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Factors Behind Low Long-Term Interest Rates

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Rudiger Ahrend, Pietro Catte and Robert Price**

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ABSTRACT/RÉSUMÉ

Factors behind low long-term interest rates

Long-term bond yields have been low in recent years both in nominal and real terms, and – especially in the United States - they have reacted differently to shifts in monetary and fiscal stances relative to previous cycles. This article examines various possible explanations for this behaviour, such as the effects of changes in monetary policy frameworks on inflation and interest rate expectations; developments in *ex ante* saving-investment balances, and shifts in investors' portfolio preferences (including official reserve accumulation, "petro-dollar" recycling and pension fund demand for longer maturities). The paper finds that it is unlikely that any individual explanation can account for the level and profile of bond yields in recent years, but that an important element has been a compression in term premia, together with shifts in expected short rates. Even though bond yields have started to rise in the early part of 2006, they are unlikely to go back to the levels that prevailed in the 1980s or the early 1990s, as several of the factors that drove them lower are set to persist.

JEL codes: JEL: E43, F2, G11, G15

Keywords: Interest rates; bond yields; term premia; risk premia; neutral rate; inflation expectations; monetary policy; credibility; saving-investment balance; capital flows; current account; pension funds; portfolio preferences; financial markets; bond spreads; reserve accumulation; petro-dollars.

Éléments à l'origine de la faiblesse des taux d'intérêt à long terme

Au cours des années récentes les rendements des obligations à long terme ont été faibles tant en termes nominaux qu'effectifs. Par rapport aux cycles économiques antérieurs, ils ont réagi différemment aux changements de politique monétaire et budgétaire, notamment aux États-Unis. Cet article examine plusieurs explications potentielles de ces comportements comme les effets d'un changement de cadre de la politique monétaire sur l'inflation et les anticipations de taux d'intérêt; l'évolution des soldes *ex ante* d'épargne et d'investissement et les changements de préférence dans les placements des investisseurs (y compris l'accumulation des réserves officielles, le recyclage des « pétrodollars » et la demande des fonds de pension pour des obligations à maturité longue). L'article conclut qu'il est improbable qu'une seule explication puisse rendre compte du niveau et du profil des rendements obligataires au cours des dernières années. Toutefois, un élément clef a été la réduction de la prime de risque, accompagnée par des changements dans les anticipations de taux d'intérêt à court terme. Néanmoins, bien que les rendements des obligations aient commencé à remonter au début de l'année 2006, il est peu vraisemblable qu'ils atteignent les niveaux enregistrés dans les années 1980 et au début des années 1990, dans la mesure où plusieurs des facteurs qui ont entraîné leur déclin sont amenés à perdurer.

Classification JEL : E43, F2, G11, G15

Mots clés : Taux d'intérêt ; rendement des obligations ; prime à terme ; prime de risque ; taux neutre ; anticipation d'inflation ; politique monétaire ; crédibilité ; solde d'épargne et d'investissement ; flux des capitaux ; compte courant ; fonds de pension ; préférences en matière de placements ; marchés financiers ; spread de crédit ; accumulation des réserves ; pétrodollar.

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FACTORS BEHIND LOW LONG-TERM INTEREST RATES

by

Rudiger Ahrend, Pietro Catte and Robert Price¹

1. Introduction and main findings

1. Whether and for what reasons long-term bond yields are low and the chances of them rebounding are hotly debated topics. In May 2006, nominal yields on 10-year government benchmark bonds stood at slightly above 5% in the United States, just under 4% in the euro area and below 2% in Japan. For both the United States and the euro area, this made for real yields of somewhat above 2½ per cent if measured net of core CPI inflation or around 2% measured relative to long-term inflation expectations. In Japan, real rates were above 1½ per cent, but only slightly above zero when factoring in long-term inflation expectations. Three aspects of the behaviour of long rates stand out as requiring explanation:

- Current interest rates, both in nominal and real terms are considerably lower than in the 1980s and the 1990s (Figures 1 and 2). This may reflect a process of reversion to a longer-run norm, perhaps related to the fact that financial markets have gone through an extended period of disinflation, with inflation “surprises” on the downside (Figure 3). Taking a longer view, Figure 4 shows that the 20th century average for 10-year US high-grade corporate and municipal bonds was only slightly above 2½ per cent in real terms. But at the same time, long rates have also apparently failed to react to the deterioration in the structural budget situations in the three major economies, particularly in the United States.²
- Bond yields seem to be low relative to short rates and have been reacting differently to shifts in monetary and fiscal stances relative to previous cycles, particularly in the United States. While they fell during the 2001-2002 downturn in parallel with the marked easing of policy rates, in February 2006 ten-year bonds were still trading at roughly the same level as at the start of monetary tightening in 2004, whereas the intervening increase in policy rates had been 3½ percentage points. Forward rates at a ten year horizon initially fell as short-term interest rates rose, and by early 2006 the yield curve had become virtually flat (Figure 5). In the euro area, also, the yield curve has flattened, albeit in the face of only two intervening increases in policy rates. In Japan, long rates have reacted only very modestly to the improved economic outlook and the end of quantitative easing policy.

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1. The authors are respectively members and head of the Monetary and Fiscal Policy Division of the Economics Department. The views expressed are those of the authors and do not necessarily reflect those of the OECD. They are grateful for helpful comments given by Mike Feiner, Jørgen Elmeskov, Jean-Philippe Cotis, other members of the Economics Department, various members of the OECD Ad Hoc Group of High Level Monetary Experts and Jonathan H. Wright. They have been heavily reliant on statistical assistance given by Laure Meuro, Catherine Lemoine and Debra Bloch and on secretarial assistance from Paula Simonin, Sandra Raymond and Veronica Humi.
 2. Several studies have found that fiscal positions tend to have a significant effect on real long-term interest rates. See Engen and Hubbard (2004) for an overview of the empirical literature. See also Friedman (2005), Orr *et al.* (1995) and Laubach (2003).

Figure 1. Nominal long-term interest rates

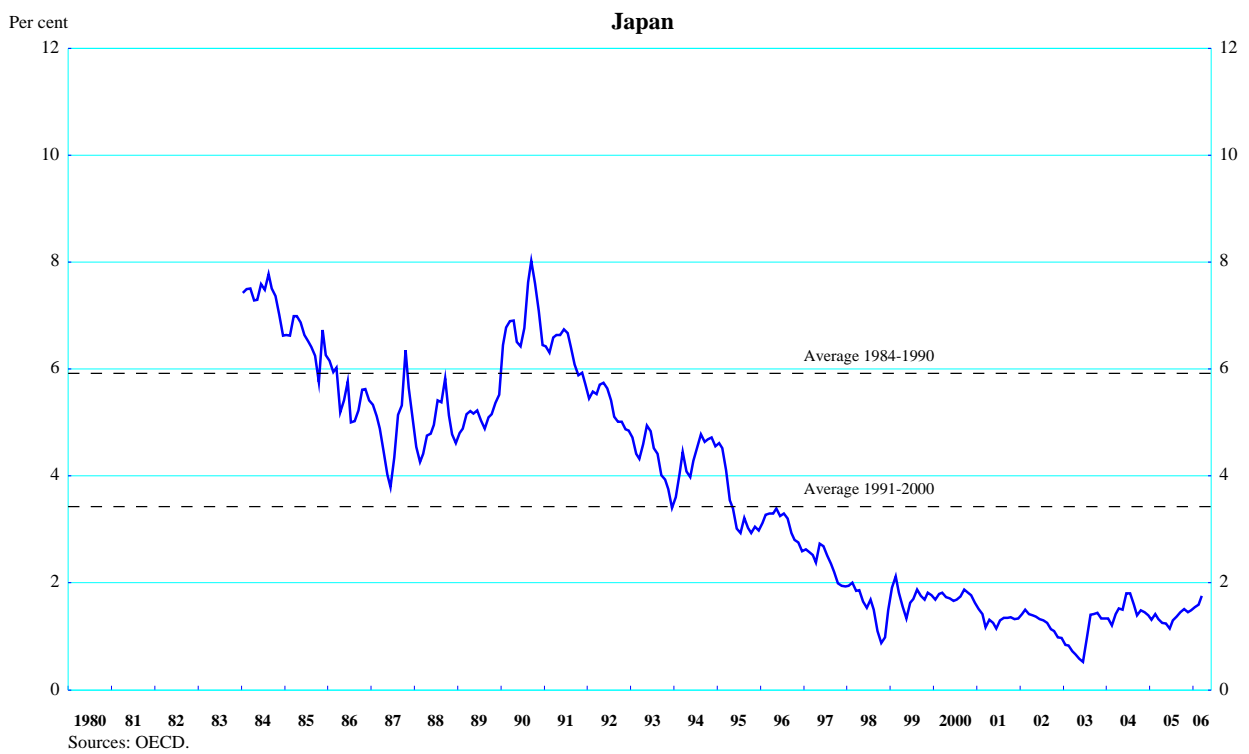
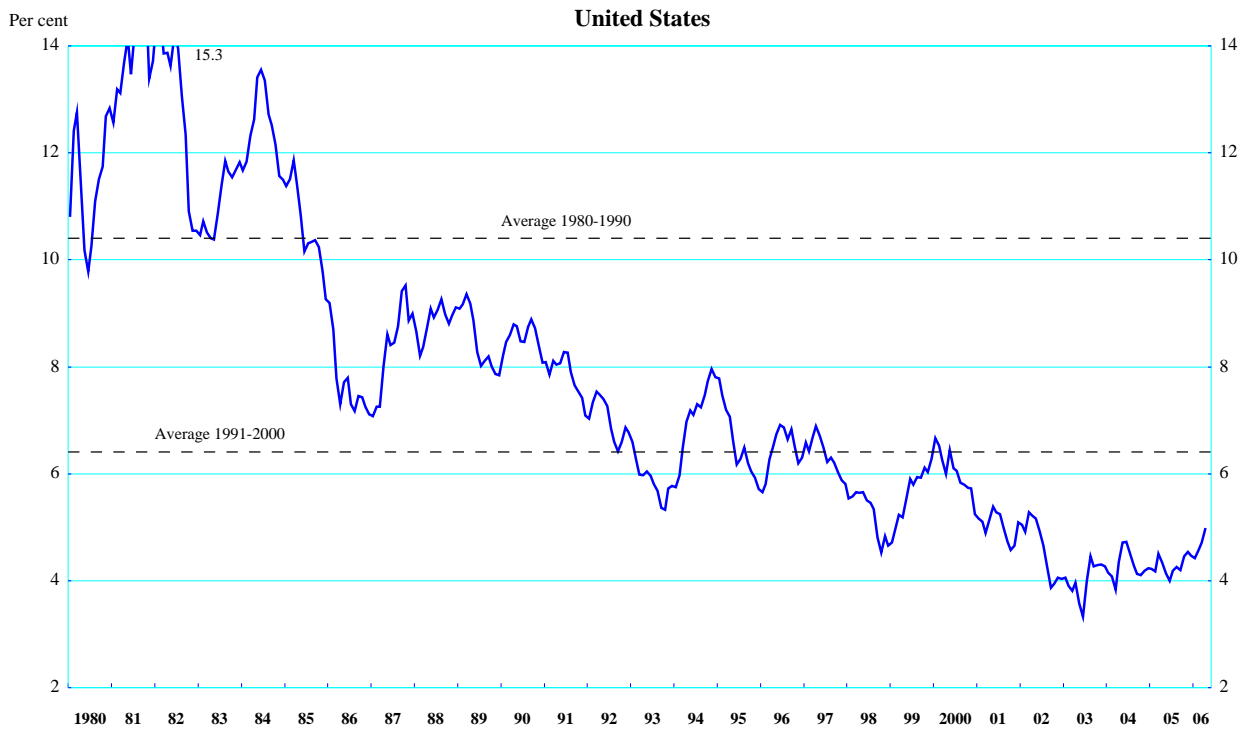


