
A World Out of Balance?

DANIEL GROS

Until the summer of 2007, the global economy was on a dynamic growth path with ever-increasing US current account deficits financed by the surpluses of emerging-market economies. This state of affairs was underpinned by rising housing prices in the United States (and parts of Europe) coupled with permissive credit markets in which the risk premium had fallen to historical lows. These two supporting factors have now gone into reverse, prompting a global credit crisis and a slowing of domestic demand in the United States (table 4.1).

The US external deficit has already fallen from 6 percent of GDP in 2006 to 5 percent of GDP in 2007, largely due to stronger exports, which in turn were made possible by the resilience of the global economy. If this combination of continuing strong growth (especially in emerging markets) and the cooling of the US real estate sector were to continue, global imbalances could be resorbed gradually without a crash of the US dollar.

However, the 2007 year-end surge in oil prices makes a rebalancing of the global economy more difficult. The reason is quite simple: Oil producers tend to save about half of their windfall gains from higher oil prices. If the oil price stayed at about \$90 to \$100/barrel (about \$30 above the 2006 average), oil producers would probably increase their current account surpluses by \$200 billion to \$300 billion per annum. Other commodity-exporting countries are also saving part of the windfall they earn from the generalized increase in commodity prices. Thus the global supply of savings from commodity-exporting countries might substantially exceed the \$300 billion expected from oil exporters alone.

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Table 4.1 Change in current account balances, 2007 relative to 1995–97 (billions of US dollars)

Country/region	2007	1995–97 average	Change
United States	784.34	-126.20	-658.10
Japan	195.90	91.20	104.70
Euro area	-21.20	n.a.	n.a.
United Kingdom	-96.69	-8.40	-88.27
Central and Eastern Europe	-119.20	-15.80	-103.40
Emerging markets	607.39	-75.20	682.60
Commonwealth of Independent States	77.20	0.70	76.50
Middle East	227.00	9.30	217.70
Western Hemisphere	19.50	-47.60	67.10
Newly industrialized countries in Asia	90.89	1.90	89.00
Developing Asia	389.20	-23.10	412.30
Of which: China	379.16	15.27	363.89

n.a. = not available

Sources: International Monetary Fund, *World Economic Outlook*, *International Financial Statistics*, and *Direction of Trade Statistics* databases, December 2005.

The key question will then be, Which countries will be willing and able to run corresponding deficits? Apart from the United States, there are only two regions large enough to contemplate a shift in the external position of this order of magnitude: the euro area and Asia (i.e., Japan and China). The euro area would have no problem running a current account deficit of \$200 billion to \$300 billion (at the current exchange rate the upper end of the range would amount to €200 billion, around 2½ percent of euro area GDP). In an ideal world, this could be achieved if domestic demand remained strong in the face of a strong euro. However, it seems that domestic demand in Euroland is already weakening and remains rather difficult to influence with either monetary or fiscal policy.

Asia, especially China, seems determined to continue the export-led growth model. The Chinese authorities will not be able to resist a substantial appreciation of the renminbi forever. A real appreciation is already happening via higher inflation in China, but this is a relatively slow process. China might be in a similar situation today as Germany in the late 1960s, when despite explicit controls on capital inflows, market pressure on the exchange could finally no longer be resisted. However, it will be several years before Chinese policymakers throw in the towel on the exchange rate. In the meantime, the most that can be expected from China is a reduction in the pace of increase of the current account surplus.

A combination of the weak US housing sector and high oil prices should lead to a global ex ante savings surplus, which in turn should lead to lower global (real) interest rates and/or higher asset prices, depending on how “petrodollars” are recycled. For example, to the extent that members of the Organization of Petroleum Exporting Countries (OPEC) invest part of their surpluses in US equities (as a proxy for the global market), they will sustain the US stock market. US consumers will then be torn between lower house prices, lower interest rates (but more difficult access to credit), and strong asset valuation outside the housing sector.

The pressure on the euro (and thus on the euro area) will therefore depend to a large extent on the reaction of the US consumer. As the elasticity of consumption with respect to interest rates (and asset prices) is higher in the United States, the counterpart to rising OPEC surpluses might come again from the United States rather than the euro area (or Asia, where interest rates seem to have little influence on consumption). Growth might remain stronger in the United States than in the euro area, which might have difficulties compensating the loss of export demand with stronger domestic demand.

The lower real interest rates resulting from excess OPEC savings should facilitate adjustment to the subprime crisis: The combination of lower nominal interest rates and moderately higher inflation will make it easier for debtors to service the debt built up over the last cycle of permissive credit conditions. The main role of central banks will be simply to influence the slope of the yield curve: If central banks keep short-term interest rates up (because inflation is likely to stay at the upper end of their comfort zone), long-term rates might well fall permanently below them. An inverted yield curve will make life much more difficult for banks, whose main business is after all to finance medium-term credit with short-term deposits. However, lower profits for banks in the current situation of increased capital requirements (due to losses from credit risk that they thought had been eliminated through securitization) increase the risk of a systemic credit crisis. The basic choice for central banks on both sides of the Atlantic is thus now between inflation targeting and financial stability.

I begin by analyzing the US external deficit and explaining that its main cause cannot have been higher US growth, as often argued. Then I consider the US deficit in the context of the global financial system, finding that its global counterpart has recently been concentrated primarily in oil-exporting countries, and go on to briefly explore the relationship between the increase in the price of oil and the future evolution of the demand-supply balance. I bring these factors together in a model-based analysis of how the link between growth and interest rates changes when one takes into account oil-based savings surpluses. In the last section I offer conclusions and questions for further consideration.

Table 4.2 Growth of GDP and domestic demand
(long-term average, percent)

Country/region	1992–98	1999–2006
United States		
GDP growth	3.1	2.8
Domestic demand	3.2	3.2
Euro area–12		
GDP growth	1.8	2.1
Domestic demand	1.5	2.1

Euro area–12 = Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain

Source: European Commission, Directorate General for Economic and Financial Affairs, annual macroeconomic (AMECO) database.

The US External Position: Evolution and Determinants

The most eye-catching imbalance in the world economy today remains the US current account deficit. Its (partial) counterpart, China's surplus, is beginning to get a similar level of attention, but its rationale is much easier to understand than that of the US deficit: China is clearly on a dynamic growth path based on exports. By contrast, it is difficult to see why one of the world's richest economies should also be the world's biggest borrower for more than a decade.

I therefore start with a critical look at developments in the US current account. In this section I look at the US deficit from a purely national point of view, with an emphasis on the question of what distinguishes the US economy from that of the eurozone and thus accounts for the difference in the evolution of the two external accounts.

A first myth to debunk is that the US deficit is due to the country's higher growth. As table 4.2 shows, the average US growth rate since 1999 was 2.8 percent, actually somewhat lower than during the 1990s (3.1 percent). The deficit arose because domestic demand growth did not fall along with GDP growth. While real growth fell (on average) after 1999, domestic demand did not fall commensurately. Table 4.2 shows the rough numbers for the United States and the eurozone for comparison. The difference between US domestic demand and GDP growth might not appear large at first sight (a bit over 0.4 percent), but if this magnitude is cumulated over ten years, it implies an increase in the current account of over 4 percent of GDP.

The US deficit was thus not due to higher growth but rather a continuation of rapid domestic demand (mainly for consumption and residential investment, as discussed below) in the face of declining GDP growth. Another way to illustrate the same phenomenon is to compare the evolution

Figure 4.1 US trade deficit and imports, 1990–2007



Source: US Department of Commerce, Bureau of Economic Analysis.

of the US trade deficit with that of US imports; figure 4.1 shows both as a percentage of GDP. It is apparent that the two lines track each other closely. As a matter of fact, one could predict the US deficit during most of the last decade just by assuming that exports are constant at around 10 percent of GDP. The deficit then varies one to one with imports. This pattern seems to have changed only in 2007, when US exports turned sharply higher.

The role of the dollar exchange rate in these ever-increasing deficits seems to have been limited. In a first phase, from the mid-1990s to about 2000, the dollar appreciated along with an increasing deficit. As concerns about the size of the deficit increased, the dollar then declined by about 15 percent from its peak in trade-weighted terms, but then in 2005, recuperated part of the terrain lost, as US companies repatriated profits to take advantage of the Homeland Investment Act and as negative political news in Europe and Japan reduced the appeal of those currencies. The overall result of these ups and downs is that the US real effective exchange rate (based on unit labor costs) appreciated by only a little (less than 5 percent) between 1997 and 2005. This small change suggests that it is difficult to argue that exchange rate movements have been a major factor behind the massive US deficit. Developments since 2001 (and up to 2006) are particularly difficult to reconcile with the view that the deficit is due to an overly strong dollar given that the US dollar has depreciated considerably in recent years while the US external deficit continued to widen until very recently.

