

Interpreting recent movements in sterling

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The sterling effective exchange rate has depreciated significantly since the start of the financial market crisis in August 2007. Movements in sterling affect UK monetary policy via their potential impacts on CPI inflation prospects, where it is important to consider the reasons behind the change in the exchange rate. Sterling's movements potentially reflect a wide range of factors in the United Kingdom and overseas, in both the real economy and in financial markets. Indicative evidence suggests that sterling's depreciation reflected a combination of perceived changes to UK relative cyclical prospects, the perceived riskiness of UK assets and the apparent need for the UK economy to rebalance, the effects of which may have been amplified by financial market factors. But there is substantial uncertainty about the precise role of each factor.

Introduction

The sterling effective exchange rate index (£ERI) has depreciated significantly since the beginning of the financial market crisis. Despite a 10% appreciation in the first half of 2009, at the end of June 2009⁽²⁾ the £ERI was around 20% lower than in August 2007. These recent moves represent a significant departure from the decade of relative stability for sterling which preceded the crisis.

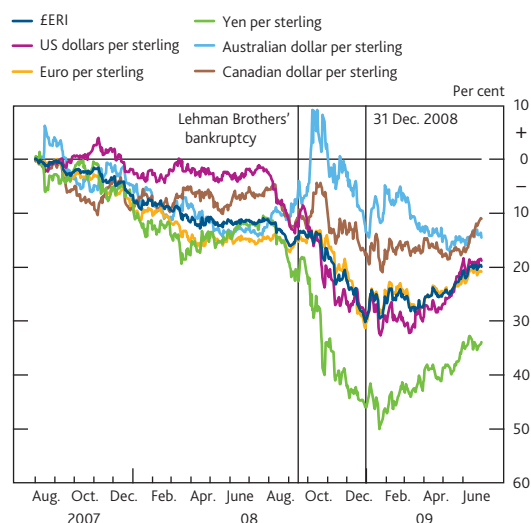
Such sharp shifts in the exchange rate raise important issues for UK monetary policy. In particular, sterling's movements affect the relative price of UK imports and exports and, more generally, changes in the value of a currency can be accompanied by moves in other asset prices. These developments will affect the balance of aggregate supply and demand in the UK economy. But, as discussed below, it is important to consider the underlying reasons behind the change in the exchange rate when assessing the overall impact of a movement in sterling on CPI inflation, the policy objective of the UK Monetary Policy Committee (MPC).

Disentangling the different influences on exchange rates can be difficult, as many factors may have an effect simultaneously. This article nonetheless discusses the potential causes of sterling's sharp depreciation during the financial crisis. It draws on indicative evidence about developments in the real economies in the United Kingdom and abroad, as well as in financial markets.

Sterling's recent movements

Chart 1 shows developments in sterling exchange rates between August 2007 and June 2009. Overall, sterling's moves seem to have occurred in three broad phases, which themselves have echoed developments in other currencies and in financial markets more generally.

Chart 1 Cumulative change in selected sterling exchange rates since August 2007

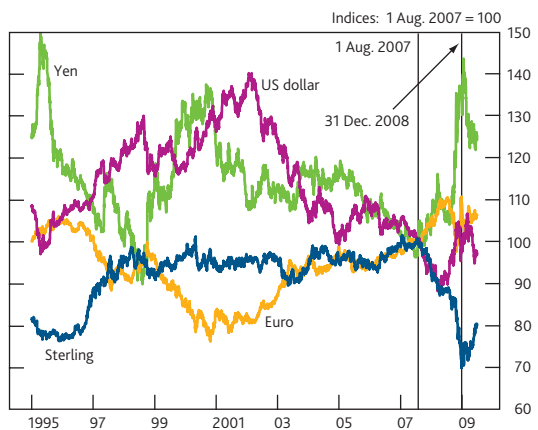


(1) The authors would like to thank Phillip Butler and Philip Thomas for help in producing this article.

(2) The data cut-off for this article was 30 June 2009.

In the initial phase, during the first year of the crisis, the depreciation in the £ERI was largely accounted for by falls against the euro and the yen, with sterling little changed against the US dollar. Indeed, the sterling and US dollar effective exchange rates depreciated by similar amounts during this period (Chart 2). This would tend to suggest that the UK and the US economies were initially perceived to be similarly affected by the financial crisis. By contrast the euro and yen effective rates appreciated over this period, consistent with the euro area and Japan being initially perceived to be relatively less affected.

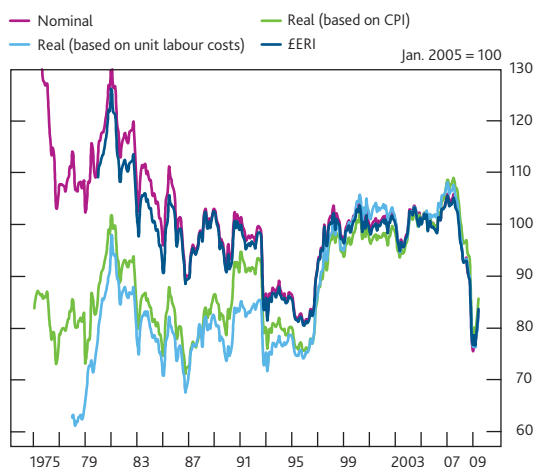
Chart 2 International effective exchange rates



Sources: Bank of England and IMF.

The second, and sharpest, phase of sterling’s depreciation occurred in the final few months of 2008, as the financial crisis intensified substantially following the bankruptcy of Lehman Brothers in September 2008. In fact, the 20% £ERI depreciation in 2008 Q4 was the sharpest quarterly fall in sterling since the end of the Bretton Woods system of fixed exchange rates in the early 1970s (Chart 3). But the pattern

Chart 3 Sterling nominal and real effective exchange rates



Note: All measures are from the IMF except the £ERI.

Sources: Bank of England and IMF.

of global currency movements differed from the initial phase. The US dollar, and especially the yen, appreciated sharply at the end of 2008 while the euro was little changed (Chart 2).

The third phase was sterling’s appreciation in the first half of 2009: the £ERI rose by around 10%, reversing around half of the depreciation in the last quarter of 2008. The sharp US dollar and yen appreciations of late 2008 were also partly reversed in 2009.

Despite the rebound in the first half of this year, at the end of June 2009 the £ERI remained close to its lowest level since the mid-1970s. Over longer periods of time it is more appropriate to examine real exchange rates, which adjust for relative movements in consumer prices or labour costs across countries. On this basis, sterling’s depreciation over the past two years has taken the real value of sterling back to around its level in the mid-1990s, which itself was close to the average level in the preceding 20 years (Chart 3).

How are exchange rates determined?