Figure 1 (cont.) Nominal long-term interest rates

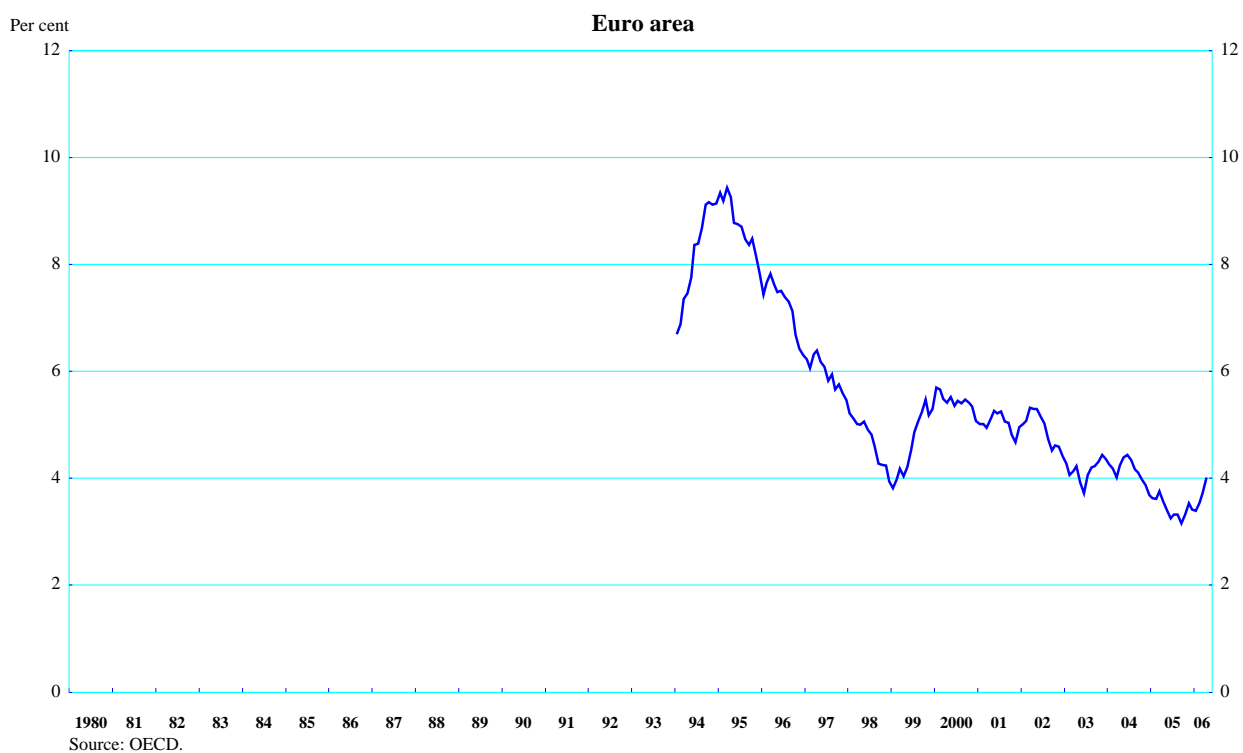
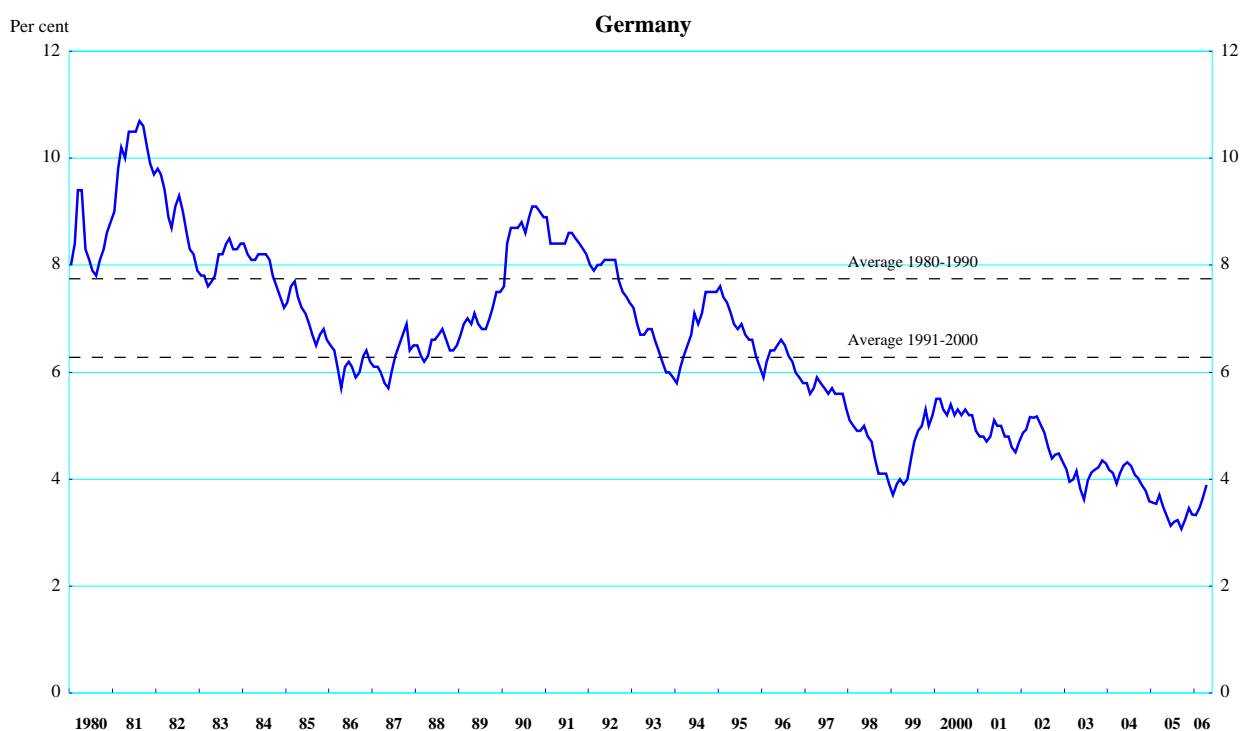
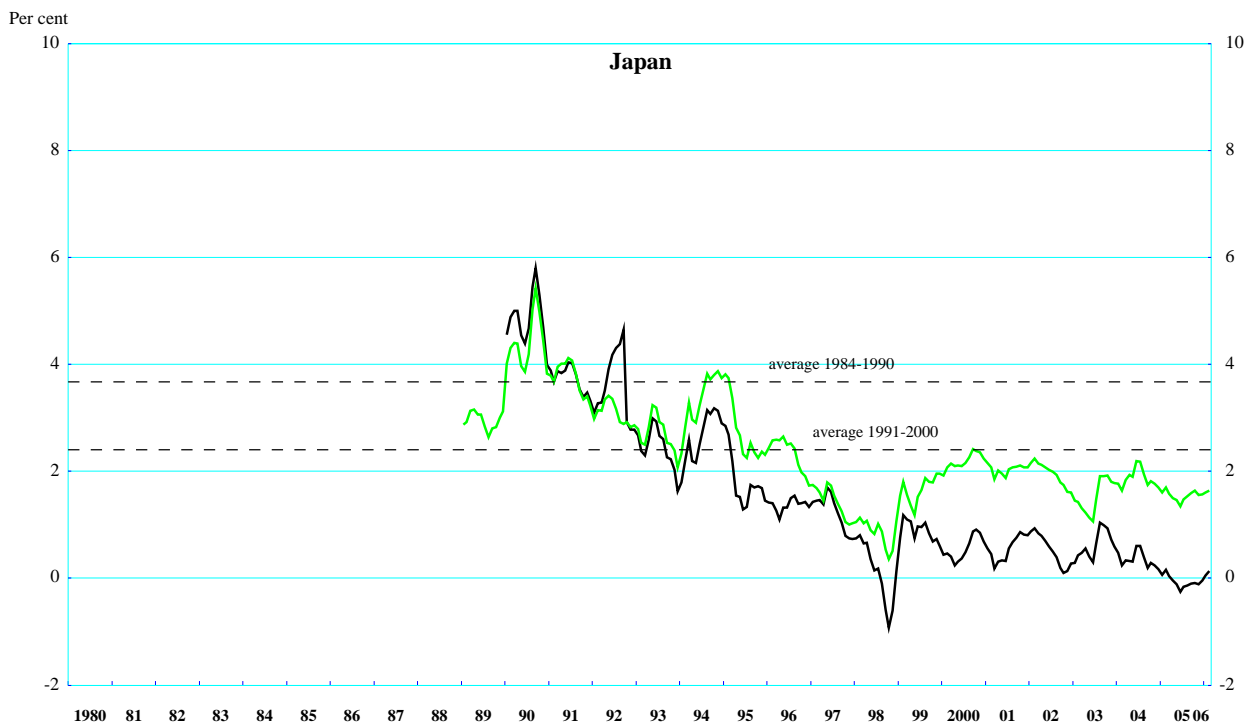
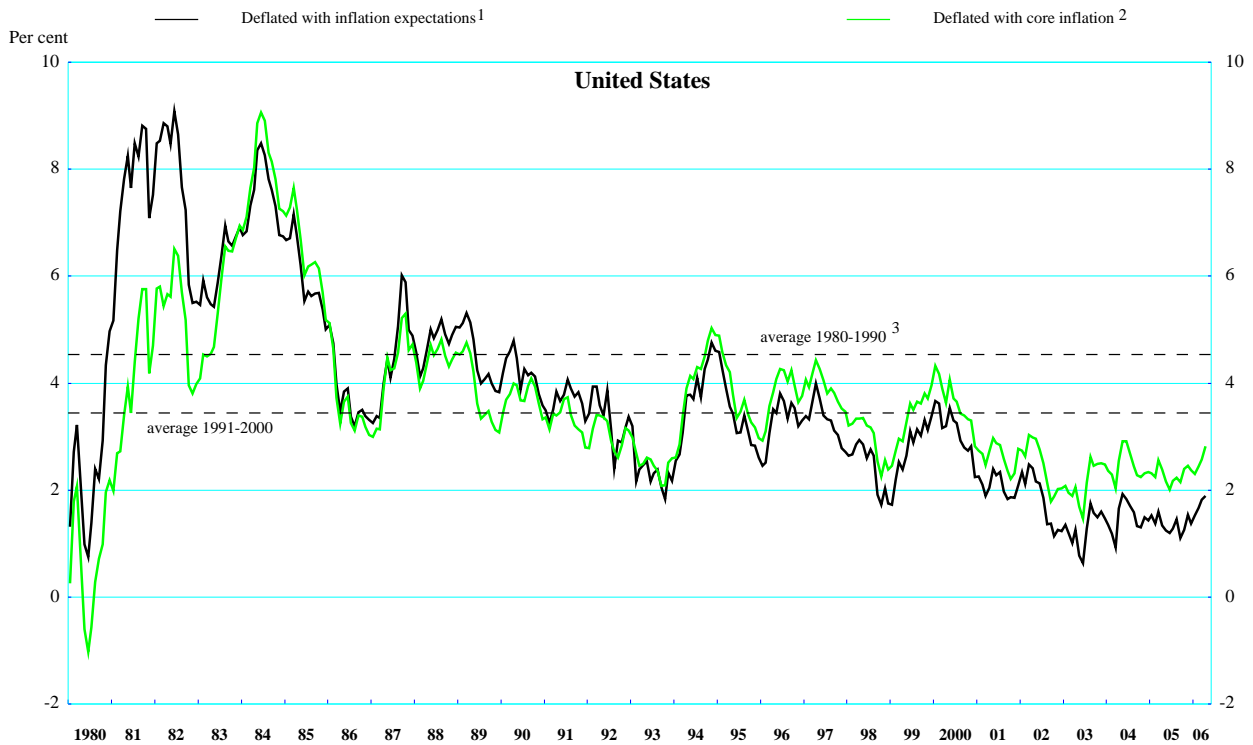
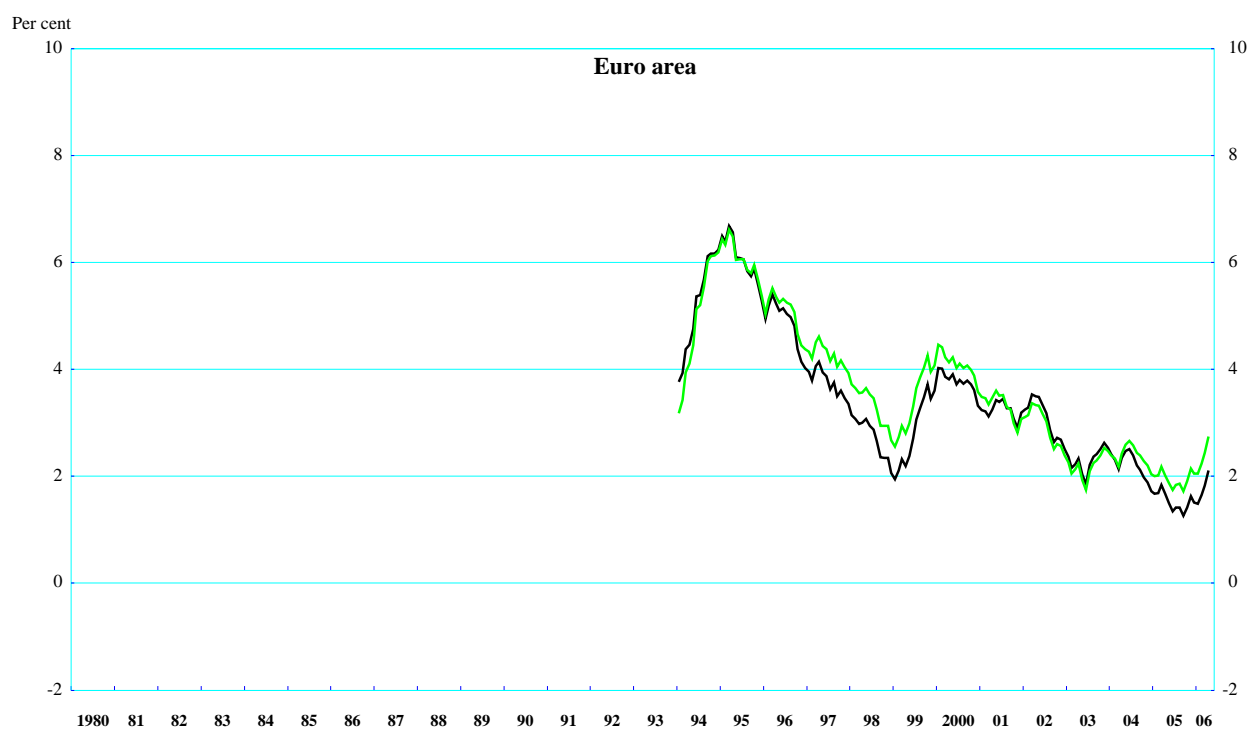
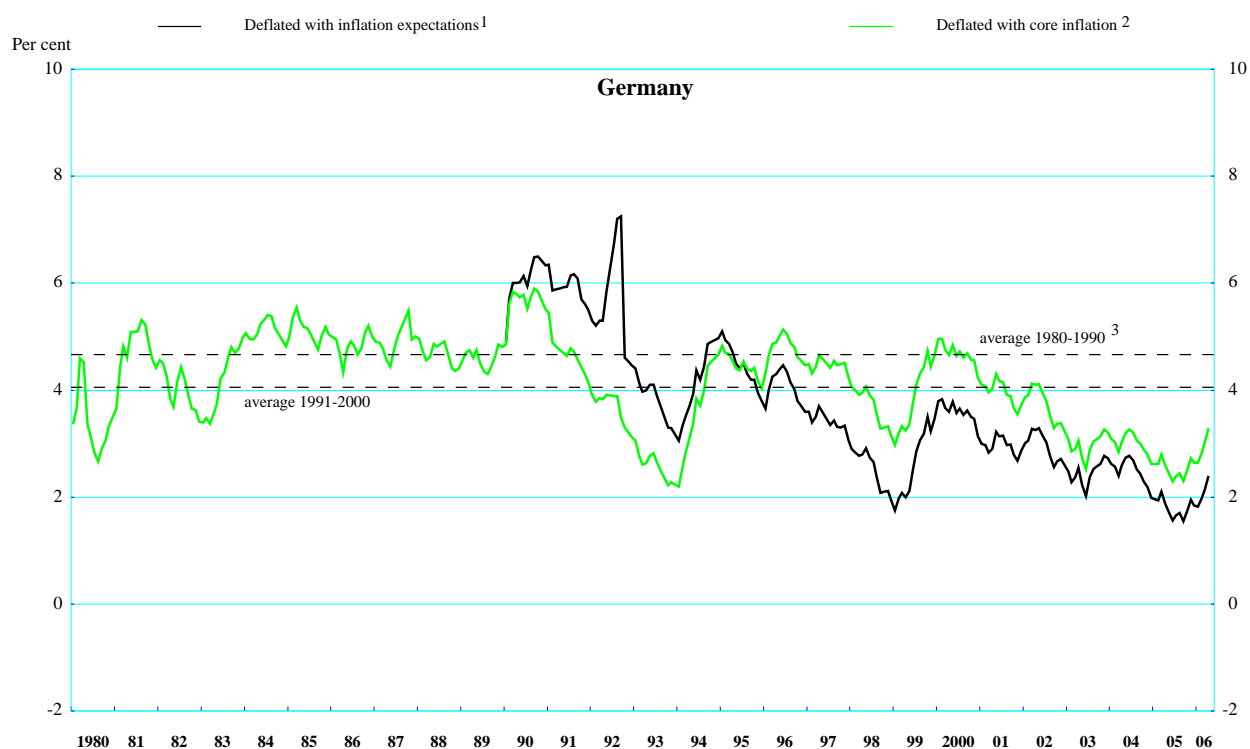


Figure 2. Real long-term interest rates



1. Inflation expectations: for USA, 5-10 years ahead, from University of Michigan, Survey of Consumers; for Japan, 6-10 years ahead, from Consensus Forecast.
 2. Real rate calculated as nominal rate less HP filtered CPI core inflation.
 3. All shown averages are for core inflation deflated real interest rates.
 Source: OECD, University of Michigan Survey of Consumers, Consensus Forecasts.