Partly for this reason, it is often argued that the US deficit is due to a growth deficit in the rest of the world. This argument is flawed on both theoretical and empirical grounds. First, if the higher US growth rate were the result of a positive supply shock (i.e., higher US productivity growth), one would expect exports to increase—even at a constant or rising real exchange rate—along with the increase in the potential output. But this has not been the case: Over the last decade, exports from the euro area (supposedly a slow-growth economy) have increased as much as those from the United States. Second, while it is true that growth in the eurozone and Japan has been disappointing, it has been more than compensated for by higher growth in emerging markets. Thus the difference between US and world output growth has not increased over the last decade. Indeed, if one compares the ten years before 1995 with the following decade, one finds that world output growth has actually increased slightly more than US growth (the US growth rate increased by 0.46 percentage points, whereas world output growth, using purchasing power parity [PPP] weights, increased by 0.53 percentage points). Moreover, the US deficit rose most strongly after 2000, when US growth was actually somewhat lower.

For these reasons, it is not easy to explain the continuing widening of the US external deficit with the two main conventional factors, the exchange rate and relative growth rates. The key factor must have been that US policymakers overestimated the country's anticipated growth rate and thus pushed domestic demand above its potential.¹

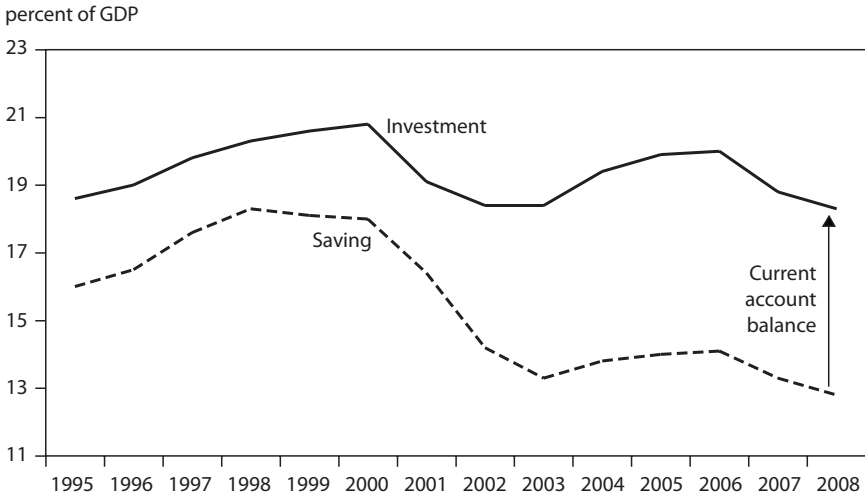
The excess of domestic demand over domestic production can also be seen in the investment-saving balance, which reflects the current account from a different point of view. As shown in figure 4.2, most of the deterioration of the US external balance has been due to a fall in the national saving rate, not an increase in investment.

Changes in Global Financial Markets and the US Current Account Deficit

From the discussion, it may be reasonable to conclude that recent developments in the US current account are unsustainable in the sense that the deficit is due neither to higher US productivity growth nor to an investment boom. But before jumping to any conclusions, it is important to look at the US deficit in the context of the global economy, to get a better view of the genesis of the existing imbalances.

1. This overestimation of the potential growth rate was apparently shared by the major international financial institutions, which explains why they did not anticipate the continuous increase in the deficit (Gros, Mayer, and Ubide 2006).

Figure 4.2 US saving-investment balance as percent of GDP, 1995–2008



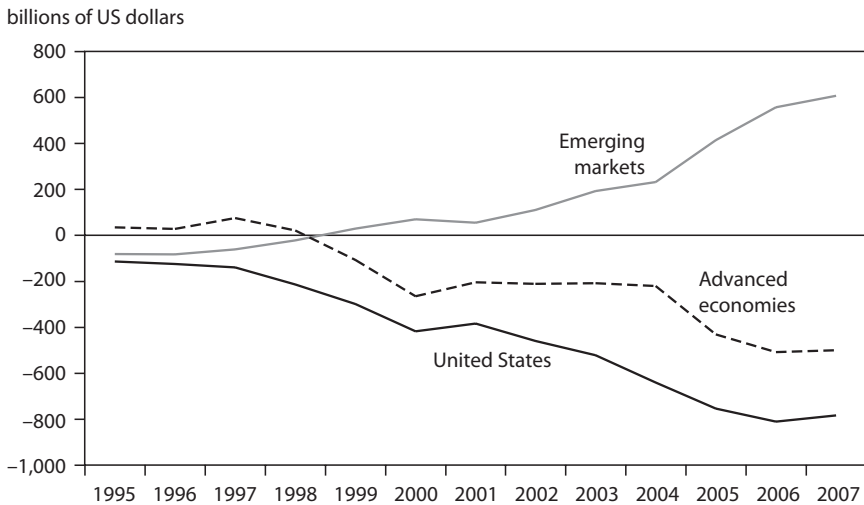
Source: International Monetary Fund, *World Economic Outlook*, October 2007.

Booms and Busts in Emerging Markets as the Initial Driver Behind Increased World Savings

The best starting point for a narrative of the evolution of the US external deficit is the atmosphere of the late 1990s. Equity markets all over the world were booming in the mid-1990s thanks to expectations of intensifying globalization and a revolution in information and communication technologies. At the same time, emerging markets were becoming popular destinations for international investors, particularly as their markets were opening up and offering high-growth potential and attractive rates of return. But the boom experienced in emerging markets came to an abrupt halt in 1997 as a combination of lax fiscal policies, rigid exchange rates, and rapid growth in consumption and investment led to widening current account deficits financed by large short-term capital inflows. Indeed, outside Asia and Eastern Europe, foreign direct investment constituted a small share of the financing of the current account deficits. These were the classic ingredients that provoked the crises that occurred between 1997 and 2002.

The history of crises in emerging markets in the late 1990s and early 2000s is well documented so I won't dwell on it here. My interest is in the adjustment in current account and fiscal balances that followed the crises and its implications for the world real interest rate and for global savings and investment balances. Shut out of international capital markets and

**Figure 4.3 Emerging-market economies financing advanced economies:
The mirror image in current account balances, 1995–2007**



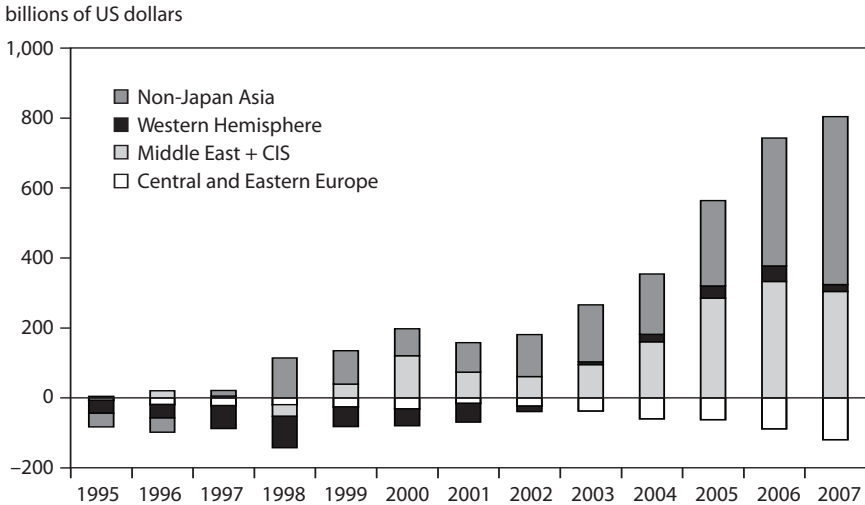
Source: International Monetary Fund, *World Economic Outlook*, October 2007.

forced to embrace tough International Monetary Fund (IMF) medicine and elect more conservative governments, emerging markets began adopting sound economic policies: They abandoned fixed exchange rates, turned current account deficits into surpluses, generated large primary budget surpluses, eliminated short-term external debt, and replenished the depleted stock of international reserves to record levels.

Figures 4.3 and 4.4 show the cumulated current account position of Eastern European, Asian, Middle Eastern, and Latin American emerging-market countries (all those hit by the wave of currency/banking crises that started in East Asia in 1997). This diverse group provides an almost exact mirror image of the current account of the industrialized countries, which in turn closely parallels that of the United States.