Before turning to the potential causes of sterling’s recent depreciation, this section sets out in broad terms what determines currency movements, based on some key insights from the extensive academic literature.

The dual role of exchange rates within the economic system

The nominal exchange rate is the price of one country’s money relative to the price of another country’s — it converts a price in one currency area into a price in another. In this way, exchange rate movements may alter international relative prices. But importantly currency movements do not happen in isolation. Rather they are related, in one way or another, to relative changes in the domestic or foreign economies.⁽¹⁾

Specifically, exchange rates will move to equilibrate demand and supply in markets for both internationally traded goods and services and financial assets. Consequently, currencies will be affected by the underlying factors influencing both types of markets — with currencies’ longer-term movements typically determined by shifts in international demand and supply of goods and services, but their shorter-term changes often more related to financial market developments. This ‘dual’ role is an important feature of currencies, but can complicate their interpretation.

(1) This is often referred to as exchange rates being ‘endogenous’ to the economic system.

The role of exchange rates in international goods and services markets

According to the 'law of one price', tradable goods and services should cost the same in different countries, once converted into a common currency. This is because, abstracting from the costs of transporting goods between countries, deviations from common prices would imply profitable opportunities for trade, which if exploited would tend to put pressure on the nominal exchange rate to adjust in order to equalise common currency prices. For example, if goods were cheaper overseas, UK imports would tend to rise with the consequent higher demand for foreign currency putting downward pressure on sterling.

The law of one price underpins the purchasing power parity (PPP) theory of exchange rates. This argues that if aggregate UK tradable prices are higher than those abroad, this will tend to put downward pressure on sterling and *vice versa*. So, if all goods were tradable, the real exchange rate would tend to remain broadly constant over time. But in practice there are some goods and services that are non-tradable (for example, haircuts) and some tradables that are not perfect substitutes. As a result, there can be large and persistent movements in the real exchange rate (Chart 3). These can reflect real economic developments — changes in real aggregate demand and supply conditions — that affect the relative price of tradable and non-tradable goods and services.

For example, if the demand for UK-produced traded goods were to fall, perhaps because of a decrease in domestic spending, the real £ERI would tend to depreciate in order to help eliminate the nascent spare capacity in the United Kingdom. The depreciation would increase the price competitiveness of UK exports and make imports more expensive, tending to cause spending to shift away from imported goods and towards domestically produced goods.

Supply-side developments can also influence the path of the real exchange rate. If there was an economy-wide rise in UK supply growth, relative to that abroad, this would also be expected to cause a real sterling depreciation, since the United Kingdom will again have more goods to sell and a depreciation should help facilitate that.⁽¹⁾ The effects of such supply developments on currencies can, however, be complicated by the wealth effects that they can generate. For example, if UK households anticipate a rise in future productivity they are likely to respond immediately, bringing forward the rise in spending implied by higher future income. In that case, the associated increase in domestic demand for goods produced in the United Kingdom — including tradable goods — may increase their price and produce a real sterling appreciation in the near term.⁽²⁾

The role of exchange rates in international asset markets

Exchange rate movements also affect the returns on financial assets in different countries. So if capital is able to flow freely between countries, it is reasonable to assume that expected returns on identical assets in different countries will be the same when converted via the nominal exchange rate. If expected returns were not initially equalised, arbitrage opportunities would stimulate capital flows to eliminate them. Exchange rates are therefore affected by differences in, and changes to, relative returns in international asset markets. An example of this, which focuses on returns in international bond markets, is the uncovered interest parity (UIP) condition. This argues that the currencies of countries with relatively high interest rates should be expected to depreciate in the future, so as to equalise expected returns across countries.

The role exchange rates play in asset markets is linked to future returns on different assets. This means that exchange rates are 'forward-looking' variables. Their values should incorporate financial market participants' current collective view about the future path of the determinants of asset returns across countries, with those determinants including the real supply and demand factors discussed above. Exchange rates should move when market participants acquire new information about those underlying determinants, for example when there is 'news' in a particular data release. And since exchange rates are international relative prices it is the 'news' in the domestic economy relative to the foreign economy that should affect them. If two economies are perceived to be equally affected by an economic development, their bilateral exchange rate should not tend to change.

Long-run sustainable exchange rate and short-run dynamics

Currency movements can also be thought of in terms of shifts in the long-run sustainable exchange rate and their shorter-term dynamics.

The long-term sustainable real exchange rate ensures that the relative prices of domestic and foreign goods and services (tradable and non-tradable) are consistent with a macroeconomic equilibrium. That is, where resources are optimally allocated and any international capital flows, generated by differences between current domestic spending and income, can be sustained. For example, creditors would believe that a debtor country's borrowing can be repaid from future earnings. Shifts in the sustainable exchange rate are most frequently linked to real economy factors, although they

(1) This will occur via a combination of the lower UK prices associated with lower production costs and a nominal sterling depreciation.

(2) The effects of a supply development on the real exchange rate will also depend on whether it affects the whole economy, as assumed above, or whether it has different effects on the traded and non-traded sectors of the economy (via what is known as the Balassa-Samuelson effect).

can also potentially reflect shifts in preferences for different financial assets.

But when such shifts occur the actual exchange rate often may not jump straight to the new sustainable value. Rather there is a dynamic adjustment path towards that new long-run level, which determines currency movements in the near term. In principle, such shorter-term exchange rate movements should be consistent with the asset markets parity condition (UIP) discussed above and hence be affected by factors influencing financial markets. Shorter-term exchange rate movements can, however, be hard to rationalise in terms of returns on financial assets — currencies' relatively high volatility often appears puzzling⁽¹⁾ and it can be difficult to detect supportive evidence for the UIP condition.

Short-term volatility in exchange rates is sometimes linked to the possible different speeds of adjustment in various markets — for example, some authors suggest that the general stickiness of prices for goods and services, combined with flexible asset prices, may cause exchange rates to 'overshoot' their eventual long-run sustainable levels (see Dornbusch (1976)).

Alternatively, such volatility and the difficulties with finding support for UIP could reflect the impact of risk premia, which will arise if domestic and foreign assets are perceived to have different risk characteristics that change over time.⁽²⁾ If this is the case, currencies which at times are considered more 'risky' may be expected to appreciate more quickly than otherwise in order to compensate risk-averse investors for bearing extra currency risk. Exchange rates can therefore be affected by changes in investors' risk appetite (see the box on pages 206–07). In addition, shorter-run currency movements can be influenced by transitory factors affecting financial markets such as shifts in speculative flows.

The interaction between monetary policy and the exchange rate

The objective of UK monetary policy is to meet the Government's inflation target. In pursuit of this objective, the MPC does not attempt to control movements in sterling exchange rates. Nevertheless, movements in sterling exchange rates can have implications for inflationary pressure in the economy, and so can influence the policy decisions of the MPC. The forward-looking nature of exchange rates also means that they can potentially provide useful timely information on market participants' views of future economic prospects.