Figure 2 (cont.) Real long-term interest rates

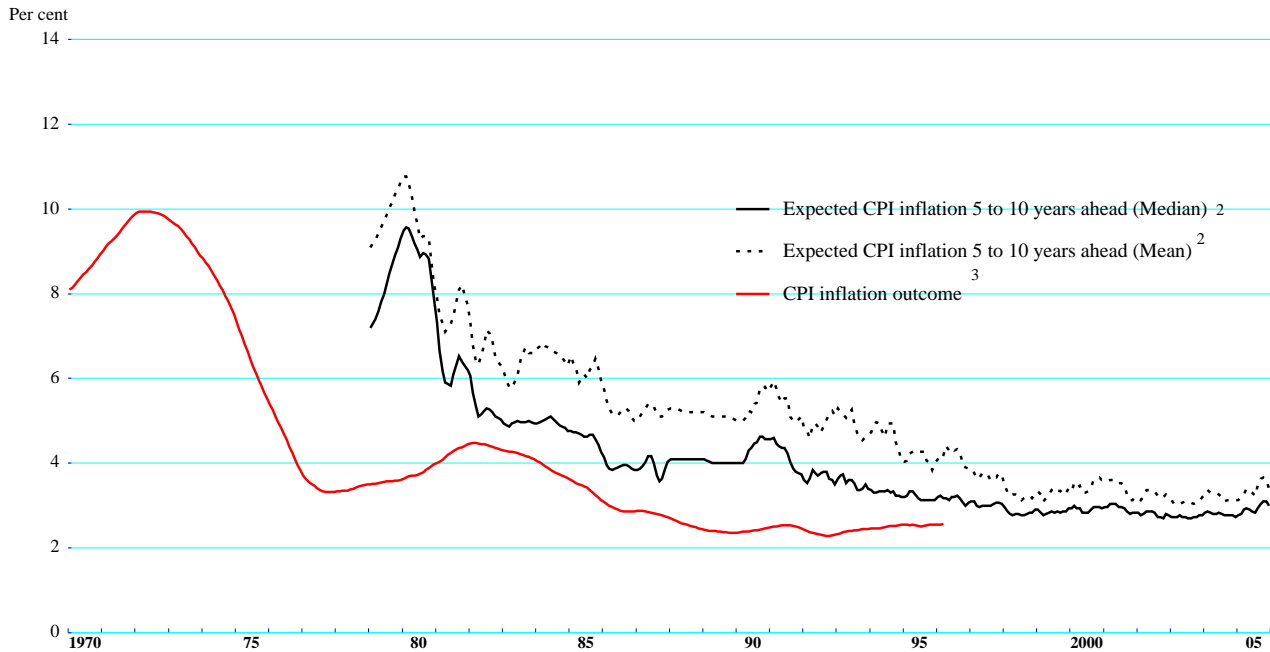
1. Inflation expectations: for Germany and euro area, 6-10 years ahead, from Consensus Forecast.

2. Real rate calculated as nominal rate less HP filtered CPI core inflation.

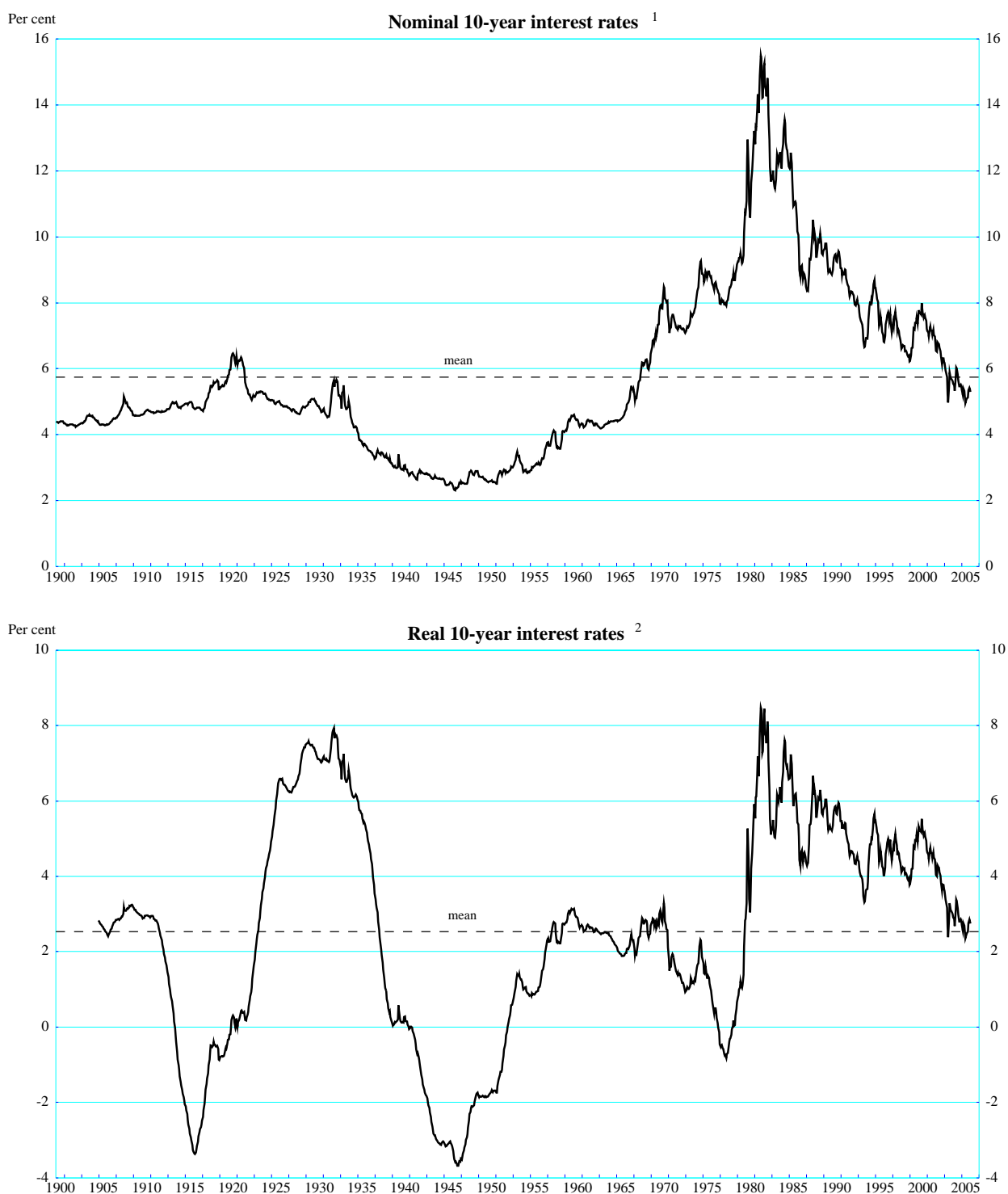
3. All shown averages are for core inflation deflated real interest rates.

Source: OECD, Consensus Forecasts.

Figure 3. Historical long-term inflation expectations versus actual inflation outcomes in the United States ¹



1. This chart examines the degree to which long-term inflation expectations have been validated by reality. For a given year, it shows the expectation of inflation at a 5 to 10 year horizon (compiled from consumer surveys at the time), as well as the inflation that was actually observed during the corresponding future period (i.e. the average inflation rate 5 to 10 years ahead).
 2. 3-month moving average.
 3. 5 years average, 5 years forward.
- Sources : University of Michigan, Survey of Consumers and OECD.

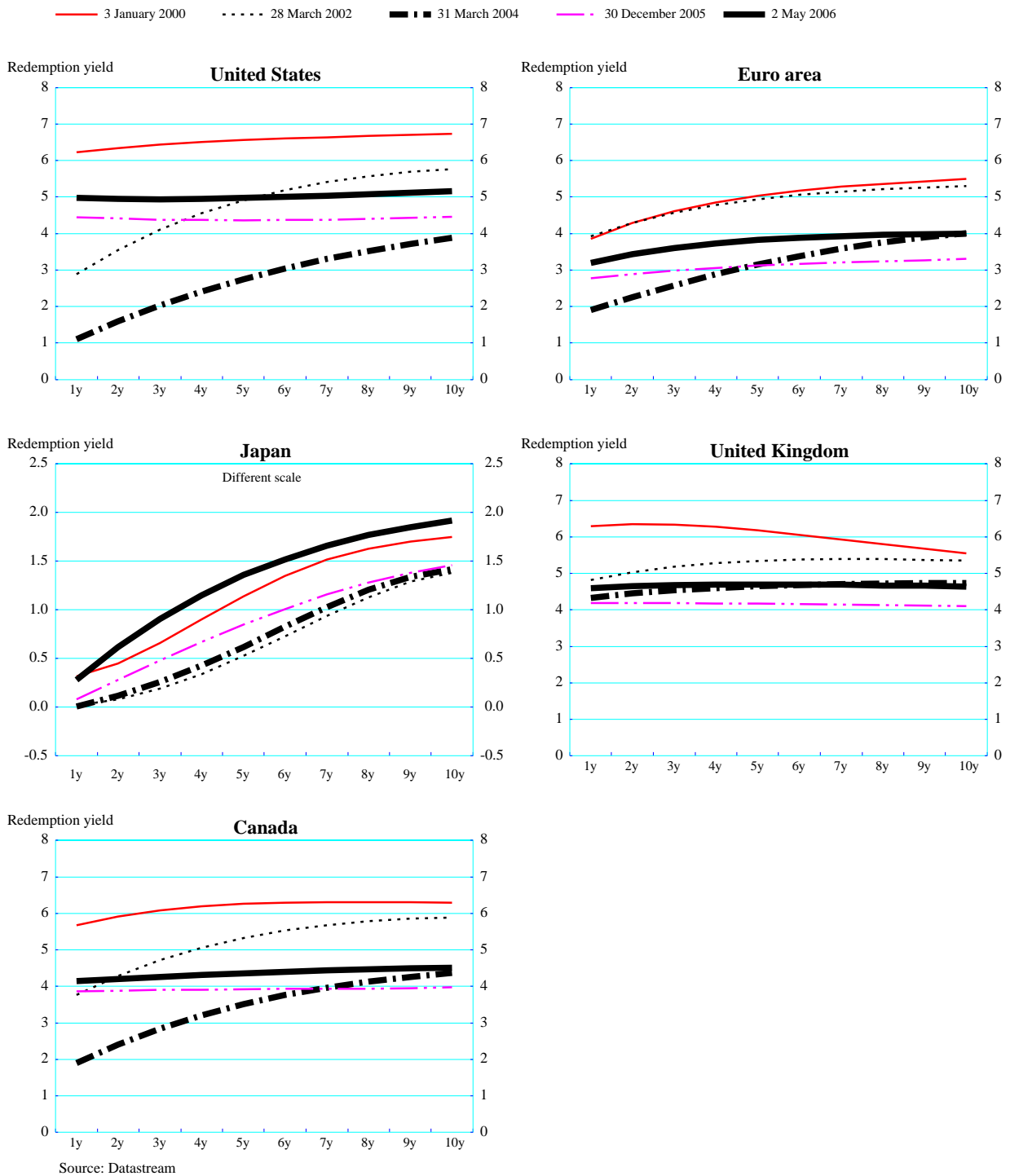
Figure 4. Long-run perspective on long-term interest rates in the United States

1. U.S. Index of Yields of High Grade Corporate and Municipal Bonds.

2. Nominal rates deflated by 10-year moving average of CPI inflation (5 years past and 5 years future inflation).

Sources: National Bureau of Economic Research (NBER), Bureau of Labor Statistics, Datastream.