During the late 1990s, emerging markets still had a small deficit, which turned into a moderate surplus by the turn of the century. The combination of fiscal and monetary policy tightening improved public and private investment-saving balances by \$150 billion. But this turnaround seems modest in the context of changes that began in 2003 with two additional developments: China and high commodity prices allowed emerging markets (as a group) to generate ever-larger current account surpluses, leading the total to exceed \$600 billion in 2006. In that year, the current account surplus of emerging markets' fuel producers was close

Figure 4.4 Regional contributions to current account balances of emerging markets, 1995–2007



CIS = Commonwealth of Independent States

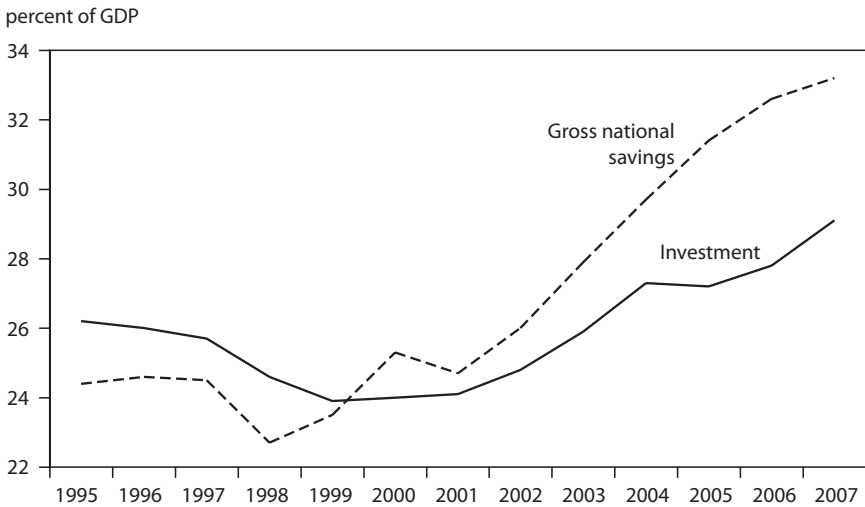
Source: International Monetary Fund, *World Economic Outlook*, October 2007.

to \$400 billion—well over half of the total current account surplus of all emerging markets.

Figure 4.5 shows gross national savings and investment relative to GDP for the emerging market countries (the difference between the two series indicates their external balance and thus their net export of savings). As crises in emerging markets unfolded in the second half of the 1990s, these countries slashed their investment spending sharply. In 1998 national savings also fell as a number of countries plunged into severe recession. Thereafter, however, savings recovered under domestic austerity policies, while investment followed with a lag and at a more moderate pace. As of 1999, in a major change from past behavior and against the conventional wisdom of development economics, emerging markets began exporting large and growing amounts of savings to the rest of the world. This export of capital from the poorer part of the world has actually increased as savings were boosted further by rising commodity prices.

The net export of savings was only initially (in the aftermath of the currency crises) related to a fall in investment. Since the turn of the century, investment rates have actually increased in emerging markets (by almost 6 percentage points, to nearly 30 percent of GDP, much higher than in the advanced economies), but savings have increased even more.

Figure 4.5 National saving and investment positions of emerging markets, 1995–2007



Source: International Monetary Fund, *World Economic Outlook*, October 2007.

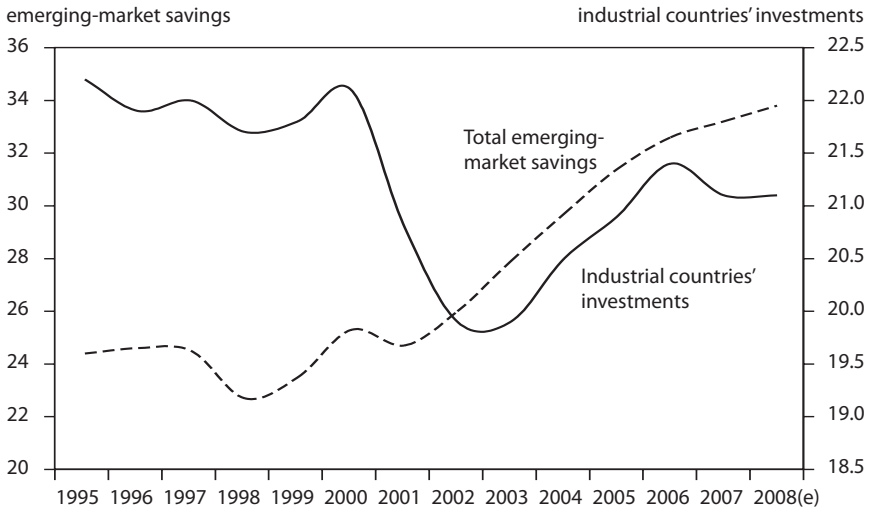
After the Boom, the Investment Bust

While emerging market countries experienced balance of payment crises and stabilization recessions in the second half of the 1990s, industrialized countries enjoyed an economic boom thanks to surging stock markets and euphoria about the benefits of new information and communication technologies. In 2000, however, the boom turned to bust as the valuation of “new economy” equities climbed to irrational highs. In the event, the equity markets’ decline triggered a sharp drop in investment, as companies struggled to repair their balance sheets by paying down debt and industrialized economies fell into stagnation or recession.

During the second half of the 1990s, industrialized countries were net importers of international savings, reflecting a rise in investment on the back of the new technology boom that had not been matched by a corresponding rise in domestic saving. After 2000, however, investment in industrialized countries fell, just when emerging-market countries stepped up their export of savings (figure 4.6).

At the beginning of the new millennium, global capital markets were thus suddenly confronted with a rising supply of savings from emerging markets and falling demand for these savings from industrialized countries, which were experiencing an investment recession. There was only

Figure 4.6 Emerging-market savings and industrial countries' investment positions, 1995–2008 (percent of GDP)



(e) = estimate

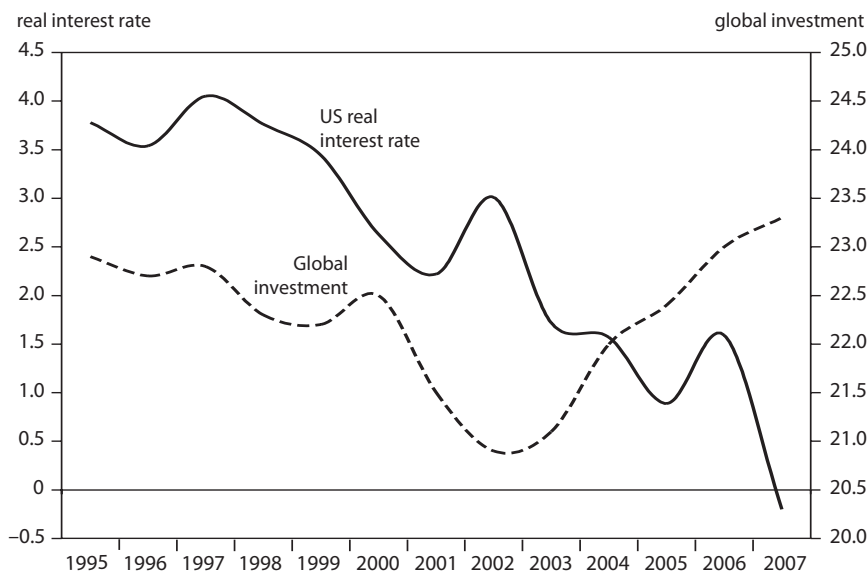
Source: International Monetary Fund, *World Economic Outlook*, October 2007.

one way to equilibrate the global supply of and demand for savings: Global real interest rates had to fall (which then depressed industrialized countries' savings). This is illustrated in figure 4.7, which shows the developments of the ratio of world investment to GDP and real US 10-year government bond yields, which I use here (somewhat loosely) as a proxy for global real interest rates. The drop in investment (relative to GDP) in the industrialized countries (shown in figure 4.6) pushed down the global investment ratio (as the rise in emerging markets' investment was too weak to compensate for the investment weakness elsewhere). As the investment ratio fell, real interest rates fell. As I argue in more detail below, the decline in real interest rates eventually helped turn around the decline in investment. More recently, the real interest rate has even turned negative in the wake of the latest hike in oil prices, a phenomenon that I analyze further in a subsequent section.