A key insight, however, is that the movements in UK CPI inflation associated with a sterling exchange rate movement depend on the type of underlying development affecting the UK or foreign economies and hence driving the currency change. This dependence on the type of underlying

development may reflect both the direct impact of an exchange rate movement on import prices and the wider effects of the underlying development on inflationary pressures. In particular, sterling depreciations tend to put upward pressure on CPI inflation by raising import prices, while the reverse is true for sterling appreciations. But this direct impact may depend on whether sterling's move is perceived to be driven by temporary or more persistent factors. An example of the importance of considering the wider effects of the underlying development is that if a sterling depreciation reflects lower demand for UK traded goods relative to supply then the higher margin of spare capacity would tend to put downward pressure on domestic prices, ameliorating the upward pressure on CPI inflation arising via higher import prices. In the medium to long run, however, inflation is determined by monetary policy, rather than by movements in relative prices such as exchange rate changes.

Policy decisions by the MPC can also affect sterling exchange rates. Indeed, exchange rate movements are an important part of the monetary policy transmission mechanism (Bank of England (1999)). As with all asset market developments, only unexpected changes that cause changes to the expected path of policy (typically Bank Rate or more recently the programme of asset purchases under the Asset Purchase Facility)⁽³⁾ should move exchange rates. As the MPC alters monetary policy in response to changes in inflationary pressure, it will alter the relative returns on sterling assets or prompt shifts in portfolios. These will, in the absence of changes to risk premia or the long-run real exchange rate, cause the nominal exchange rate to adjust in the short run, as part of the process of equilibrating goods and asset markets.

Factors contributing to sterling's recent moves

In light of the above discussion, in particular the importance of discerning the causes of currency movements, this section reviews the possible underlying developments which could have led to sterling's depreciation since the start of the financial crisis in August 2007. It first examines sterling's depreciation from August 2007 to end-2008 before briefly discussing sterling's appreciation in 2009.

There are important interconnections between the different candidate explanations, which makes it difficult to differentiate between them. Furthermore, there is considerable uncertainty about the underlying causes of

(1) This is often termed the exchange rate 'disconnect' puzzle.

(2) Other potential explanations, including the possible irrationality of market participants and the impact of large but infrequent events, have been explored in the literature.

(3) The portfolio shifts generated by the Asset Purchase Facility will potentially affect sterling to the extent that different financial assets are considered to be imperfect substitutes. The different risk characteristics discussed above is one reason why assets can be imperfect substitutes.

Interest parity, risk premia and the carry trade

Under the asset market approach to exchange rate determination, exchange rates should move to equalise returns on assets denominated in different currencies.

Covered versus uncovered interest parity

In principle if there is perfect capital mobility, investors have the choice of holding assets denominated in domestic currency, paying a rate of interest i_t or investing in assets denominated in foreign currency, that pay a foreign interest rate i_t^* . In reaching a decision, the investor with say one unit of domestic currency should compare the return of $1+i_t$ units of the domestic asset with the alternative strategy of converting at today's exchange rate into S_t units of foreign currency, investing in foreign assets to accumulate $S_t(1+i_t^*)$ units of foreign currency, and then converting the proceeds back into domestic currency at the end of the investment period.

If the domestic and foreign assets differ only in their currencies of denomination, and if investors have the opportunity to cover themselves against exchange rate uncertainty by arranging to reconvert from foreign to domestic currency at a pre-agreed forward exchange rate F_t (in units of foreign currency per unit of domestic currency), then market equilibrium requires the condition of covered interest parity (CIP):

$$1+i_t = \frac{S_t(1+i_t^*)}{F_t} \quad (1)$$

If condition (1) did not hold, and assuming markets operated perfectly, profitable arbitrage opportunities could be exploited without incurring any risks. For example, suppose $S_t = F_t$ but $i_t^* > i_t$. At the start of the period a domestic investor could borrow funds at i_t , convert into S_t units of foreign currency and simultaneously agree to sell F_t units of foreign currency at the end of the period thereby locking in a riskless profit.

Investors also have the opportunity to leave their foreign currency positions uncovered at time t and to wait to convert back into domestic currency at the prevailing exchange rate at say $t+1$, S_{t+1} . This leads to the so-called uncovered interest parity (UIP) condition:

$$1+i_t = E_t \left[\frac{S_t(1+i_t^*)}{S_{t+1}} \right] = S_t(1+i_t^*)E_t \left[\frac{1}{S_{t+1}} \right] \quad (2)$$

Taking logs and rearranging, a simplified version of equation (2) can be represented as:

$$E_t s_{t+1} - s_t = i_t^* - i_t \quad (2')$$

where lower-case variables imply logs.

Equation (2') implies that the domestic currency should be expected to appreciate (depreciate) to offset any positive (negative) differential between foreign and domestic interest rates.

Unlike F_t the value of S_{t+1} is unknown at time t , and so the attractiveness of holding an uncovered position must be assessed in terms of the likelihood of different outcomes for S_{t+1} . In fact, if assets are perfectly substitutable (ie the assets are identical in terms of liquidity, maturity, default risk etc), UIP is equivalent to combining the CIP condition with the assumption investors care only about the average return of their investment over time and not in any particular period (ie they behave as if they are risk-neutral).

Role of risk premia

In practice however, domestic and foreign assets are not perfect substitutes. In particular, a key distinguishing factor is their perceived riskiness. If assets denominated in different currencies have different risk characteristics, investors may be willing to earn lower expected returns on assets that are perceived to be less risky. Correspondingly, they will hold very risky assets only if the expected return is relatively high.

More formally, when domestic and foreign assets are imperfect substitutes, the UIP condition must be amended — the exchange rate should adjust to equilibrate the risk-adjusted returns on domestic and foreign currency assets:

$$E_t s_{t+1} - s_t = i_t^* - i_t + \rho_t \quad (3)$$

The risk premium, ρ_t , represents the additional compensation that a domestic investor would require to cover the potential that the foreign currency may depreciate (correspondingly, the domestic currency may appreciate) by more than implied solely by interest differentials. Such a change in the exchange rate would increase the cost of converting back to domestic currency at $t+1$ and thereby reduce overall returns on foreign currency assets.

Finance theory would suggest that the risk premium will depend on how well the returns from investing in assets of a particular currency co-vary with investors' overall wealth. If a currency tends to depreciate at the same time as the prices of other assets fall then investors will tend to demand a higher premium to invest in assets denominated in that currency

since their total wealth will be hit should the currency fall in value. In contrast, if changes in a particular currency are typically negatively correlated with other asset prices then investors may be willing to accept a lower return because it offers a form of insurance and enables the investor to preserve his wealth.