Figure 5. Yield curves in the major economies



- Real interest rates have been low over almost all classes of long-term bonds. Risk premia on corporate debt declined globally after the stock market crash and have remained below historical averages (Figure 6). Yields on higher risk bonds (such as high-yield or emerging market bonds) are historically low compared with earnings/price ratios, indicating falling risk premia relative to equities (Figure 7).

2. This paper discusses some possible explanations for these three sets of “stylised facts”, partly in order to assess whether the observed trends are likely to persist or may be reversed in the near future. The explanations put forward by various commentators fall into three main groups:

Monetary policy credibility, established over an extended period, may have reduced the level of long-term rates via its impact on inflation expectations and its influence on the perceived “neutral” level of short rates consistent with stable inflation and output growth at potential. Diminished perceived inflation risks, with lower associated volatility of prices and output, may also have contributed to a flattening of the yield curve via a narrowing in term premia, as the potential for large swings in both policy rates and market prices of longer-maturity bonds diminishes.

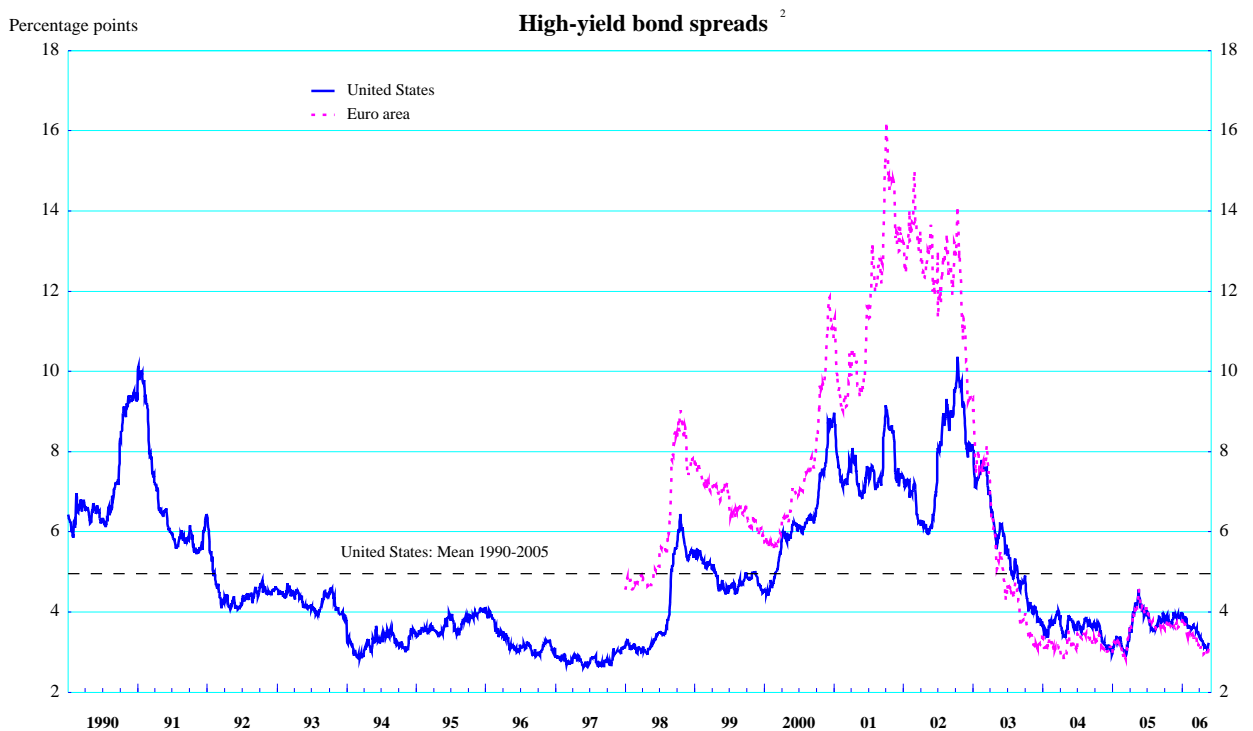
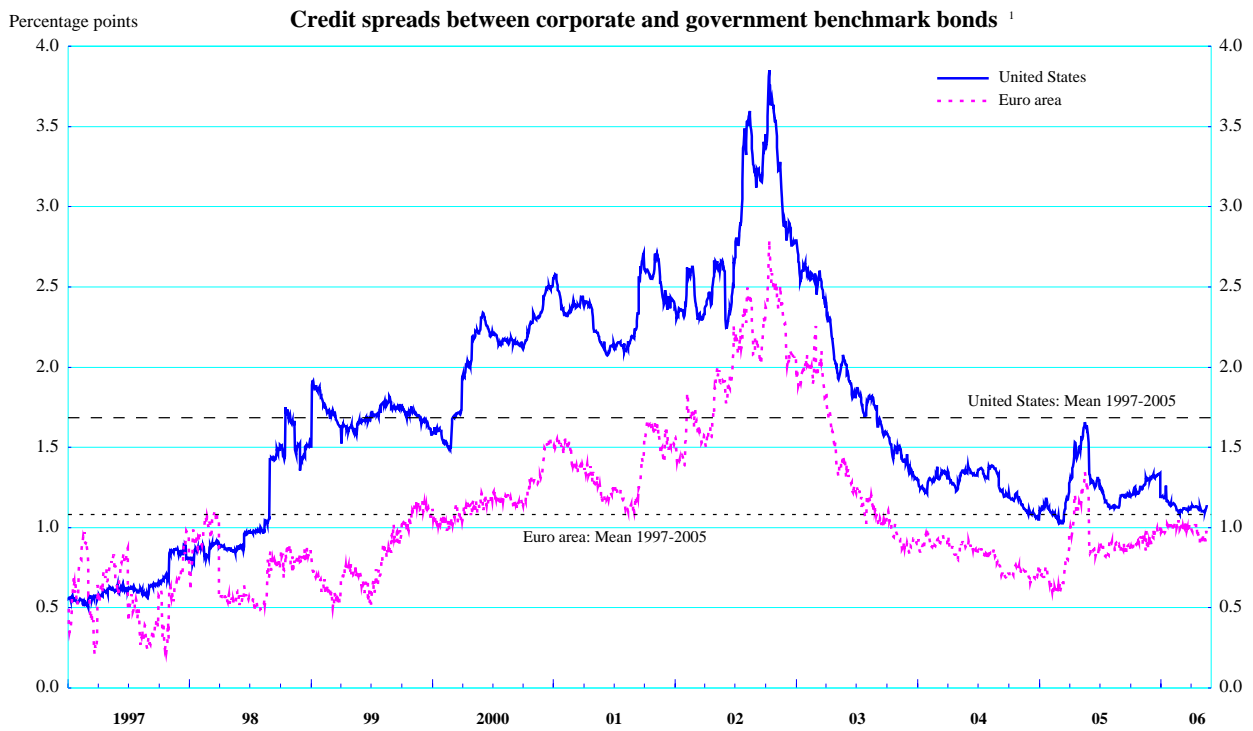
Saving-investment shifts. Within the OECD area -- and spanning the three major regions -- higher corporate saving and reduced investment propensities following the pre-millennium boom may have been major offsetting factors to higher public sector deficits, which based on past behaviour would have been expected to push up long rates. From a global perspective, the shift towards higher *ex ante* net saving has also reflected the behaviour of developing and emerging countries, especially in Asia, since the 1998 crisis -- the emphasis being variously placed on their higher saving propensities or a lack of investment.³

Portfolio shifts Official portfolio flows associated with reserve accumulation among developing and emerging economies -- especially in Asia (particularly China) but also more recently among oil exporters -- may have created a particularly strong demand for US government bonds during the post-2002 period of rising current account imbalances in the United States. Roughly in parallel, in OECD economies more generally, changed risk perceptions in financial markets, triggered by the stock market crash or to population ageing, may have reflected a stronger portfolio preference for bonds over equities -- the need to ensure steady long-term rates of return has been driving a rebalancing of pension fund portfolios, for example. In a situation of low default rates, a focus on yield could also push up the price of inherently riskier bonds.