Effects on Current Account Balances

A fall in global real interest rates was necessary to equilibrate the global market for savings and enforce the ex post identity of real savings and investment. What was required was a new term structure of interest rates at a lower level, an exercise that involves the adjustment of both market and

Figure 4.7 Global investment and US real interest rates, 1995–2007
(percent)

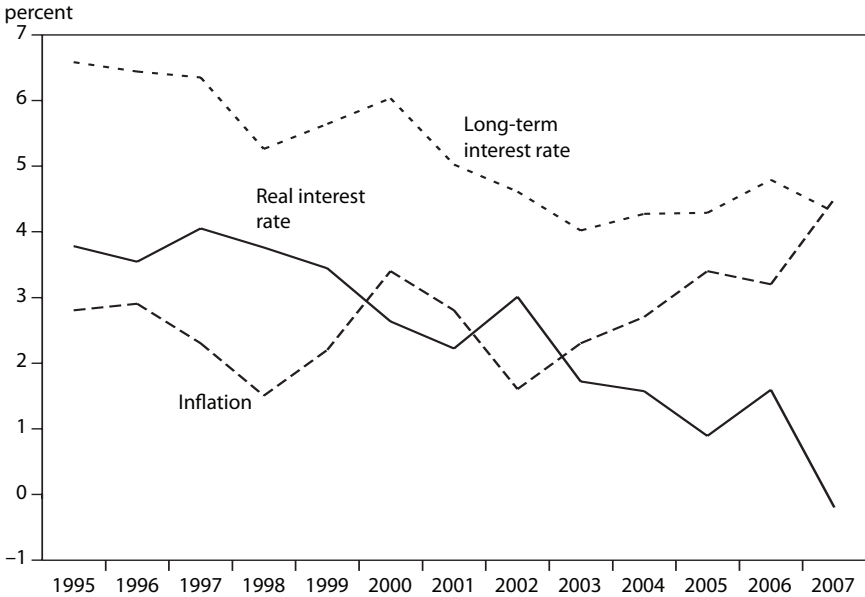


Source: International Monetary Fund, *World Economic Outlook*, October 2007.

policy interest rates in a number of important markets, where exchange rate expectations interact with individual interest rate adjustments. Because interest rate response functions of policy institutions as well as financial market and economic structures differ across countries, the adjustment process evolves with trial and error, occurs at different speeds in different markets, and is occasionally accompanied by considerable market volatility. A full description of this process with all details is impossible here; what is possible, however, is an analysis of a few key adjustment mechanisms and a discussion of the main implications of the interest rate adjustment.

Given their control over the short end of the yield curve, central banks played a key role in bringing real rates lower. Their reaction was prompted by the perceived shortfall of investment and excess supply of savings that threatened the economic outlook and raised the specter of deflation. As central banks experienced these imbalances to different degrees at different times, and as their response functions differed, they adjusted interest rates by different magnitudes and speeds. Nevertheless, their main achievement was to stabilize inflation against the backdrop of the large changes in global savings and investment and, more recently, higher commodity prices. As a result, nominal long-term rates fully reflected the fall in real rates until 2004–05, as shown for the United States in figure 4.8.

Figure 4.8 US nominal and real interest rates and inflation, 1995–2007



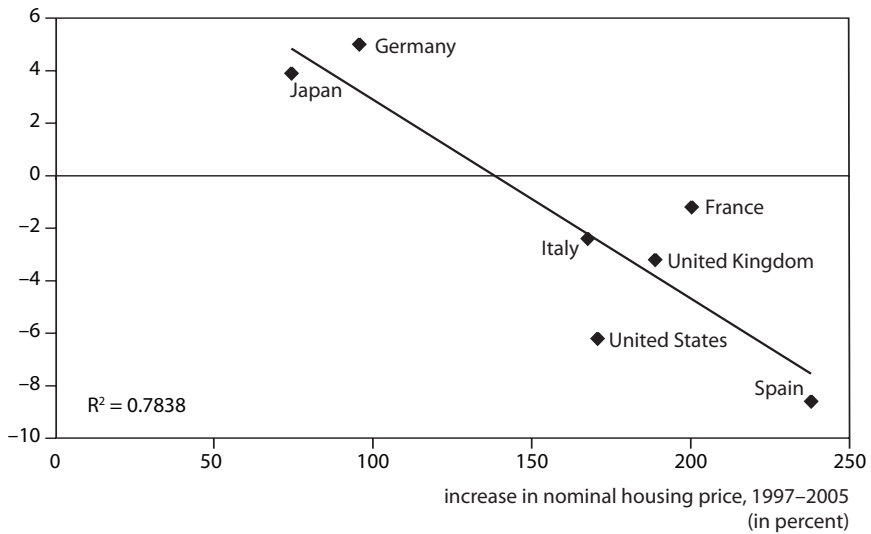
Source: International Monetary Fund, *World Economic Outlook*, October 2007.

While the demand for savings by investors responds directly to changes in real interest rates, real and financial assets are the key channel of transmission for real interest rate changes to affect the supply of savings by private households in the industrialized countries. With the decline in real interest rates raising asset prices, consumers felt wealthier and were inclined to spend their savings.

The speed and magnitude of this link between asset prices and consumption are key determinants of the divergent reactions of domestic demand to the global decline in real interest rates. Real estate markets played the most important role here because housing still represents the most important asset for most families. Figure 4.9 shows how, in countries where housing prices increased strongly, real private consumption also grew strongly. Clearly, while the decline in real interest rates was a global phenomenon, demand and supply conditions in specific real estate markets mattered. For instance, housing prices fell in Japan and Germany, where a supply overhang existed. There are also large regional differences even within countries. This applies a fortiori to the United States, where average value results from a property boom on both coasts while prices seem to have moved relatively little in the middle of the country. Even in European countries (much smaller than the United States), where, on average, housing prices did not increase greatly, there were localized booms,

Figure 4.9 Increase in housing prices and current account balance

current account balance, 2006
(percent of GDP)



Sources: Organization for Economic Cooperation and Development Statistics Portal, 2007; International Monetary Fund, *World Economic Outlook*, October 2007.

with all the attendant wealth effects. In addition to the differential direct wealth effect of diverging housing price appreciation, differences in the equity extraction mechanisms across countries played an important role. In countries where refinancing is easy and not expensive, as in the United States, or where mortgages are mainly at variable rates, as in the United Kingdom or Spain, the consumption boost from the appreciation of housing prices was magnified, exacerbating the external imbalance.

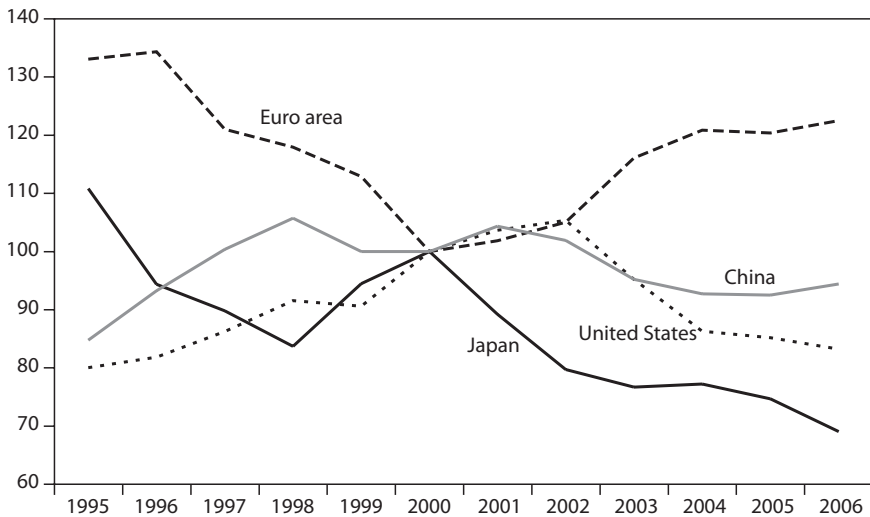
Through these mechanisms, national savings were eventually reduced in industrialized countries, allowing the latter to absorb the surplus savings of emerging markets at a time of lower investment activity without triggering a major world recession. This was indeed an extraordinary achievement. However, changes in national saving and investment were uneven across countries or country groupings, leaving the world with considerable international current account imbalances.

In sum, the stabilization of the world economy at a time of huge changes in global savings and investment flows was accomplished through a large decline in real interest rates.

It is apparent from figure 4.10 that it is difficult to attribute to exchange rate movements the massive shifts in current account balances that have taken place over the last decade. The United States and China experi-

Figure 4.10 Real effective exchange rates, 1995–2006

index (2000 = 100)



Source: International Monetary Fund, December 2007.

enced only marginal changes in their real effective exchange rates, an appreciation of slightly under 1 percent for the United States and 1.6 percent for China. But the picture looks different with 2000 as the starting point: The dollar experiences a devaluation of 16.8 percent and the renminbi of 5.9 percent, while the appreciation of the euro amounts to 22.5 percent.

Oil Prices and the Sudden Emergence of an Important Source of Excess Savings

In this section I explore the implications of high oil prices for the global investment-savings balance. The importance of the price of oil for the global economy is now (again) widely recognized. However, higher oil prices not only distribute income away from the major importers (Organization for Economic Cooperation and Development [OECD] countries plus China), they also have a major impact on the global savings balance. As discussed above, rising surpluses among OPEC countries provided about half of the counterpart to the increasing US surplus up to 2006. Adding the surpluses of other commodity exporters, whose prices have increased across the board, would show that the savings made possible by the commodity price boom of the last several years have financed about two-thirds of the US deficit.

OPEC surpluses are destined to grow even more in the near future as oil prices surged again toward the end of 2007 (after a temporary dip around year-end 2006–07). The reason for the emergence of these surpluses is quite simple: Ever-rising oil prices transfer wealth from oil-consuming countries to oil-producing countries, and the latter have a much higher propensity to save out of current income.