Carry trades

The strict UIP condition implies that exchange rates should move to ensure that expected returns are equalised. In fact, in practice high interest rate currencies do not typically depreciate as much as the interest differential with other currencies would suggest and indeed often appreciate. This empirical regularity has given rise to a prominent investment strategy whereby investors sell low interest currencies ('funding' currencies) and invest in high interest rate currencies ('target' currencies) — so-called carry trades.

One interpretation of the carry trade is that investors essentially take a bet against UIP over the horizon of their investment and they earn a risk premium for holding assets that might depreciate against them. In this way, they hope that they can close out their position before any change in exchange rates and thereby enjoy the profit implied by the interest differential between high and low rate currencies.

exchange rate movements, so the evidence presented below is necessarily only indicative. This section, therefore, also draws on the market intelligence which the Bank routinely gathers in discussions with market participants.

Negative news about relative UK prospects

There have been extensive discussions among policymakers, market participants and in the financial press about the adverse consequences of the financial crisis on global economic growth prospects. But for this to account for sterling's depreciation it requires that investors believed the crisis would have a more negative effect on cyclical growth prospects in the United Kingdom compared with overseas. Such a perceived relative UK cyclical slowdown would cause sterling to depreciate in order to help boost exports and encourage domestic residents to switch demand away from imports and thereby reduce any emerging spare capacity in the UK economy.

There are several reasons for thinking that the United Kingdom might have been relatively more affected by the crisis than some other countries, at least in its initial stages. In particular, the tightening of credit conditions associated with the financial crisis was thought by market contacts to potentially have a larger impact on the UK economy than on other countries because of the relatively high debt levels of UK households (**Table A**). Similarly, the United Kingdom could have been perceived to be particularly vulnerable to the

Although the presence of time-varying currency-specific risk premia might explain the popularity of carry trade strategies, there is no general agreement on the origins of these premia. Some authors argue that investors in high interest rate currencies can typically be prone to sudden currency crashes and it is this risk for which investors demand compensation and that underlies the positive returns to the carry trade.

However, other authors have failed to find evidence that carry trade returns are related to standard underlying risk factors. The carry trade investor should only be rewarded if there is a chance that his return on the trade would negatively affect the overall value of his investment portfolio or wealth. But empirical studies have shown that returns to carry trades often tend to co-move negatively with other asset returns and therefore should not in principle command any risk premia.

An alternative explanation for the profitability of carry trades is that they reflect some form of market imperfection. For example, some authors suggest that transaction costs or asymmetric information in foreign exchange markets stop investors ensuring that the strict UIP condition holds, at least continuously and it is this that sustains the positive returns to carry trades.

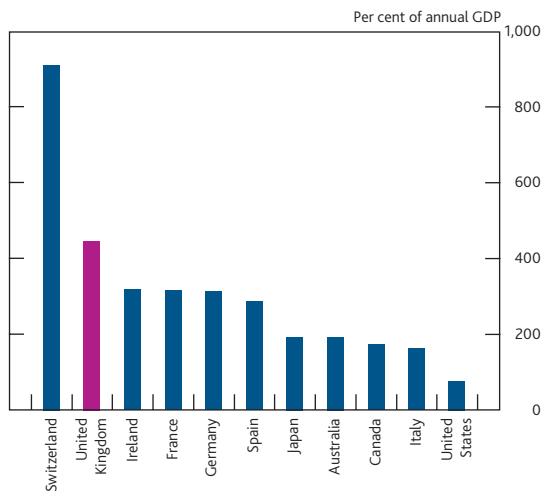
impairment of wholesale funding markets given the relatively large size of the UK financial sector (**Chart 4**) and its dependence on these markets (see King (2008) and Astley, Giese, Hume and Kubelec (2009)).

Table A Household indebtedness in G7 countries

	Per cent of nominal disposable income		Percentage point change 1997–2007
	1997	2007	
Canada	109.6	138.9	29.3
France	67.4	100.1	32.7
Germany	105.0	102.2	-2.9
Italy	42.9	72.5	29.6
Japan	132.1	127.7	-4.4
United Kingdom	107.1	185.7	78.5
United States	96.2	141.0	44.8

Source: OECD *Economic Outlook*.

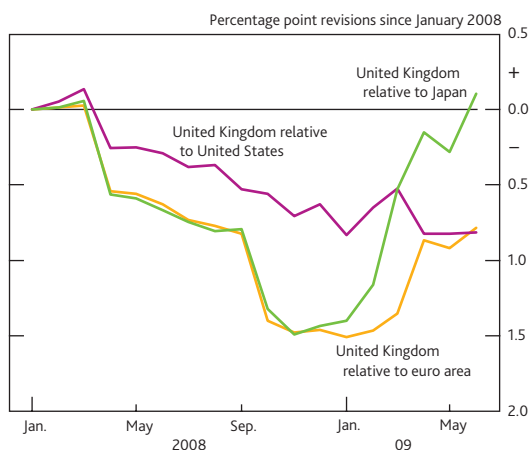
There is some empirical support for this story in the Consensus survey of economic forecasters — expectations for UK domestic growth in 2009–11 were revised down by more than their foreign counterparts (**Chart 5**). Moreover, in the first phase of sterling's depreciation, UK cyclical demand prospects were perceived to have deteriorated against the euro area and Japan by similar amounts, which is consistent with sterling's similar depreciation against the euro and the yen during this period (**Chart 1**). And a significant fall in perceived

Chart 4 Total bank assets relative to GDP^(a)

Sources: Bankscope published by Bureau van Dijk Electronic Publishing, International Monetary Fund, *The Banker* and Bank calculations.

(a) End-2007 data, except for the United Kingdom, which are at end-2008. Data for all countries except the United Kingdom are from *The Banker's* ranking of the world's largest 1,000 banks. This measure will underestimate the size of banking systems that have a large proportion of banking sector assets outside of the list. UK data are from Bankscope.

UK relative prospects in 2008 Q4 coincided with the sharpest phase of sterling's depreciation. There were initially relatively small falls in perceptions of UK cyclical prospects relative to those in the United States, which is somewhat consistent with sterling's initial relative stability against the US dollar, although those relative prospects subsequently fell further.

Chart 5 Revisions to Consensus domestic demand growth forecasts for 2009–11^{(a)(b)}

Sources: Bureau of Economic Analysis, Consensus Economics, Eurostat and ONS.

(a) Revisions since January 2008 to Consensus expectations for the weighted sum of investment and private consumption growth in the United Kingdom less than in the other country.
(b) Average of projections for end-2009, end-2010 and end-2011.