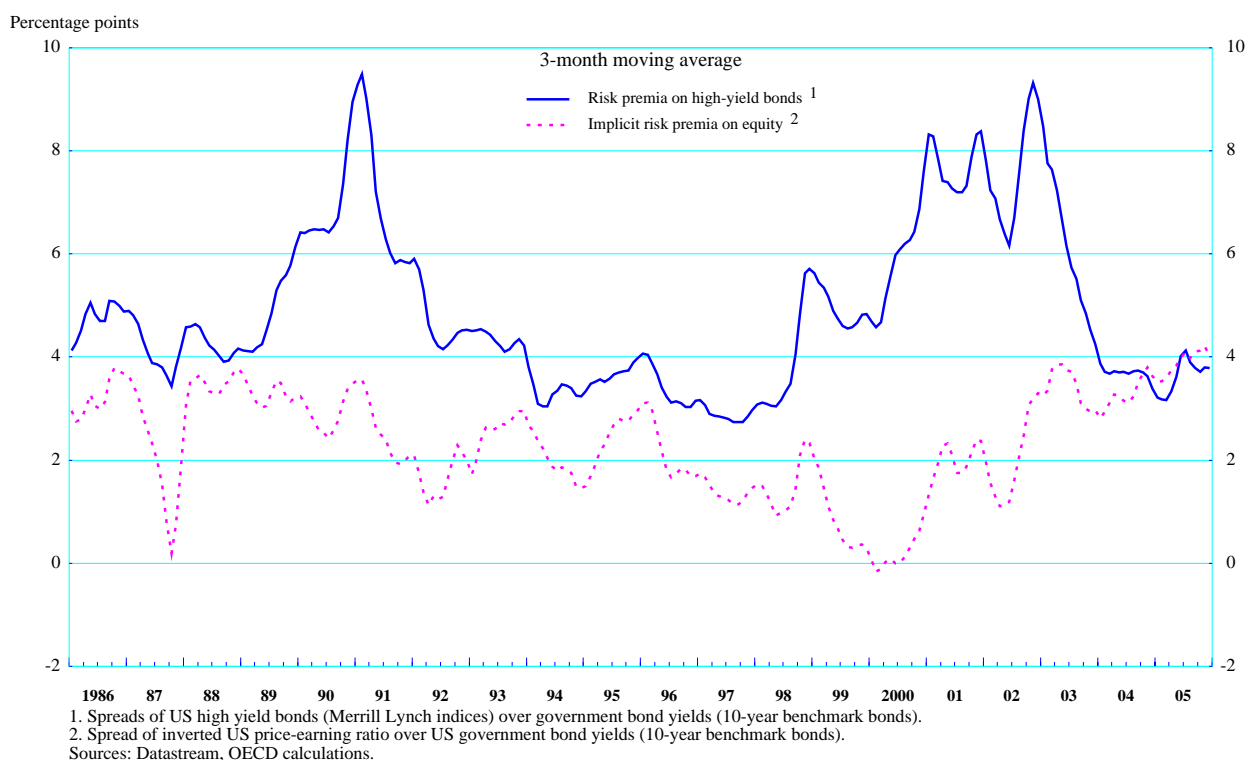
3. Based on the evidence, the paper concludes that it is unlikely that any of the individual explanations proposed above can account for each of the generalised decline in bond yields in recent years, the flatter yield curve and narrower spreads between riskier and riskless assets. These phenomena all have different time profiles. Also, though interest rates trends are determined within a global capital market and have some common characteristics, the puzzles are to some degree internationally differentiated, possibly involving different trends in inflation, growth, currencies and current account imbalances. For example, the situation in the United States may require the most explanation because of the massive rise in fiscal and external imbalances together with a large tightening of policy rates which, *ceteris paribus*, may have been expected to have stronger adverse effects on US long-term rates.

3. See Rajan (2006).

Figure 6. Corporate bond spreads



1. Spreads of high-yield bonds (Merrill Lynch indices) over government bond yields (10-year benchmark bonds).
 2. Merrill Lynch corporate BBB bonds. Spreads based on average yields for 5-7 years and for 7-10 years.
 Source: Datastream.

Figure 7. US high-yield bond risk premia versus implied equity risk premia

4. With these complexities in mind, the conclusions of this study are as follows:

- It corroborates that investors are probably expecting policy rates to be lower on average over the long term as compared with historical averages, which would suggest that “neutral” interest rate levels have indeed come down. At the same time, the perceived volatility of both inflation and interest rates has diminished, reflecting in part a greater confidence in the effectiveness of monetary policies to control inflation expectations, leading investors to demand lower term premia than in the past in order to hold long-term securities. These effects emerged gradually, in terms of a trend decline in long-term rates up to the turn of the century, and have been instrumental in recent years in influencing agents to expect real policy rates to remain significantly lower than past average levels despite the cyclical pick up.
- The study also concludes that a shift toward higher intended net saving at the global level is likely to have played a role in putting downward pressure on equilibrium interest rates. Its main driver has been the substantial shift toward higher net saving in newly-industrialising Asian economies and emerging markets, starting in the late 1990s. In industrialised countries higher corporate saving and more subdued investment as compared with previous cycles have been partly offset by lower household saving. Thus, increased private sector net saving has only partly compensated for the large deterioration in public sector financial balances.

- Official capital flows from Asian countries (and especially China) have been financing a large share of the US current account deficit in recent years. As these substantial and essentially price-inelastic flows have been directed primarily toward US Treasury securities, they are likely to have been one of the factors compressing term premia on that market. There is evidence that reserve accumulation in US dollars has remained large in 2005, even though it may have taken forms that are not reflected in official US statistics. Increased flows from petro-dollar recycling may also have been increasingly gaining in importance with increases in oil prices since 2004.
- In addition, protracted investor aversion to equity risk in the aftermath of the stock market collapse, combined with a search for yield, have been compressing spreads on both corporate and emerging market sovereign bonds, and may also have contributed to generally low yields. Pension funds may also be shifting their asset composition toward bonds as the large baby-boom cohorts approach retirement, but there is only limited evidence so far that this has been happening in a major way in recent years, except perhaps in the United Kingdom.

5. Several of the above-mentioned factors -- including diminished inflation risks, high Asian saving rates and to some extent also official purchases of US securities -- are likely to persist for some time, suggesting that long-term rates could well remain lower than in previous decades. Moreover, other elements -- such as the reallocation in pension fund assets in connection with demographic trends -- may still not have displayed their full effects on market yields. Nevertheless, a reversal of some of the factors that have been keeping long rates low cannot be excluded. In particular, current market expectations about the future course of policy rates may be subject to revision as cyclical slack disappears; investor attitudes toward equity *vs.* bond risk could normalise if volatility increases; and perceptions regarding the long-term sustainability of China's current exchange rate policy may shift. Unfortunately, because the weight of the different explanations of the bond yield decline is not known, not only the timing but also the impact of any such events is hard to quantify.

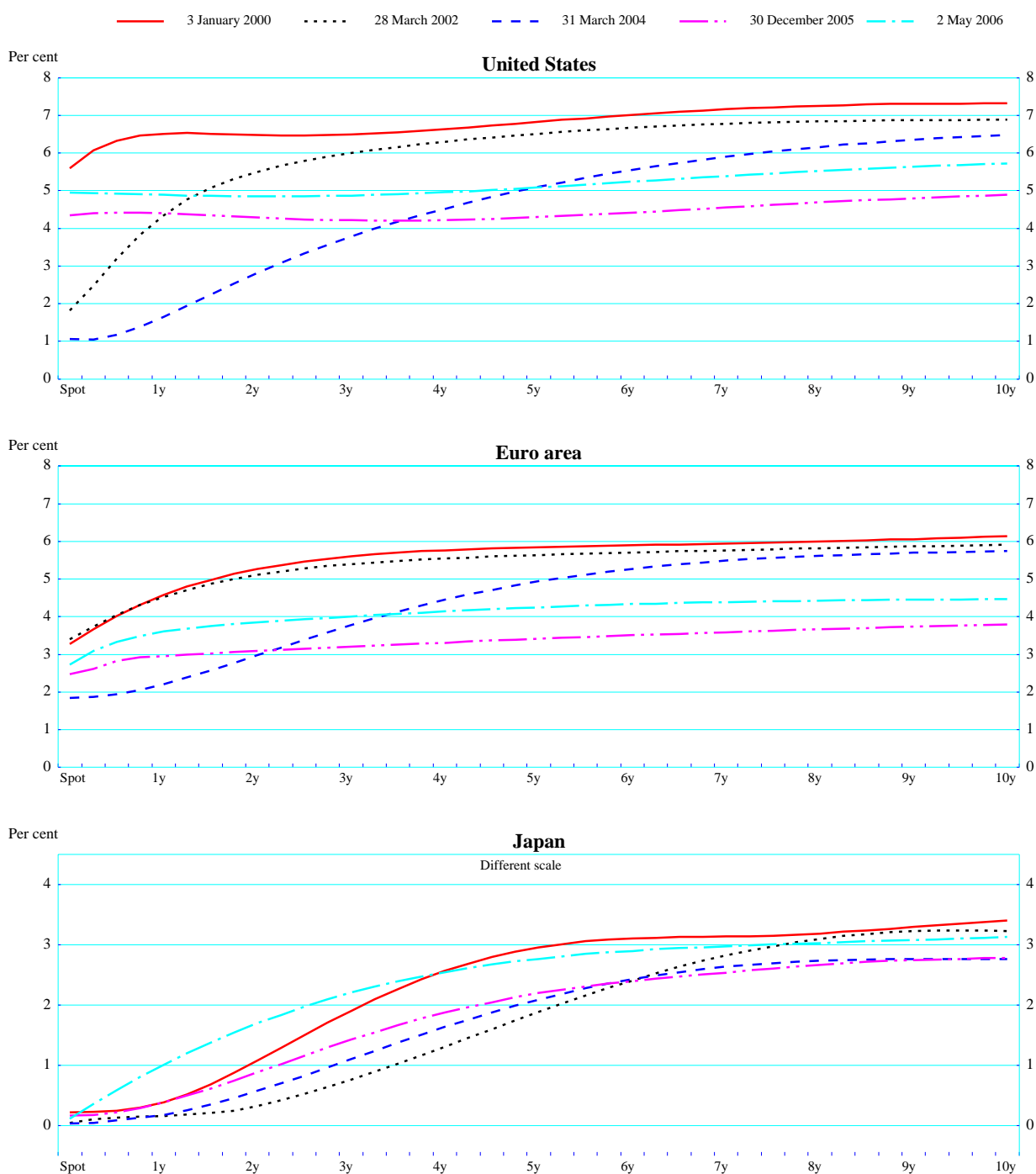
6. The structure of the paper is as follows. The next section briefly outlines some analytical background. The following three sections examine in turn the three main categories of explanations presented above. The last section discusses the different elements that might either contribute to sustain low long-term interest rates or trigger a correction.