There are at least two reasons why OPEC and other commodity-producing countries are not spending their windfall gains immediately. First, despite the existence of the futures market, there is considerable uncertainty about the future of oil (and other commodity) prices, and thus the marginal propensity to consume may slow in the short run for precautionary reasons. Second, the international financial institutions (IFIs) have constantly been urging governments of commodity-exporting countries to build up stabilization funds, advice that has been at least partially taken. This implies that governments are saving a substantial part of the windfalls that accrue to them in the form of higher royalties in order to raise national savings. These two mechanisms, both of which are based on the uncertainty of future oil prices, are fundamentally very similar. I return to this issue below.

A simple calculation can show that the magnitudes involved are significant. Approximately 50 billion barrels a day are produced by countries that are not themselves big consumers. An oil price increase of \$30 a barrel (e.g., from the less than \$30 average that prevailed until 2001–02 to the \$60 to \$65/barrel in 2005–06) implies a transfer to these producers of about \$1.5 billion per day, or around \$550 billion per annum. In reality, the gain would be even higher since most oil producers (especially Russia) also export natural gas, whose price tends to follow that of oil. Hence the transfer resulting from an increase in the oil price by about \$30 would probably be considerably above \$600 billion per annum.

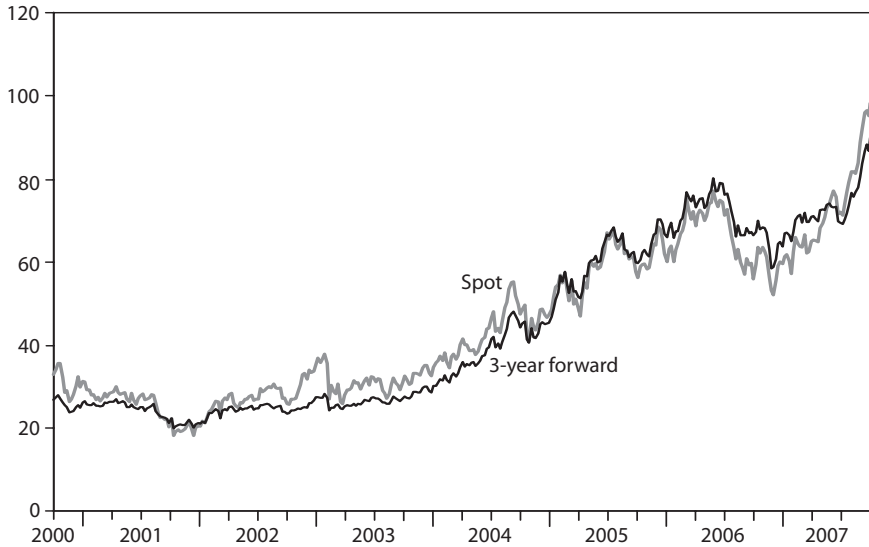
If about half of this amount is initially saved, the increase in the oil price up to 2005–06 should have been equivalent to an *ex ante* increase in global savings of about \$300 billion (and for the oil-consuming countries, an equivalent negative demand shock). This alone would equate to a drop in the investment ratio in both the United States and the eurozone of over 1 percent of GDP.

The global economy did absorb the first increase in oil prices (up to 2005–06) without visible negative effects, as the US economy proved willing to absorb the excess savings from OPEC countries. The key question for the world economy is now whether the end-2007 surge in oil prices to close to \$100/barrel can also be absorbed, and if so whether it will, if sustained, create another shock of the same magnitude.

A key question for the global economy is thus whether the recent run-up in oil prices will prove to be temporary or permanent.

Figure 4.11 Crude oil spot and forward prices since 2000

US dollars per barrel



Note: Dates are for February, May, August, and November of the years indicated.

Source: Bloomberg market data, 2007, available at www.bloomberg.com.

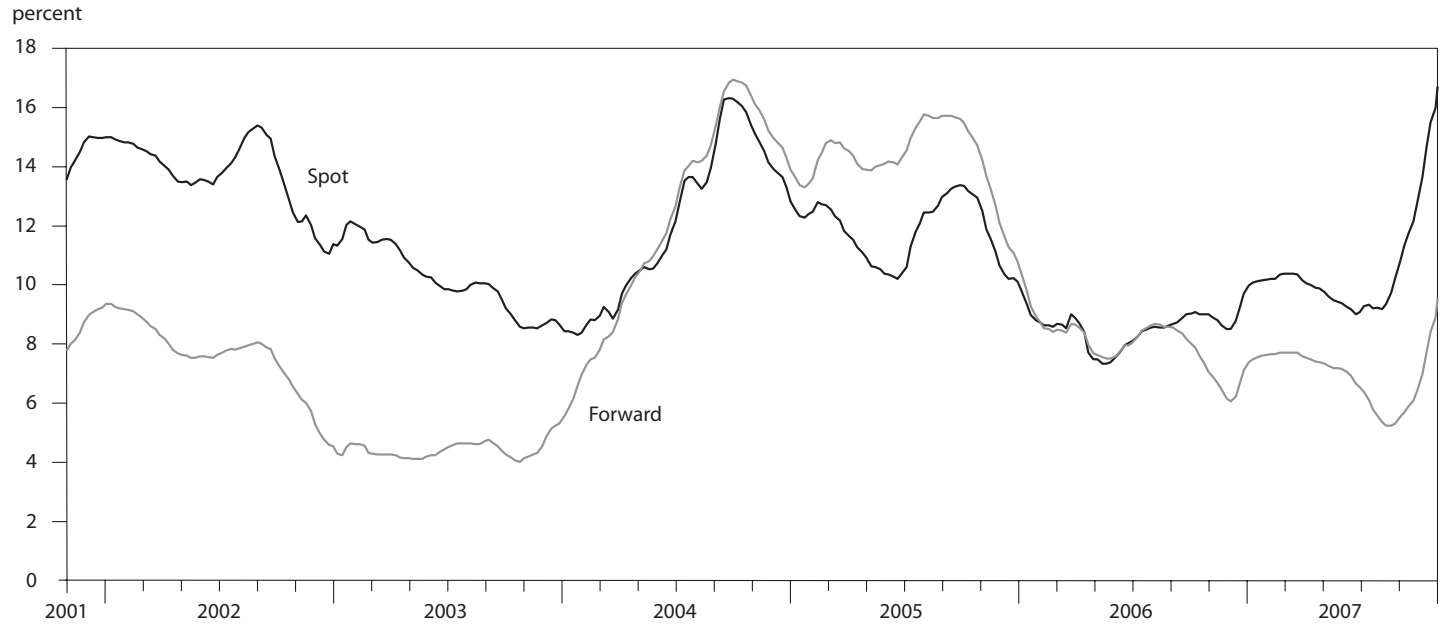
A Strong Demand Shock?

Are higher oil prices here to stay? The oil shock of the last few years does seem to be of a more permanent nature. During the 1990s, spot crude oil prices varied between \$10 and \$40 a barrel, but futures were stable at around \$20 a barrel, signalling stability in the equilibrium price of oil at around this price. This stability of the future price lasted until 2003, then starting in early 2004, there was a sharp acceleration of futures prices toward values fluctuating in 2007 between \$60 and over \$80 a barrel (see figure 4.11 showing spot and 3-year future contracts).

The futures markets are thus signalling that prices are expected to stay elevated, conferring on this oil price shock a more permanent nature. This can also be deduced from the fact that the coefficient of variation of future prices is (at around 8 percent as of end-2007) only half that of spot prices, as shown in figure 4.12.

To understand the dynamics of recent oil price developments, it is fundamental to disentangle the shocks that led to them. However, this is

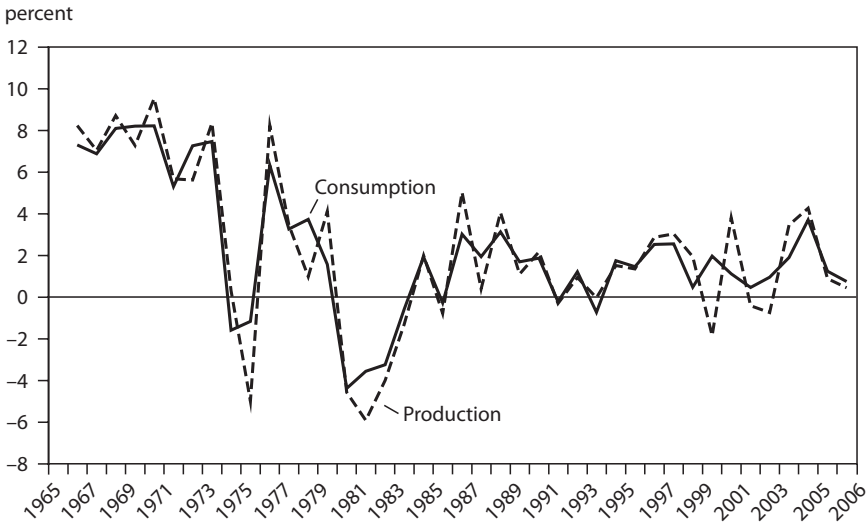
Figure 4.12 Coefficient of variation of spot and forward crude prices, 2001–07 (ratio of standard deviation to mean, rolling 12-month basis)



Note: Dates are for February, April, June, August, October, and December of the years indicated.