Any negative reassessment of the cyclical outlook in the United Kingdom relative to abroad would also, given the MPC's objective of keeping CPI inflation close to the Government's target, likely prompt a reduction in market expectations of future sterling interest rates (relative to foreign interest rates). To the extent that such a shift in expectations prompted a reduction in prospective returns on UK assets relative to those

in other countries that would tend to cause sterling to depreciate. **Chart 6** shows an indicative measure of relative UK cyclical prospects derived from relative interest rate 'news' (ie unexpected shifts in relative returns on sterling and foreign currency assets). The main messages have some similarities with those from **Chart 5**. In the first year of the crisis, the news was again most negative, and broadly similar, against the euro area and Japan, broadly consistent with relative changes in the different sterling bilateral exchange rates over this period. The positive news against the United States was, however, hard to reconcile with sterling's initial stability against the US dollar.

Chart 6 Cumulative relative interest rate 'news' and cumulative changes in the £ERI since August 2007

Notes: Interest rate 'news' is calculated from the uncovered interest parity (UIP) condition. Unanticipated movements in sterling relative to international interest rates are cumulated from 1 August 2007. For more information see Brigden, Martin and Salmon (1997).

Sources: Bloomberg and Bank calculations.

Moreover, weighting together the relative interest rate 'news' against all the major bilateral exchange rates, it seems that by the end of June 2009 relative interest rate news might account for only around a third of the £ERI depreciation. Sterling's sharp depreciation in 2008 Q4 seems hardest to rationalise.

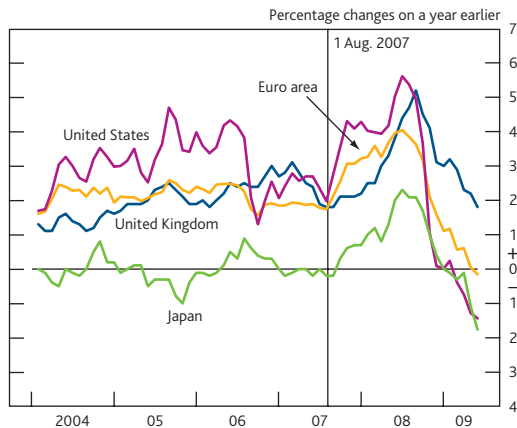
Higher UK relative inflation

Another possible factor behind sterling's depreciation could be movements in inflation rates across countries. If a country's inflation rate persistently exceeds corresponding rates abroad then, according to the purchasing power parity theory, the nominal exchange would tend to depreciate in order to keep the real exchange rate broadly unchanged. Any such adjustment would, however, likely take place over longer periods of time and would also be affected by the perceived monetary policy reaction.

UK consumer price inflation has fallen by less than that in other major economies during the crisis (**Chart 7**). The difference was, however, substantially smaller than the fall in the nominal value of sterling, so the real £ERI has depreciated

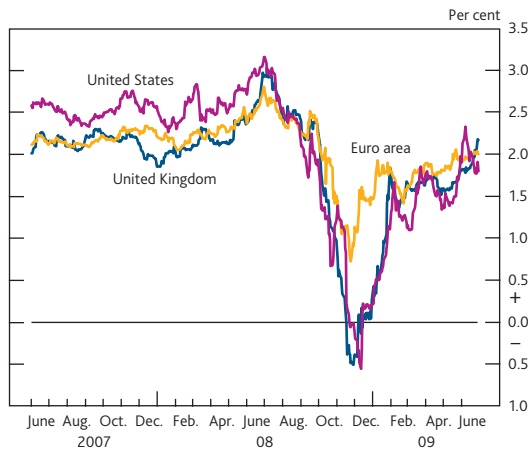
substantially (Chart 3). Moreover, the relatively high UK CPI inflation over the past year or so in part reflects the rise in import prices associated with sterling's depreciation (see the August 2009 *Inflation Report*), so it is difficult to tell a causal story. There is also little evidence from index-linked securities that expectations of UK inflation have risen relative to those in other countries (Chart 8).⁽¹⁾

Chart 7 International consumer prices



Sources: Bureau of Labour Statistics, Eurostat, Ministry of Internal Affairs and Communications and ONS.

Chart 8 International forward-looking inflation measures^{(a)(b)}



(a) Based on five-year inflation spot rates derived from inflation swaps.
 (b) UK series adjusted down by 80 basis points to reflect UK inflation swaps referencing RPI inflation, whereas US and euro-area series reference CPI inflation.

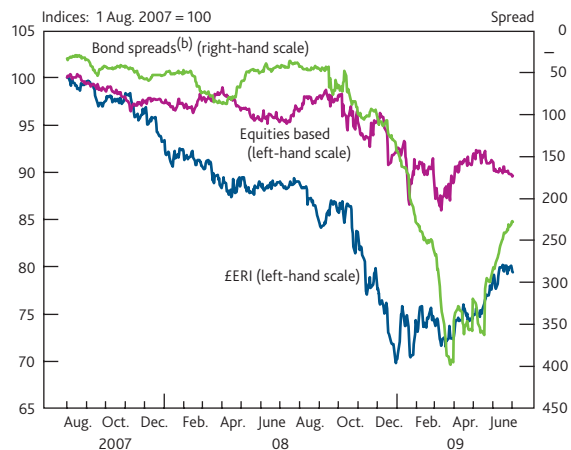
A rise in the risk premia on sterling assets

Increased investor concern about the uncertainty of future returns on sterling-denominated assets, relative to those on non-sterling assets, might also have contributed to sterling's depreciation. As discussed above, such concerns would cause investors to demand additional compensation to hold sterling assets. This can be brought about via expectations of a larger future appreciation of sterling relative to the expected path implied by interest rate differentials. And in order to deliver this, sterling would tend to depreciate when the risk concerns arose (see the box on pages 206–07 for further discussion).

It is possible that increases in investors' required risk compensation on sterling assets could be related to the concerns about UK relative cyclical prospects. For example, if there were greater uncertainty about the magnitude and duration of the recession in the United Kingdom, relative to other countries, this might have prompted investors to demand greater compensation for the increased uncertainty surrounding returns on sterling assets, at least temporarily until the longer-run effects of the financial turmoil became clearer.⁽²⁾

The Bank's market contacts have mentioned several reasons for thinking that sterling assets may have been perceived to have become relatively more 'risky' during the financial crisis. First, increased investor worries about UK banks' access to both short-term liquidity and long-term capital and the potential wider implications for credit extension in the United Kingdom, coupled with the relatively large size of the UK financial sector, might have prompted them to demand a higher risk premia on sterling assets. And indeed, Chart 9 shows that there has been some correlation between sterling's depreciation and the relatively larger moves in market indicators of financial sector soundness, especially following the failure of Lehman Brothers last autumn. That said, the financial sector accounts for only around 8% of UK value added, of which only around 60% is related to the activities of the monetary and financial institutions that were most directly affected by the crisis.