2. Decomposing the decline in long-term interest rates: forward rate expectations *vs.* term premia

7. Long-term interest rates can be decomposed into the sum of: *a)* the compounded expected short-term real interest rate during the bond's life; *b)* expected inflation, and *c)* a combination of term, liquidity and credit risk premia connected to the bonds' maturity and issuer and to the characteristics of markets where they are traded (see Box 1). The same decomposition can also in principle be applied to the corresponding sequence of forward rates, which are in many respects more interesting, since they contain information about the expected path of spot rates.⁴ This decomposition, which is often used in analytical models of the yield curve, provides a useful reference for examining how the different determinants of long-term rates discussed in this paper fit together.

4. Zero-coupon yields can be decomposed into a sequence of short-term forward rates, which can be seen as risk-adjusted expected spot rates at the corresponding horizons. If market participants were risk-neutral, the "naïve" version of the expectations hypothesis would hold, and arbitrage would ensure that forward rates exactly reflect expected spot rates. Under risk aversion, the two will differ by a term premium, which can vary over time.

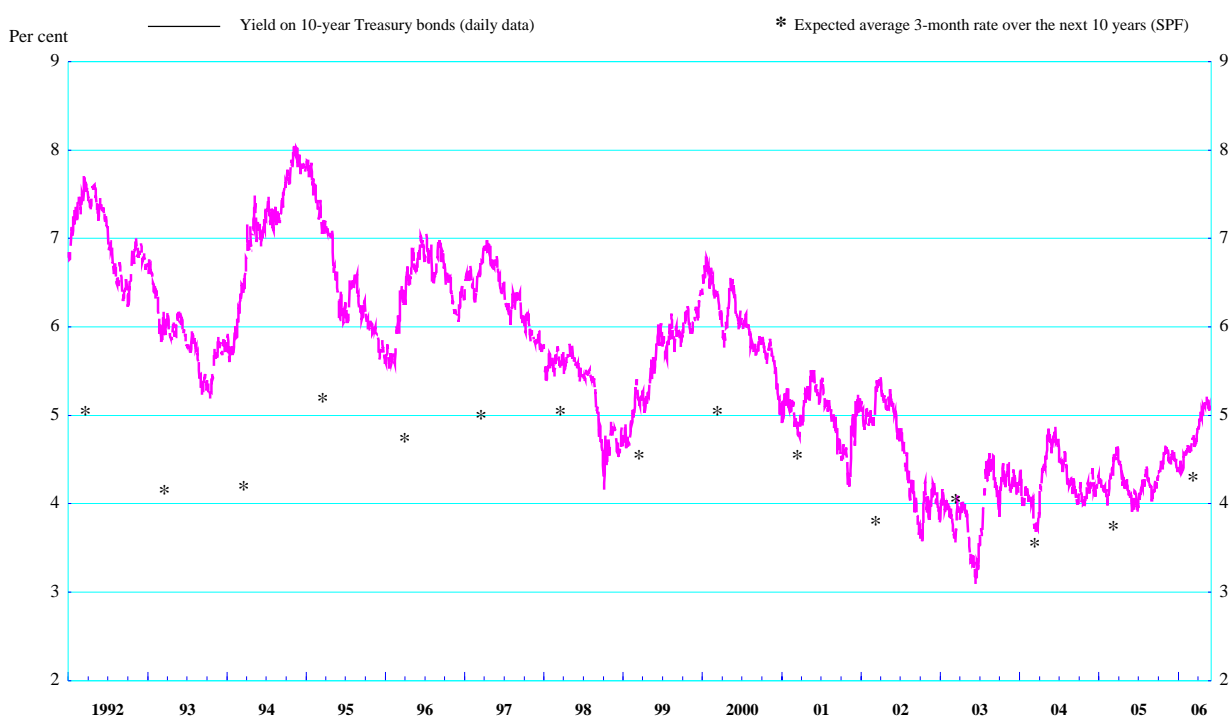
Figure 8. Forward 3-month interest rate curves ¹



1. Interpolated forward 3-month interest rates derived from zero-coupon yield curves.
Sources: US Federal Reserve Board, Bundesbank and Datastream.

8. US forward three-month interest rate curves derived from zero-coupon yields have recently become remarkably flat (Figure 8). In principle, this would be consistent with two interpretations: *either* average policy rates over the next ten years are expected to be around present levels (5%) and premia are very low throughout the maturity spectrum; *or* policy rates are expected to gradually decline from present levels and this is approximately offset by term premia rising with maturity. However, the second scenario does not seem very likely. Evidence from surveys (Figure 9) and market analysts' commentaries suggest that policy rates are expected to remain not far below current levels. Moreover, there are no signs that US financial markets have started to anticipate a recession -- a situation that is usually associated with a flattening and eventually an inversion of the yield curve. For example, based on Consensus forecasts in early 2006, US output growth was expected to continue at close to potential rates.

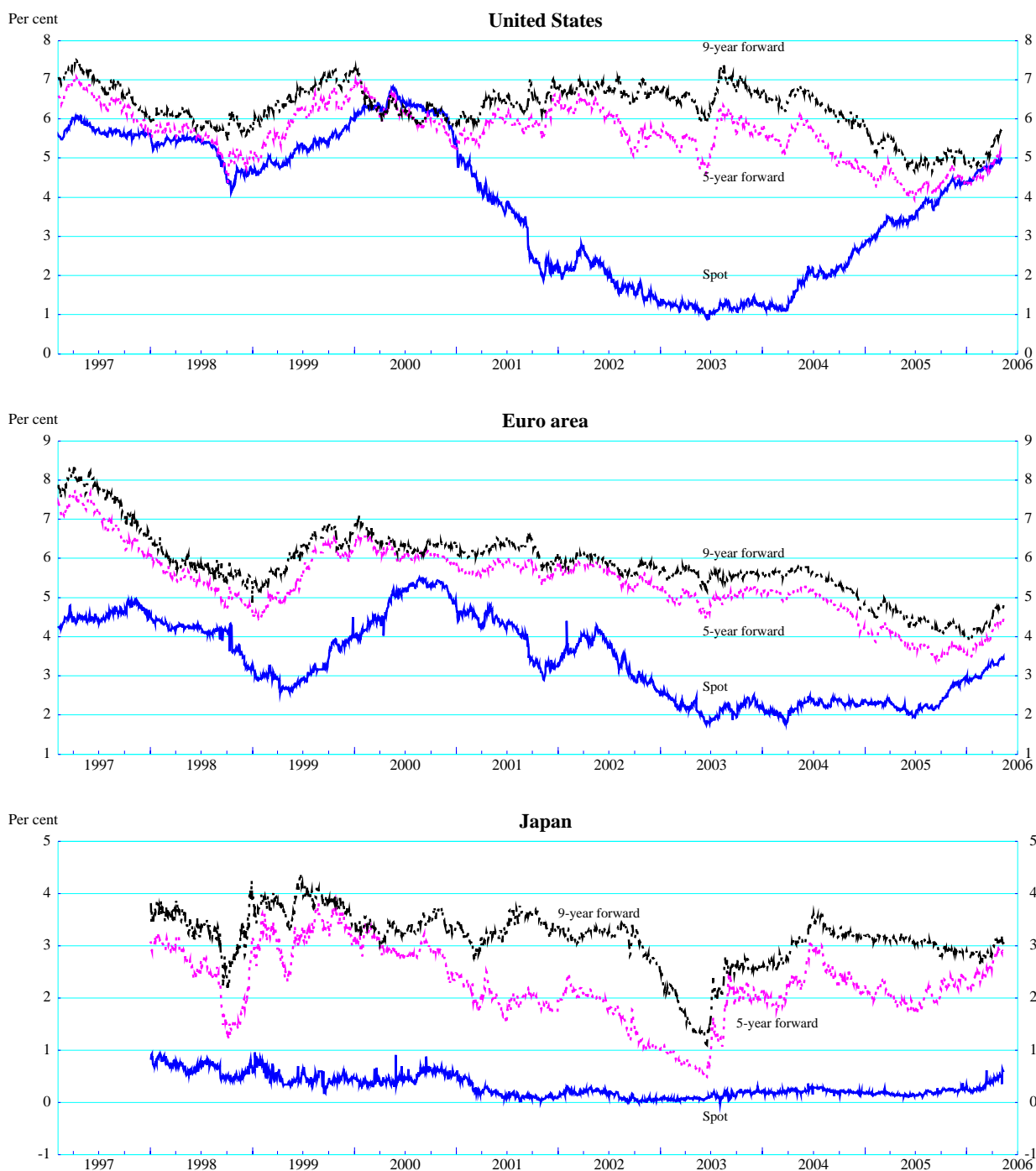
Figure 9. United States: bond yields and expected average short-term rate



Sources: Datastream; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters.

9. Evidence is less clear-cut for the euro area and Japan, but on balance, it is likely that term premia have also declined substantially, although perhaps by less than in the United States. The forward interest rate curve has not become as flat as in the United States, not only at the front end -- which largely reflects the fact that these two economies are only at the start of their respective monetary tightening cycles -- but also in the 5 to 10 year section (Figures 8 and 10). But current long rates, at around 4% in the euro area and below 2% in Japan, could be reconciled with term premia at their historic average levels of 1-1½ per cent only if average short rates over the next ten years were expected to be close to or only slightly above current levels, which seems an unrealistic assumption given the current level of monetary accommodation.

Figure 10. Spot and implied forward 1-year interest rates



1. Forward interest rates at different horizons are derived from zero-coupon yield curves.
Sources: US Federal Reserve Board, Bundesbank and Datastream.

Box 1. The determinants of long-term interest rates according to conventional models

According to financial theory, yields on long-term bonds should reflect the expected future path of short rates, after correcting for term, liquidity and credit risk premia. If these premia could be assumed to be time-invariant, it would be possible to attribute observed movements in market yields to changes in expected short rates, which is the basis of the "expectations hypothesis". However, there is substantial evidence that, in practice, premia vary over time, reflecting changes in perceived underlying risks and investors' willingness to bear them. At each future maturity, the expected short rate can be further decomposed into the expected rate of inflation and an expected real short rate, which can be seen as reflecting *monetary policy* stance, with associated risk premia dependent on volatility.¹ These factors may be affected by shifts in *saving/investment balances* (including budget deficits) which may affect the level and the slope of the yield curve, and by *shifts in portfolio preferences*, which may affect the curvature of the yield curve via their impact on term premia.