Source: British Petroleum, *World Energy Review 2007*.

Figure 4.13 Annual growth rates of world crude oil production and consumption, 1965–2006



Source: British Petroleum, *World Energy Review* 2007.

difficult for the simple reason that one observes only how much oil is produced and consumed. Since stocks amount to a small fraction of consumption (and production), one observes demand and supply at the same time, making it difficult to disentangle the complex combination of supply, demand, and portfolio shocks that all affect oil markets.

Until 2004 it appeared that demand growth was the main driver of higher prices. Projections for demand were constantly revised upward because consumption in emerging markets (especially China, which accounts for more than 40 percent of current demand growth) had been dramatically underestimated. An increase in demand can be expected from a combination of factors, including higher economic growth in emerging economies, a sharp increase in the oil intensity of GDP of these countries as they adopt oil-consuming technologies (such as cars—Asia is projected to add 200 million cars in the next 20 years, a third of them in China), and an increase in strategic demand. The last two points are very important as they represent a permanent shift in the demand curve that is inelastic with respect to prices.

However, since 2004, demand (or rather consumption) has decelerated sharply to annual growth of less than 1 percent. Figure 4.13 illustrates that the 2003–04 surge seems in fact to have been a blip. On average, demand growth has been rather stable over the last two decades if one looks at five-year averages. However, the sharp deceleration in consumption must have been at least partially the result of higher prices. It is thus likely that

the demand curve has indeed shifted but that the quantity actually consumed has not increased because the increase in price (a movement along the new demand curve) has offset the shift in demand.

Figure 4.13 also shows that demand and supply have tended to shadow each other. Over the last two years, growth rates for both have fallen. This is difficult to understand for supply.

A Very Tight Supply Situation

The key mystery in the oil market is that the response of supply to higher prices has been very slow, to say the least. Why would production growth fall when spot and future prices increase sharply? One explanation might be that such a decline represents an attempt by OPEC to increase its monopoly rent. However, this is not borne out by the facts, as OPEC production has in recent years been increasing (albeit slowly), whereas non-OPEC production has been more sluggish.

What is difficult to explain is that non-OPEC production (i.e., supply that either is not subject to a cartel or is managed by market forces) has not responded to higher oil prices. One reason non-OPEC production has not increased is that oil companies have not invested in new capacity in recent years. Given the relatively high forward prices, they can cover themselves against a possible decline of prices for at least five years (after which markets are no longer liquid).

The only other rational explanation is that remaining reserves are significantly costlier to extract than the mature basins the market is now draining. For example, the marginal variable lifting costs of the oil reserves in the US Midwest—comparable in size to those of Saudi Arabia—is about \$15/barrel, requiring prices of about \$50/barrel to justify the investment needed for extraction. By comparison, the lifting cost of Saudi Arabian oil is about \$1.50/barrel. As the time frame over which investment in additional capacity can repay itself is much longer than the longest liquid forward contracts, oil companies might be reluctant to bet on permanently higher prices beyond the next five years or so over which they can cover themselves.

In addition, political turbulence in the areas that contain the cheaper available resources—not only in Saudi Arabia but also in Russia and Venezuela, for example—is redirecting investment toward higher-cost and lower-return areas, compounding the problem.

A few years ago stabilization of prices at about \$35/barrel was seen by many companies as a precondition to resume investing. However, developments so far have not borne this out. Oil companies have been returning cash to shareholders through share buybacks (for example, in 2005, Exxon bought back almost \$10 billion and BP over \$7 billion) rather than invest in new capacity.

Table 4.3 Increase in global energy consumption, 1996–2006

Region	Crude oil	Primary energy
World (millions of tons of oil equivalent)	542.8	2,020.6
Contribution to total (percent)		
Organization for Economic Cooperation and Development	26.6	22.3
United States	18.8	6.7
European Union	6.7	4.5
Emerging markets		
Former Soviet Union	-0.3	4.1
Other emerging-market economies	73.6	73.6

Source: British Petroleum, *World Energy Review 2007*.

The Longer-Term Outlook for Oil Prices

The much higher oil prices along the forward curve can represent an equilibrium only if demand is expected to continue growing strongly despite higher prices and if supply also does not react much to higher prices (there has not recently been any large exogenous shock to supply, apart from temporary events such as the usual spikes in Middle Eastern political uncertainty).

This scenario of continuing tight conditions in the oil market (which is implicit in the forward prices) is difficult to reconcile with the historical record. Over the last 15 years, demand growth has consistently oscillated at an annual value just below 2 percent (if measured over five-year intervals; see figure 4.13). The (spot) price also, until 2004, fluctuated around a stable level of around \$30/barrel (in real, inflation-adjusted terms).

Is there any reason to believe that global oil demand growth will suddenly accelerate much above the trend (± 2 percent per annum) to which it settled for about two decades after the price gyrations of the two previous oil shocks (1973, 1979)? It is unlikely that global growth will accelerate much over the next few years since global growth was already close to its record in 2004 and 2005. But the weight of the faster growing emerging markets is increasing (their growth rates are already at a record, but their weight increases constantly), and they are growing on the back of fast growth in industry and transportation, which are highly energy intensive. Hence many argue that oil demand will be driven by emerging markets. This is at first sight an attractive hypothesis, since over the last decade (a five-year horizon yields similar results), almost three-quarters of total demand growth (of both oil and overall primary energy) has come from emerging markets (see table 4.3).

However, much of the increased oil (and general energy) demand by emerging markets might simply be due to the fact that manufacturing activity (which is energy intensive) has shifted to them from the OECD countries. Thus, the underlying increase in global oil demand may be lower than commonly estimated once the additions to strategic oil reserves in the United States and China (and possibly elsewhere) are taken into account.

As an aside, one might note that there is indeed a marked difference between the European Union and the United States in terms of oil consumption: The latter has been responsible for about one-quarter of the global increase in oil consumption, against less than 10 percent for the European Union. However, in terms of overall energy consumption (in the long run, different forms of energy are fungible), the difference between the two is much smaller and can be entirely explained by the higher US growth. The image of a “gas-guzzling” United States with its SUVs against a “thrifty” European Union is correct if one looks only at oil, but in terms of overall energy consumption (or even more in terms of marginal energy efficiency of GDP), the difference is much smaller, probably because of the higher share of industry in the EU GDP.

By how much would global oil demand growth have to accelerate so that the current price level represents an equilibrium? As a starting point, one can observe that the end-2007 price of around \$100 per barrel represents roughly a threefold increase (in real terms) compared to the previous decade average. In other words, the question is whether a tripling of the price is needed to keep demand and supply in balance over the next decade.

Most studies of the oil market find a long-term elasticity of both demand and supply of between 0.1 and 0.3. Taking a value in the middle would imply that an increase in the (natural) logarithm of the price, a little over one unit ($\ln(3) = 1.1$) should lead to an increase in supply of about 20 percent and a fall in consumption (*ceteris paribus*) by a similar amount. This calculation suggests that over the long run (e.g., a decade) a gap of around 40 percent should open up between demand and supply, further suggesting that demand growth would need to accelerate to around 4 percent, double the previous medium-term average, for current price levels to be sustained.

Is there any reason to believe that the elasticity of oil demand has declined? The share of energy in general and of oil in particular in GDP has actually fallen in recent decades, and the price of coal, one important substitute for oil (at least in electricity generation), has not increased significantly. The first fact might suggest that the elasticity of demand has fallen, as oil might now be used mainly in transportation, where it is very difficult to substitute. Moreover, a quantum leap is taking place in this area in many emerging markets. However, although transportation is an important part of overall oil demand, it still accounts for only about one-third of the total.

The relative stability of the price of coal points in the opposite direction as it means that the potential to substitute oil for other energy sources

should actually be rather high (at least in emerging markets; the switch to oil has already largely taken place in OECD countries).

There is thus little reason to believe that there will be pressure from demand for oil prices to continue to increase indefinitely.

The key question is whether supply can continue to expand as it has done until recently. What is the outlook for supply? My analysis assumes that supply will continue to be available to meet demand at current price levels (which reduce demand). But there is some question as to whether the world will be able to find enough new capacity at the current level of prices. There are many views on this. Matt Simmons' 2005 *Twilight in the Desert* is the most prominent example of the view that the supply curve is "kinked"—that the years of plentiful and inexpensive oil supplies are over and that the future holds a much more difficult and expensive search for new sources of oil. If one considers, in addition, that likely new sources are in areas of the world with higher geopolitical risk, the view that supply will be available at the same conditions as in the past has to be qualified. I do not wish to take a position on this issue. It is likely that the marginal cost of finding new sources of oil will increase over time, but I doubt that it suddenly doubled in two years after having been roughly constant for decades.