Chart 9 £ERI and indicative measures of relative UK financial sector soundness^{(a)(b)}



Sources: Bloomberg, British Bankers' Association (BBA) and Bank calculations.

(a) Growth in UK bank equity prices relative to growth in FTSE All-Share less growth in international bank equity prices relative to growth in global equity index.
 (b) Difference in the option-adjusted spread on sterling bonds issued by financial companies and the weighted average option-adjusted spread on bonds issued by financial companies in US dollars, euros, Japanese yen, Canadian dollars and Australian dollars. A negative spread indicates a widening in UK bond spreads in relation to global spreads.

(1) Changes in expected inflation rates across countries tend to give a potential guide to future trends in the nominal exchange rate rather than being associated with a change in the current exchange rate.
 (2) There may also be links between the risk premium explanation and a potential change in the perception of the long-run sustainable level of sterling as part of the rebalancing of the UK economy discussed below.

A second potential reason for increased risk premia on sterling assets could be that investors have become more worried about the potentially large exposure of the UK Government to the financial sector, and more generally the sustainability of the UK fiscal position.

Finally, contacts have expressed some concerns about the composition of the UK external balance sheet, and in particular the potential maturity and currency mismatches. The maturity mismatch arises because the United Kingdom has a net external asset position in longer-term direct investment but a net external liability position in shorter-term financial instruments such as bank deposits. That net mismatch is, however, small relative to the gross asset and liability positions. And, prior to the financial crisis, the UK banking sector's gross external assets in the form of loans, currency and deposits were around nine times the net liability position (**Table B**). The currency mismatch issue is related, apparently arising from the UK banking sector's external liabilities featuring, prior to the crisis, foreign currency deposits of around 160% of UK GDP. Again, however, the net currency mismatch on such banking sector positions was substantially smaller than the gross position. And for the UK external balance sheet as a whole, a higher proportion of assets are denominated in foreign currency than are liabilities. Sterling's depreciation during the crisis has therefore resulted in a significant improvement in the UK external balance sheet (international investment position), see Astley, Giese, Hume and Kubelec (2009).

Table B Composition of UK external balance sheet for 2007 Q2 (percentage of nominal GDP)

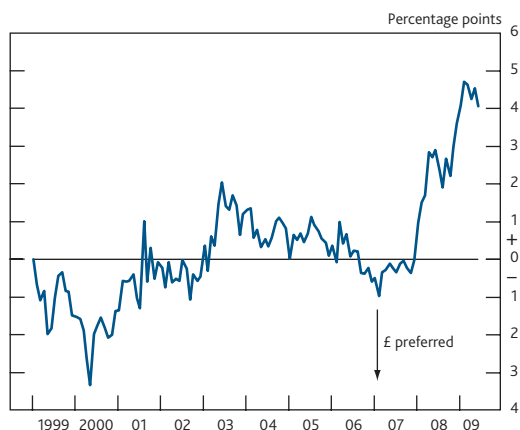
	Gross assets	Gross liabilities	Net assets (+) or liability (-)
Total	420.2	442.4	-22.2
<i>of which:</i>			
Foreign direct investment	58.7	42.1	16.6
Equity	53.7	60.9	-7.2
Debt securities	65.3	71.2	-5.9
Other	240.9	269.1	-28.2
<i>of which:</i>			
Loans	60.9	72.6	-11.7
Currency and deposits	179.0	195.1	-16.1

Sources: ONS and Bank calculations.

Is there any other evidence to corroborate and quantify these risk premia concerns of market contacts? It is difficult to measure exchange rate risk premia — they depend on investors' perceptions about the uncertainty of future returns on sterling assets relative to foreign assets and investors' risk aversion, which are themselves unobservable. Nevertheless, **Chart 10** shows a simple proxy indicator. The measure compares Consensus survey expectations for sterling with the path implied by forward interest rates. If sterling assets were

considered to be more 'risky' than those denominated in other currencies, the path of survey expectations for the exchange rate should lie above that implied by forward interest rates indicating that survey respondents expected to receive higher returns to investing in sterling. This measure suggests that sterling risk premia increased somewhat in the first year of the crisis, but then rose substantially further as the crisis intensified in the final months of 2008.

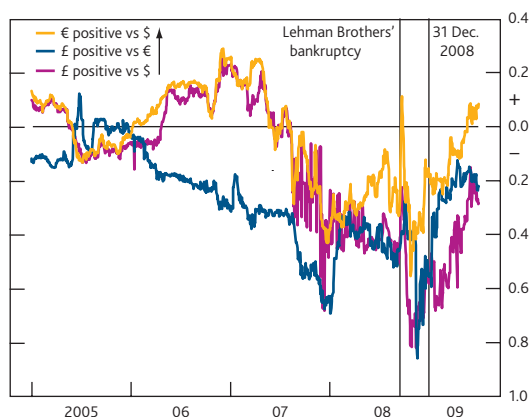
Chart 10 Survey-based indicative measure of £ERI risk premium



Sources: Consensus Economics and Bank calculations.

This proxy measure is clearly imperfect, making it difficult to draw firm conclusions. But forward-looking measures of currency uncertainty inferred from option prices also increased substantially during the crisis for a range of sterling bilateral exchange rates, again particularly at the end of 2008. More specifically, the implied probability distribution for sterling bilateral exchange rates widened sharply and became significantly more negatively skewed in late 2008 relative to other currencies (**Chart 11**). This could be consistent with increased risk premia on sterling assets since it suggests that sellers of options demanded increased compensation to provide protection against large falls (compared with large rises) in the value of sterling.

Chart 11 Option-implied skewness of foreign exchange returns (twelve month)



Sources: BBA, ICAP and Bank calculations.

Other financial market factors

The Bank's market contacts have also suggested that sterling's sharp depreciation at the end of 2008 in part reflected the unwinding of the 'carry trade' foreign exchange trading strategy (investing in relatively high interest rate currencies, by borrowing in low interest rate currencies, see the box on pages 206–07) which had been popular in the run-up to the financial crisis. The significant increases in risk aversion, rises in financial market volatility and reduction in cross-country interest rate differentials which occurred towards the end of 2008 adversely affected the attractiveness of such trades. This reportedly caused a repatriation of funds invested overseas. Sterling was, along with other currencies, thought to have been affected by this process because it had previously been a relatively high yielding currency in such trades and had hence reportedly been supported somewhat. Financial institutions' general deleveraging following the failure of Lehman Brothers — see Astley, Giese, Hume and Kubelec (2009) — also reportedly contributed to a reversal of capital flows.

