that they do not incorporate the induced impact on volumes of relative price movements. Real GDP growth for the full panel was then regressed on the current and lagged values of these terms-of-trade effects, and the results are reported in Table 2.6. Shocks to the terms of

Table 2.6. Estimated Effects of Commodity Price Changes on GDP Growth
(t *statistics in parentheses*)

	Current Value	Lagged Value
Nonfuel exporters	0.009 (0.18)	0.196 (4.19)
Fuel exporters	0.086 (2.04)	0.104 (2.11)

Note: Panel regression of change in the logarithm of real GDP on a country-specific constant term and the current and lagged values of the impact of commodity price movements on the terms of trade expressed as a percent of GDP. Kuwait was excluded from the group of fuel exporters due to data volatility associated with the Gulf War.

trade have little contemporaneous impact on activity for the nonfuel exporters. This is consistent with the ambiguous nature of the direct effects of price changes, the fact that prices for farmers are often fixed in the short-term (and many major producers also take out long-term, fixed-price contracts), and that crop rotations are different from calendar years. With a lag of one year, the coefficient is significantly positive: an improvement in the trade balance of 1 percent of GDP arising from commodity price movements is associated with an increase in real output growth of 0.2 percentage points. For fuel exporters, the aggregate impact is roughly the same, but the effects are distributed more evenly between the current and lagged values, suggesting that the indirect effects may work faster in these countries.

These results imply that recent commodity price movements will have their greatest effect on fuel exporters, reflecting the large fall in oil prices. The projected decline in world oil prices of 35 percent from 2000 to 2002 implies a decline in the terms of trade of this group of about 10 percent of GDP and a decline of real GDP of 2 percent or more (given it is a demand side shock), although this may well overestimate the impact as the more conservative policies followed by many oil exporters over the latest cycle—when more of the oil windfall revenues were saved than in previous episodes—will re-

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[7]However, to the extent that lower prices reduce the incentive to invest in production facilities, they can reduce supply capacity, thereby increasing the likelihood of a price spike when activity accelerates, as occurred in 2000.

duce the amplitude of the boom-bust cycle. For nonfuel exporters, the effects are smaller, as declines in prices of imports of manufactured goods and oil have moderated the effect of lower export prices—a similar calculation points to a drop of less than ¼ percent in GDP due to terms of trade movements.

That being said, for many poor nonfuel commodity exporting countries the growth numbers may understate the impact on poverty. Lower prices for agricultural goods will hurt rural areas, where most of the poor live, while the benefits of lower oil prices tend to accrue in urban areas, and within these urban areas often to the middle class who have the means to buy oil-based fuels for heat rather than using wood.

References

Abadie, Alberto, and Javier Gardeazabal, 2001, "The Economic Costs of Conflict: A Case-Control Study for the Basque Country," NBER Working Paper No. 8478 (Cambridge, Mass.: National Bureau of Economic Research).

Acemoglu, Daron, and Andrew Scott, 1994, "Consumer Confidence and Rational Expectations: Are Agents' Beliefs Consistent with Theory," *Economic Journal*, Vol. 104 (January), pp. 1–20.

Allen, Franklin, and Douglas Gale, 1999, "Financial Contagion," Starr Center for Applied Economics, Economic Research Reports No. 98–33, New York University.

Bram, Jason, and Sydney Ludvigson, 1998, "Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race," *Economic Policy Review,* Federal Reserve Bank of New York (June), pp. 59–78.

Calvo, Guillermo, 1999, "Contagion in Emerging Markets," (unpublished; Department of Economics, University of Maryland).

Campbell, John, 1999, "Asset Prices, Consumption and the Business Cycle," in *The Handbook of Macro-economics,* ed. by John B. Taylor and Michael Woodford (Amsterdam; New York: North-Holland).

Campbell, John Y., and Andrew Lo, and Craig MacKinlay, 1997, *The Econometrics of Financial Markets* (Princeton: Princeton University Press).

Carroll, Christopher, Jeffrey Fuhrer, and David Wilcox, 1994, "Does Consumer Sentiment Forecast Consumer Spending? If So, Why?" *American Economic Review*, Vol. 81 (December), pp. 1397–1408.

Greenspan, Allen, 2001, statement before the Joint Economic Committee of the U.S. Congress, October 17. Available on the Internet at *www.federalreserve.gov.*

IMF, 2001, *Emerging Markets Financing*, International Monetary Fund, third quarter (November). Available on the Internet at *www.imf.org/external/ pubs/ft/emf/index.htm.*

Kumar, Manmohan, and Avinash Persaud, 2001, "Pure Contagion and Investors' Shifting Risk Appetite: Analytical Issues and Empirical Evidence," IMF Working Paper No. 01/134 (Washington: International Monetary Fund).

Macroeconomic Advisors, 2001, *Economic Outlook*, October 15, Vol. 19:9.

Malz, Allan, 1997, "Estimating the Probability Distribution of the Future Exchange Rate from Option Prices," *The Journal of Derivatives*, (Winter), pp. 18–35.

Persaud, Avinash, 2001, "Fads and Fashions in the Policy Response to Financial Market Crises," in *Financial Innovations and the Welfare of Nations,* ed. by L. Jacque and P.M. Vaaler (Boston: Kluwer Academic Publishers).

Shiller, Robert, 1998, "Human Behavior and the Efficiency of the Financial System," NBER Working Paper No. 6375 (Cambridge, Mass.: National Bureau of Economic Research).

UBS Warburg, 2001, *Global Economic Strategy Research*, October 12.

U.S. Bureau of Economic Analysis, 2001a, *Survey of Current Business,* November.

———, 2001b, "Gross Domestic Product: Third quarter 2001 (Preliminary). Corporate Profits: Third quarter 2001 (Preliminary)," News Release, November 30.