This analysis has two important implications:

- Unexpectedly inelastic supply, rather than runaway demand seems to be the root cause of tight market conditions.
- Increasing oil prices (as opposed to high but stable prices) lead to substantial savings surpluses by OPEC countries, possibly indicating that the increase in oil prices in 2007–08 will result in more global imbalances. (By contrast, at a stable oil price around the 2006–early 2007 level, one would have expected the savings rate of the oil exporters to decline gradually as their consumption caught up to the increase in income.)

Model-Based Analysis of the Intersection of Global Growth, Interest Rates, and Oil Prices

I have argued in the previous section that the evolution of oil prices can have an important, perhaps decisive, impact on the evolution of global imbalances, as the combined surplus of oil-exporting countries is now much larger than that of China. Moreover, it seems that the Chinese surplus is mainly determined by domestic conditions and has stabilized, whereas the OPEC surplus is essentially determined by external conditions, namely the oil price. The latter seems to be determined in the short run by the intersection of an inelastic demand and an equally inelastic

supply curve. As demand for oil is closely related to growth in the major consuming economies, it follows that there should be a link between global growth, oil prices, and the global supply of savings.²

It is by now clear that higher oil prices lead to higher OPEC external savings. This suggests a simple explanation of the combination of strong global growth and low interest rates: Strong global growth exerted pressure on oil prices, leading to an *ex ante* OPEC savings surplus, which in turn kept interest rates low (the “conundrum” as it was called in 2005–06). It is thus possible that stronger global growth could lead to even lower interest rates. Moreover, this effect could also explain why higher oil prices have so far not had a negative impact on global growth: Any shock to oil prices (e.g., because of unexpected shortfalls of supply) would lead to lower interest rates, thus stimulating demand.

This section outlines a simple model to show analytically how global growth, oil prices, and interest interact. The basic building blocks of the model are quite simple.

The key element is the oil market. It seems reasonable to assume that growth in world income and production leads, *ceteris paribus*, to a proportional increase in the demand for oil and that the price elasticity of demand is rather low. Moreover, in the short run, oil supply is also very inelastic, especially if producers operate close to capacity, so that the market-clearing price must increasingly rise as demand nears the available supply (as mentioned above, the available estimates suggest long-term elasticities in the 0.1 to 0.3 range; the short-run elasticities must thus be even smaller). This seems to represent the situation at the end of 2007, when the price was close to \$100 per barrel as stocks fell to a historic low. These two elements imply that when oil producers operate close to capacity, there should be a tight relationship between the price of oil and world output growth.

The next building block is also quite simple. It describes the supply of external savings in two major blocks: the oil-consuming economies (the OECD, proxied by the United States) and OPEC. It is important to distinguish between these two blocks because their savings are influenced by different variables.

For OPEC, the oil price is the key variable. As mentioned above, OPEC member countries tend to save a fraction of their oil revenues, so the supply of external savings from OPEC countries should be a linear function of

2. This approach can of course be regarded as a special case of the “savings glut” hypothesis. In a speech on March 10, 2005, Ben Bernanke, then a member of the Board of Governors of the US Federal Reserve System and now Chairman of the Federal Reserve, pointed to a rising supply of international savings from emerging markets as the counterpart of the US deficit and as the probable cause of persistently low interest rates. However, the “savings glut” hypothesis essentially took emerging-market countries’ savings as given. Here I show how savings outside the OECD can actually be a function of global growth.

the oil price. This is in keeping with the facts that OPEC countries' domestic financial markets are underdeveloped and their use of oil revenues is decided mainly by governments. Thus OPEC savings are exogenously determined by governments (the advice of the international financial institutions like the IMF seems to be to save about half the oil revenues). Interest rates therefore do not play a major role in determining OPEC savings.³

In contrast, saving by oil-consuming countries (i.e., the OECD) is affected by conventional macroeconomic variables and should depend mainly on income and the (real) interest rate.⁴

The model can be closed by the requirement that in equilibrium, OPEC countries' external savings equal "dissavings" for oil consumers. There is thus a relationship between growth and interest rate that maintains equilibrium on the global market for external savings (and the market for oil). It is apparent that if OPEC had a marginal propensity to save oil revenues equal to zero, higher growth would lead to higher interest rates. However, once OPEC saves a substantial proportion of its income, the sign of the relationship between income and interest could change: Higher growth could lead to lower interest rates. This seemingly surprising result has a simple explanation: As demand for oil nears available supply, prices rise faster and hence OPEC savings increase more than proportionally. This correlation might well describe the situation over the last few years, when higher global growth (especially higher growth in the largest oil consumer, the United States) was not accompanied by higher interest rates. The solution to this "conundrum" of low interest rates might thus be found in the reaction of OPEC (and most other oil-producing nations) to higher oil prices.

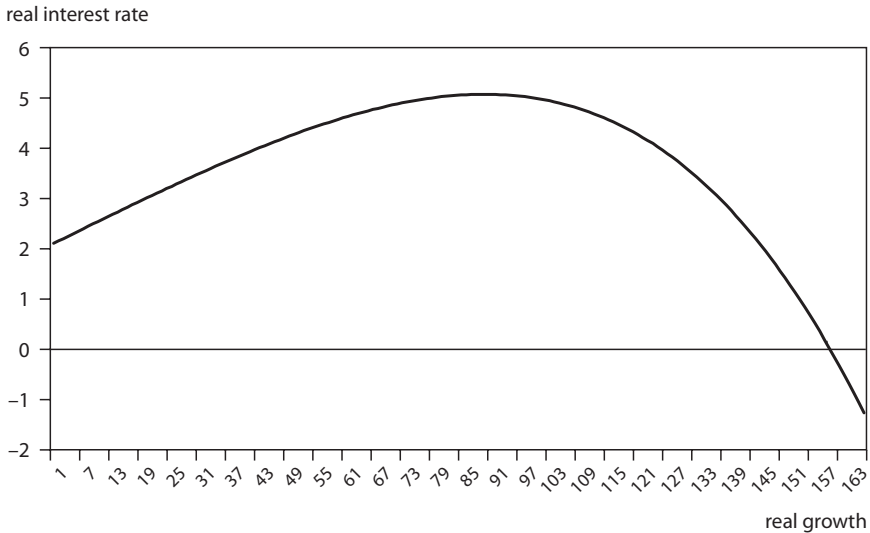
Figure 4.14 illustrates the shape of the global savings equilibrium for a particular numerical combination. The curve is strictly concave and might be called the "OS" curve (the oil-savings relationship). The curve in figure 4.14 represents the combinations of growth and interest rates that satisfy the global savings equilibrium. The shape of the curve is essentially determined by the sum of the (short-run) elasticities of supply and demand for oil. Given the low values for the long-run elasticities, the curve assumes a value of 0.2 for the sum of the two elasticities.

In order to close the model, one can use a standard investment-saving (IS) equation, which links demand to interest rates (again, valid mainly for OECD countries) in a simple, standard way, with higher interest rates leading to lower demand. Putting the IS curve together with the "OS"

3. What role interest rates should play in a perspective of intertemporal optimization of consumption paths is a different question.

4. It is assumed here that OECD consumers do not increase their savings in response to higher oil prices. This assumption could be easily modified, but the essential results would not be affected as long as OPEC's propensity to save is higher than that of the OECD.

Figure 4.14 Shape of global savings equilibrium



Source: Author's calculations.

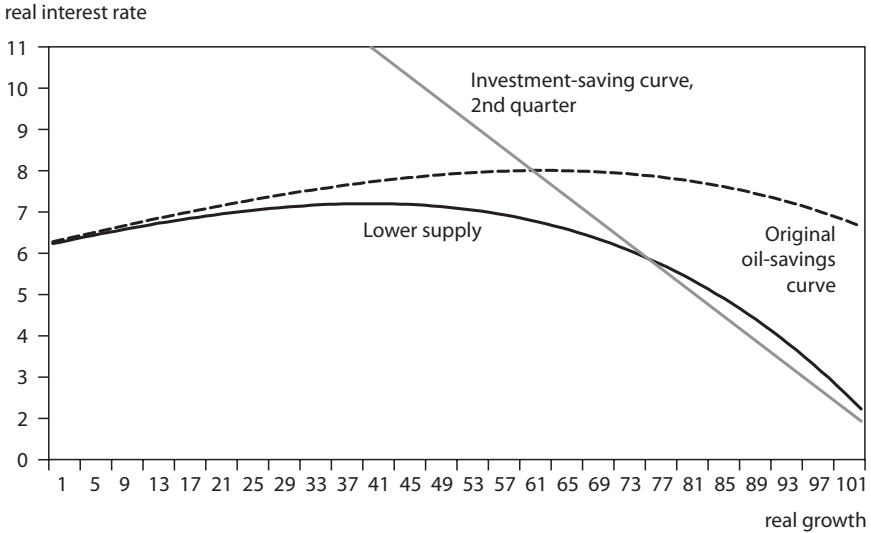
equation gives the combination of growth and interest rates determined by the global equilibrium (internal and external savings in the OECD).⁵

With this model, the usual comparative static exercises can determine how the system reacts to different shocks. The first point to note is that any shift in the OS curve displaces the equilibrium along the IS curve. For example, a negative supply shock would tend to move the OS curve lower but at an increasing rate, with an unchanged IS curve. This would then lead to a combination of higher oil prices but also higher growth in the OECD because of lower interest rates, which stimulate OECD domestic demand and higher current account imbalances (higher OECD deficits and higher OPEC savings), as illustrated in figure 4.15.