This unwinding of carry trades may also have contributed to the end-2008 appreciations of the Japanese yen and US dollar (Chart 2) which had previously been popular 'funding' currencies. Demand for the US dollar is also reported to have been amplified by a general 'flight to quality' as, in an environment of heightened risk aversion, investors sought a safe haven for their funds in highly liquid US assets such as government securities. Moreover, the Bank's contacts report that foreign investors facing falls in the value of their US dollar assets sought to hedge their foreign currency liabilities by buying US dollars, which could also have contributed to the end-2008 US dollar appreciation.

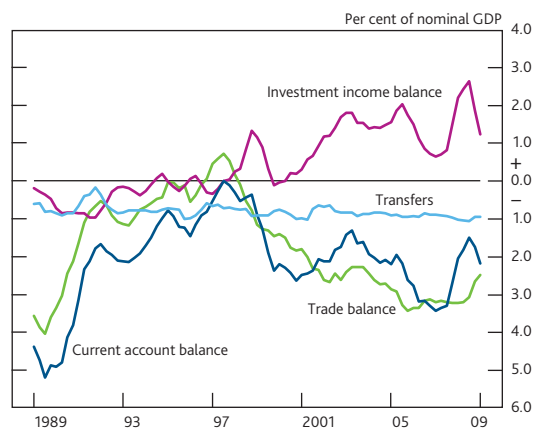
The combination of strong demand for US dollar funds and heightened fears about financial institutions' ability to meet their contractual obligations in the wake of the failure of Lehman Brothers, triggered a number of pricing anomalies and illiquid conditions in financial markets in late 2008.⁽¹⁾ That could also have boosted required illiquidity premia on sterling and contributed to its depreciation. The foreign exchange market is typically highly liquid but in 2008 Q4 contacts reported that transaction costs in the interdealer foreign exchange market (as measured by bid-ask spreads)⁽²⁾ picked up sharply, especially for sterling trades. And intraday volatility spiked higher for sterling bilateral exchange rates.

Need for UK economy to rebalance — changes in the long-run sustainable real exchange rate

A final possible explanation for sterling's depreciation, discussed in the February 2009 *Inflation Report*, is that it is part of the process of rebalancing activity in the UK economy away from domestic demand and towards net trade.

Since the mid-1990s, the United Kingdom has consistently run current account deficits averaging around 2% of GDP (Chart 12) as collectively UK corporations, UK households and the UK government borrowed from overseas to finance their consumption and investment plans. Provided foreign investors were content to build up claims on the future earnings of UK residents in the form of financial assets, such an imbalance of domestic expenditure over savings was sustainable. But the financial crisis may have led overseas investors to reassess their willingness or ability to purchase sterling assets and thereby finance the UK trade deficit. As a result, the long-run sustainable real sterling exchange rate, the rate consistent with a balance of UK real aggregate demand and supply and a sustainable external net asset position, may have fallen.

Chart 12 UK current account balance and component balances^(a)



(a) Four-quarter moving averages.

Put another way, it is possible that in the years prior to the crisis the real \pounds ERI had moved above its long-run sustainable level. Indeed, as discussed in King (2002), given persistent current account deficits, the continued strength of sterling over the past decade has perhaps been surprising.⁽³⁾ So the financial crisis may have prompted some reassessment of the factors which were previously perceived to have supported that high level of sterling; the depreciation has taken the real sterling exchange rate back to its mid-1990s' level (Chart 3). That change in perceptions, triggering a fall in the long-run real value of sterling so as to bring about an improvement in the UK trade balance, could relate to the international demand for UK goods and services or the United Kingdom's supply potential.

(1) See the June 2009 *Financial Stability Report* and the box 'Pricing anomalies in financial markets' in the 'Markets and operations' article in the 2009 Q1 *Quarterly Bulletin*.

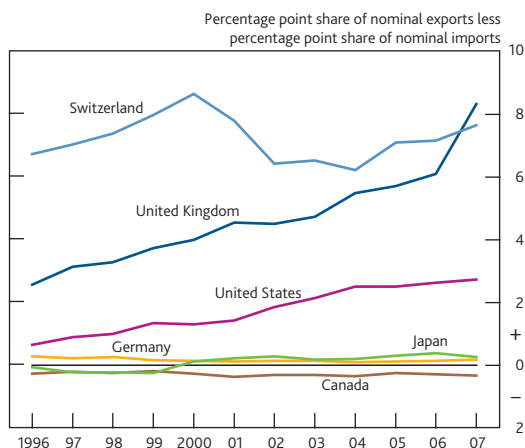
(2) Bid-ask spreads are the difference between the price quoted by a market maker for an immediate sale (bid) and an immediate purchase (ask).

(3) King (2002) argued that such current account deficits could not be sustained indefinitely and that the required shifts in resources between sectors might be accompanied by considerable movements in sterling.

There are several reasons why market participants might perceive that the financial crisis has prompted a fundamental shift in demand away from UK goods and services. First, in an extension of the previous cyclical story, the potentially more pronounced effect on the UK financial sector relative to other countries could be perceived to have led to a permanent fall in UK households' and firms' income. This would reduce the sustainable growth rate of domestic spending, causing a fall in the demand for UK goods (relative to foreign goods) since UK residents consume more UK-produced goods than foreign goods.

Second, the crisis could also be perceived to have caused a persistent fall in the global demand for financial services. This would lower demand for UK goods and services because UK net exports are relatively concentrated in financial services (Chart 13).

Chart 13 Trade specialisation in financial services



Note: Specialisation defined as the share of financial services in nominal exports less share of financial services in nominal imports.

Source: OECD.

And third, the crisis could have been perceived to have reduced the United Kingdom's ability to generate significant foreign investment income relative to other countries. Such income has been significant in recent years, offsetting, to some extent, the UK trade deficit (Chart 12). That occurred despite the United Kingdom having a reported net foreign debt position, and reflected both the UK banking sector's ability to attract low interest rate deposits and the relatively high returns on the United Kingdom's direct investments abroad — see Whitaker (2006) and Kubelec, Orskaug and Tanaka (2007).⁽¹⁾ The financial crisis could be perceived to have permanently reduced the supply of those low-cost funds while weaker global growth prospects could undermine the future returns on UK foreign investments.

On the supply side, recent *Inflation Reports* have discussed how the financial crisis and associated recession are also likely to have adversely affected UK productive capacity. This

reflects a number of effects including more restricted access to credit, higher corporate bankruptcies and, allied to greater macroeconomic uncertainty, lower investment. According to the Consensus survey, however, prospects of future UK labour productivity growth have been revised down by less than those in the United States and euro area during the crisis (Table C). Those measures may, however, imperfectly capture market participants' expectations of future productivity. Moreover, changes to cross-country productivity prospects have an ambiguous effect on exchange rates — as discussed above, the effect depends on the relative impact of wealth effects versus pressures on costs and prices. As such, there are considerable uncertainties about the contribution of supply-side developments to sterling's recent movements.