However, when the IS curve shifts the sign of the relationship between changes in income and the interest rate depends on whether the IS and OS curves intersect. Consider, for example, a shift of the IS curve to the right (e.g., a fiscal expansion in the OECD or an increase in OECD housing prices, which would lead to higher consumption demand). Growth might then go up, but interest rates fall if the intersection of the IS and OS curves is to the right of the maximum of the OS curve (as in the shift from IS curve second quarter to IS curve fourth quarter in figure 4.16). This might

5. It is apparent that these two curves might have two intersections (two solutions to the model).

Figure 4.15 Global savings equilibrium: Negative supply shock



Source: Author's calculations.

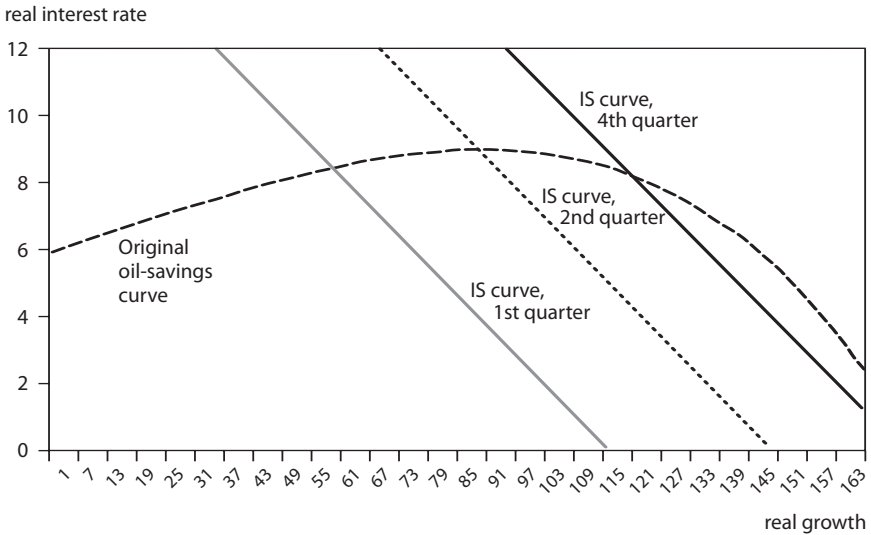
explain what happened when the US economy started to recover in 2004–05 but interest rates stayed very low (the conundrum). This aspect of the model fits the facts particularly well because much of the counterpart to the increasing US current account deficit came from OPEC surpluses until about 2004–05; the current account surplus of China had been quite small (and did not vary much) until about that time.

Concluding Remarks

Until the summer of 2007, the policy debate about the US current account deficit was highly politicized, with a different consensus emerging in each of the affected geographical areas as to the cause of the imbalances:

- the “Washington consensus” blamed China for underconsumption and a beggar-thy-neighbor exchange rate policy,
- the “European consensus” blamed the US fiscal deficit and the Federal Reserve’s loose monetary policy, and
- the “Asian consensus” blamed the United States for overconsumption and saw a competitive exchange rate as a necessary element of an export-led growth strategy.

Figure 4.16 Global savings equilibrium and shifts in the investment-saving (IS) curve



Source: Author's calculations.

With the onset of the subprime crisis, perceptions shifted. Both sides of the Atlantic are now converging on the view that the main problem lies in Asia, especially China, whose growing surpluses are considered “unfair.” In China it is also becoming apparent that foreign exchange rate intervention has its cost and that keeping the exchange rate pegged de facto to a falling dollar is stoking inflation at home. However, as there is no apparent alternative to export-led growth, the authorities are trying everything to delay the inevitable.

The emerging consensus on the need for a revaluation of the renminbi overlooks the fact that it will be difficult to achieve equilibrium only through price adjustment. There are reasons to doubt that exchange rate changes alone will suffice to restore current account imbalances to more sustainable levels. The existing global imbalances arose in the absence of any clear trend in exchange rates until the end of 2006. The US deficit rose during times of a strong dollar as well as when the dollar was weak. China’s surplus started to rise significantly only when the renminbi was allowed to appreciate against the dollar.

The focus on the Chinese surplus and the renminbi has diverted attention from an equally large source of global savings (and hence imbalances), namely oil (and other commodity)–producing countries. Their external savings are climbing along with the oil (and other commodity) prices, with the paradoxical result that strong global growth is coupled with low interest rates.

In this environment, it becomes of course more difficult for central banks to gauge the appropriate stance of monetary policy. Central banks control only short-term interest rates, and a reduction in these rates to stimulate the economy might, if successful, lead to higher oil prices and lower interest rates along the entire yield curve. As a result, one standard indicator of the stance of monetary policy—the yield curve—would give a different signal.

The key condition for the gradual adjustment in the US external deficit to continue is that US policymakers accept a prolonged period of weaker growth; a condition *sine qua non* for further reductions in the US external deficit to more sustainable levels is a reduction of the growth rate of domestic demand by about 1 percentage point over several years.

However, were US policymakers to try to resist this slowing of domestic demand growth (e.g., with aggressive interest rate cuts), all the adjustment would have to come through the exchange rate channel. The odds of a disorderly adjustment with a massive fall of the dollar would then increase dramatically.

The slowing of US domestic demand necessary for a reduction in the US external deficit should be seen as reversing a process that started around the turn of the century, when a rise in the international supply of savings from emerging-market economies, combined with a postdotcom-bubble fall in investment in OECD countries, pushed real interest rates to record lows. The deflation scare that emerged from the combination of the bursting of the stock market bubble, the shocks that ensued from corporate scandals and geopolitical events (e.g., 9/11), and China's and India's entry in the world trading system all provoked the aggressive lowering of nominal and real interest rates. An initial savings glut thus became a liquidity glut, which also led to an extraordinary easing of credit conditions, most apparent in the US subprime mortgage market. While the fall in real interest rates and the easing of credit conditions was experienced in most OECD countries (and in particular the United States and the eurozone), the impact on domestic demand was asymmetric and consequently, current account imbalances rose.

With the break of the subprime crisis, this cycle stopped. Credit markets tightened and the US real estate sector is starting to contract. Given the extraordinary length of the upswing it is likely that the fall in housing prices could also be long.

How does the story end? A few aspects seem clear.

First, central banks for the time being focus on keeping the banking system alive and credit channels open. Global adjustment, and to a certain extent inflation, has become secondary.

Second, the eurozone has discovered that adjustment in the US deficit might create difficulties in Europe: Either the dollar tumbles, creating difficulties for eurozone exporters, or the US economy slows, and then the slowdown might be global. "Decoupling" seems unlikely in the face of a transatlantic credit market crisis.

In this context, one has to wonder whether the current framework for monetary policies around the globe is adequate. In a world with ever more integrated capital markets and global supply chains, the informational value of traditional domestic indicators of price pressures has declined significantly. Inflation is becoming a global phenomenon, raising the question of whether monetary policy based on domestic Phillips curve considerations is still appropriate. The strong correlation between housing price inflation and current account deficits across developed countries suggests that, in the absence of wage inflation because of global labor arbitrage, overheating is reflected in the external accounts. Under this hypothesis, the US current account deficit and inflated housing markets could just be indications of an overheated economy, probably as a result of an overestimation of potential growth. Thus it looks as if the global imbalance may not be a problem per se but could become one if at the same time high commodity prices fuel emerging-market savings and excessive asset price inflation in the industrialized world turns into deflation, at least in the housing sector.

A number of questions arise: Can a central bank consider its job done if it achieves internal balance at the expense of a large external imbalance? Should monetary policy be redefined as the achievement of financial stability in a way that encompasses internal and external balances as well as asset price stability? Should monetary policy among advanced economies be more coordinated in the face of a large supply of savings from emerging-market countries (whose economies do not respond to the same macroeconomic levers)?

The answers to these questions will provide the key to defining the appropriate policy response, but such answers are not apparent at this stage. By formulating these questions in a (hopefully) clear manner, I hope to improve the chances of finding answers to steer policymakers in the right direction as events unfold.

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