Table C Revisions to survey expectations of future productivity growth since August 2007^(a)

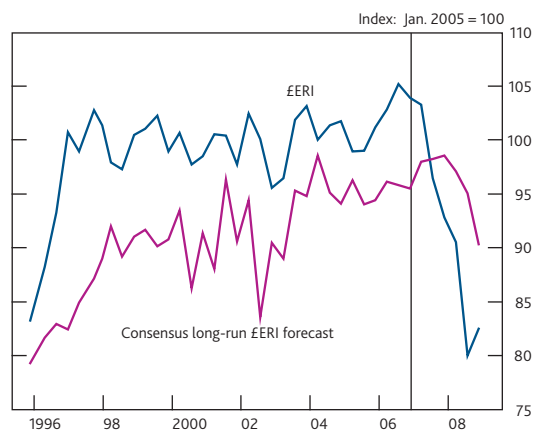
Country	Revisions up to	Year of projection (percentage points)		
		2011	2012–16	2017–21
United Kingdom	Aug. 2008	0.1	0.1	0.0
	Feb. 2009	-0.2	-0.2	-0.2
Euro area	Aug. 2008	-0.4	-0.4	-0.4
	Feb. 2009	-0.3	-0.6	-0.6
United States	Aug. 2008	-0.8	-0.7	-0.3
	Feb. 2009	-0.2	-0.5	-0.5

Source: Consensus Economics.

(a) Forecasts of real output per employee.

Overall, it is difficult to assess exactly how far any prospective rebalancing of the UK economy may have prompted a fall in the long-run sustainable value of sterling. Chart 14 illustrates that Consensus survey respondents have revised down their five-year £ERI forecasts by around 10% during the financial

Chart 14 £ERI and Consensus five-year £ERI forecasts^(a)



Sources: Bank of England and Consensus Economics.

(a) Vertical line refers to the date of the June 2007 survey (the survey conducted closest to the start of the crisis). The £ERI series refers to the observations on the day of each survey.

(1) An alternative interpretation is that this pattern reflects the mismeasurement of the UK external net asset position — see Nickell (2006).

crisis.⁽¹⁾ Notably, in a reversal of the pattern in recent years, the actual £ERI now lies significantly below those longer-term forecasts. This might suggest that, at least according to the available survey responses, the long-run value of sterling may not have fallen by as much as the £ERI.

Sterling's appreciation in 2009

Sterling has appreciated by over 10% since the start of 2009 (to end-June), unwinding around a third of its total depreciation since August 2007. So does this reflect the reversal of previously discussed factors or new factors affecting sterling?

There is some evidence that UK relative cyclical prospects are perceived to have improved. In particular, both the Consensus survey and relative interest rate news (**Charts 5 and 6**) suggest some improvement in perceptions of the near-term macroeconomic outlook in the United Kingdom relative to both the euro area and Japan. This could be linked to the apparent change in the nature of the global crisis from one concentrated in financial markets to one having a large adverse effect on world trade. The UK economy is relatively less specialised in manufactured goods than some euro-area countries or Japan and so could be perceived to be less vulnerable (see pages 22–23 of the May 2009 *Inflation Report*).

As explained above, if sterling's depreciation reflected risk premia considerations, sterling would have been expected to appreciate more quickly than was previously the case in order to generate the increase in expected returns on sterling assets required by investors. So sterling's appreciation in 2009 could to some extent simply reflect a realisation of higher sterling returns, although the magnitude of such risk premia effects is itself subject to considerable uncertainty.

Sterling's appreciation in 2009 has, however, also coincided with rises in the prices of 'risky assets' such as equity prices and a general fall in forward-looking measures of volatility. These developments could reflect the perceived positive impact of the unprecedented monetary and fiscal policy responses to the crisis in reducing the risks to the financial sector. But the Bank's financial market contacts also report that there has been some reduction in market participants' required compensation for taking on risk.

Accompanying the improvement in market sentiment and reduced volatility in the first half of 2009, market contacts also report that there were signs that carry trade activity increased somewhat and that liquidity conditions in foreign exchange markets improved. Both factors could be consistent with sterling's appreciation as well as the depreciation in the US dollar and the yen in 2009.

It seems unlikely, given the evidence presented in **Chart 14**, that investors have revised up their estimates of the long-run

sustainable level of sterling based on developments thus far in 2009.

An additional factor in 2009 has been that the MPC, along with other central banks, started a programme of asset purchases. As explained in recent *Inflation Reports*, sterling will tend to depreciate if this policy causes portfolios to be rebalanced away from UK assets. However, there may also be pressures for sterling to appreciate if the policy stimulus is perceived to improve UK relative cyclical prospects. The impact on sterling will, again, depend on how UK developments compare with those in other countries.

Conclusion

This article has discussed sterling's significant depreciation during the financial crisis. Such sharp exchange rate movements can, given the MPC's inflation-targeting remit, have important implications for UK monetary policy if they are associated with changes in the prospects for CPI inflation. Any such revision to inflation prospects will depend on the underlying developments affecting the United Kingdom and foreign economies and hence causing sterling's depreciation.

On balance it appears that a combination of factors, related to the financial crisis, contributed to sterling's depreciation although there is substantial uncertainty about the precise contribution of each factor. There is some evidence that concerns about UK relative cyclical prospects played a role, especially in the first year of the crisis, although this does not appear to account for all of sterling's depreciation. Such adverse cyclical developments may, however, tend to offset some of the upward pressure on UK inflation from higher UK import prices. There are also signs that elevated risk premia contributed to sterling's depreciation, particularly during the period of sterling's sharpest fall in 2008 Q4. Indeed, although the magnitude of such risk premia effects is uncertain, sterling's appreciation in the first half of 2009 could in part simply reflect the realisation of higher required sterling returns. If this were the case, the impact on inflationary pressure in the United Kingdom would not only depend on what underlies the rise in risk premia but also on the horizon over which higher returns are realised. Other shorter-term factors such as carry trades unwinding, illiquid market conditions and international capital flows driven by safe-haven motives also appear to have affected currencies in late 2008, with sterling's appreciation in 2009 coinciding with a dissipation of some of those factors. It is also possible that sterling's depreciation may be part of a more prolonged process of rebalancing of the UK economy, generating a fall in the long-run sustainable real exchange rate, although it is again difficult to obtain direct evidence about this possibility.

(1) The fall was largest against the euro.

Given the uncertainty about the precise sources of sterling's depreciation, the MPC has to apply judgement in assessing the implications of the depreciation. In doing so the MPC considers a broad range of evidence including developments in financial markets and indicators of international economic developments. Moreover, the MPC's policy decisions are affected by the balance of risks to inflation prospects.

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