Monetary policy expectations can influence the yield curve via the expected path of real policy rates (which responds to the evolution of aggregate demand and inflation) and will be reflected in the short and medium-term portion of the forward curve. If, however, policy rates are expected to return to the neutral level once any cyclical and inflation shocks have run their course and if long-term inflation expectations are well anchored, the far end of the forward curve should in principle move very little over the course of the cycle as long as term and other premia do not vary. If in practice far-out forward rates do shift around, this may reflect changes in long-term inflation expectations, in the expected real neutral rate or in far-out term premia. Of these, the real neutral rate should in principle be essentially determined by the longer-run real equilibrium of the economy, while inflation expectations may vary with perceptions of either the central bank's inflation target or its ability to achieve it change over time. Monetary policy credibility may also affect term premia, to the extent that the expected variability of both inflation and real interest rates affect the degree of uncertainty on asset returns.

The *balance between saving and investment* enters as a fundamental driver of changes in equilibrium real interest rates in most theoretical models. Its underlying determinants include shocks to the marginal productivity of capital, rates of time preference and expected income profiles (including the effect of future taxes), as well as demographic factors related to ageing. Depending on the degree of international capital mobility, the equilibrium real rate will be determined either at the global or at the national level. The empirical literature suggests that although capital mobility has been increasing it is probably not perfect. In this case, shifts in national saving and investment -- reflecting changes in private and/or public sector behaviour -- can affect real interest differentials.² In the limiting case of fully integrated capital markets a global real interest rate is determined by global saving and investment, although some scope for cross-country differentials would still exist if real exchange rates are expected to change over time.

Shifts in investors' portfolio preferences as between different asset categories can affect bond yields via changes in the size of term and other risk premia. Such aggregate shifts may result from changes in investors' perceptions of and/or attitudes toward risk, or they may be the effect of shifts in the distribution of wealth across categories of agents with different risk preferences. For example, an increase in the demand for long-term government bonds relative to the existing supply -- or a shift in the composition of demand toward investors less sensitive to risk -- will normally tend to compress premia. Yields may therefore decline even in the absence of changes in expected inflation and equilibrium real rates, and the yield curve will flatten if the decline in term premia is larger at longer maturities.

1. As in the determination of other asset prices, the relevant expectations and risk perceptions are those of the marginal investor, not the average ones present in the market. Since exogenous shifts in bond demand or supply -- such as, for example, large transactions by official authorities -- can move the position of the marginal investor, they may affect market prices even though expectations and risk perceptions have not changed. To the extent that the empirical decomposition of bond yields is based on indicators of average rather than marginal expectations (as in the case of surveys), the effects of such demand or supply shifts will tend to be attributed to changes in term premia, which are calculated as a residual. For a discussion of these issues, see Mishkin (1981) and Kim and Orphanides (2005).
2. Fiscal imbalances, as reflected in large budget deficits and/or a high public debt, may also affect interest rates via higher term or default premia on public debt. Higher term premia may for example result if an unsustainable fiscal situation increases inflation expectations and policy uncertainty.

10. Recent econometric research at the Federal Reserve seems to confirm the conclusion that US term premia have fallen. Modern term structure theory states that the information value of the forward curve for forecasting future short rates depends on the correct “loading” of level, slope and curvature factors.⁵ Applying this three-factor model to extract the information content of the ten-year instantaneous forward rate, and incorporating *Blue Chip* survey data on expected short rates and similar professional forecasters data on inflation expectations, the Fed finding is that term premia have shown a clear declining trend since the early 1990s, while oscillating considerably over time.⁶ They have come down particularly sharply since mid-2004. Lower expected short-term rates and term premia both contributed to the decline in 10-year forward rates in the United States from 1990, but the most recent decline -- between June 2004 and July 2005 -- has essentially been due to a fall in the term premium alone.

11. In Figure 11 the same three-factor model is applied to the 9-year ahead one-year forward rate.⁷ While, based on historical averages, the “normal” term premia for most industrialised countries would tend to be of the order of 1 to 1½ percentage points for 10-year yields, with differences across countries related mainly to the size of budget deficits, based on these estimates, the term premium on 10-year yields had fallen to less than ½ of a percentage point at the end of 2005.⁸ Again, it is evident that the fall in long-horizon forward rates has been due, over an extended period, to a trend decline in both expected short-term interest rates and lower term premia⁹, but their further decline since 2000 can be attributed only to a limited extent to lower expected short rates. It is mainly -- and particularly since mid-2004 in the United States -- due to a substantial decline in term premia.

3. The role of monetary policy factors

12. Before analysing the factors behind the more recent decline in term premia in more depth, it is worth exploring the fundamental factors behind the longer-run downward trend in expected short rates and premia. While the concept of “*neutral*” or *equilibrium real interest rate* involves a substantial amount of judgment, it may prove to be a convenient starting point for understanding this trend, together with declining inflation expectations and associated volatility.

5. For a survey of the role of factor models of the term structure in forecasting short rates, and hence term premia, see Diebold, Piazzesi and Rudebusch (2005). The three factors roughly correspond to level, slope and curvature and are constructed (latent) variables; in economic terms they relate, respectively, to longer-term influences (inflation and growth), which affect yields of all maturities; business-cycle effects which affect mainly shorter maturities and are mean-reverting as the central bank fulfils its dual mandate to maintain price stability and stabilise the real economy; and more transient factors which are difficult to relate to systematic economic influences: see, for instance Duffee (2000).

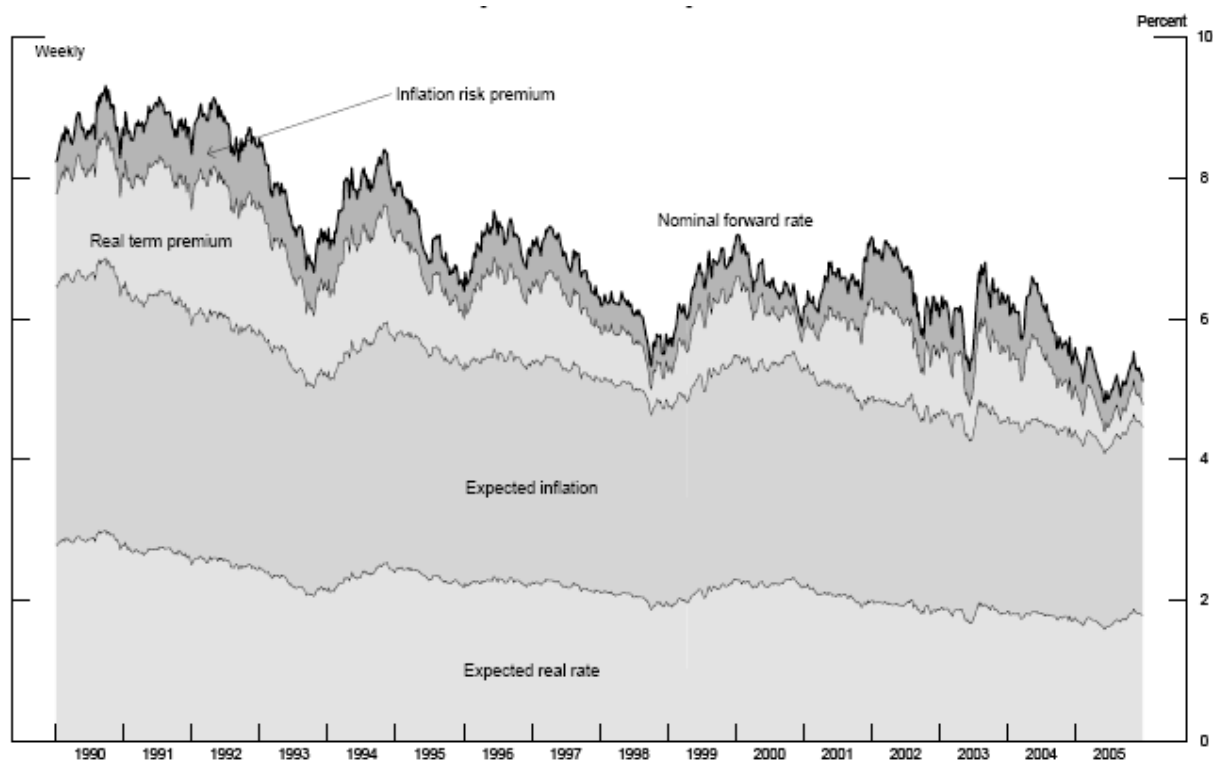
6. See Kim and Wright (2005) and Kim and Orphanides (2005). The forward term premium is derived as the difference between the forward rate and the expected future short rate -- as calculated from the three factor loadings.

7. Federal Reserve Board calculations, based on the same method as described in Kim and Wright (2005).

8. The term premium on 10-year yields should be normally lower than that on long-horizon forward rates (shown in Figure 8), since it is an average of term premia on forward rates over horizons up to ten years.

9. Diebold *et al.* (2004) give time series plots of the three factors showing that the first (level) factor was most responsible. In general, until recently, the first two principal components (level and slope) accounted for almost all variations in the term structure (see Diebold *et al.*, 2005).

Figure 11. Decomposition of one-year forward rate/ nine years ahead using a three-factor no-arbitrage model



Source: Federal Reserve Board, based on methodology of Kim and Wright (2005).

13. Analysis conducted both at the Federal Reserve and the OECD suggests that in the US case the neutral real federal funds rate -- the rate consistent with output growth at potential and stable inflation -- has trended down to just above 2%, after having fluctuated between 2 and 5% since the 1960s.¹⁰ Euro-area studies suggest that since the mid-1990s, the neutral repo rate has also come down, to around 1½-2% in real terms. Though considerable uncertainty attaches to estimates of neutral rate levels, the evidence suggests a gradual downward shift throughout the 1990s, which may have continued in recent years.

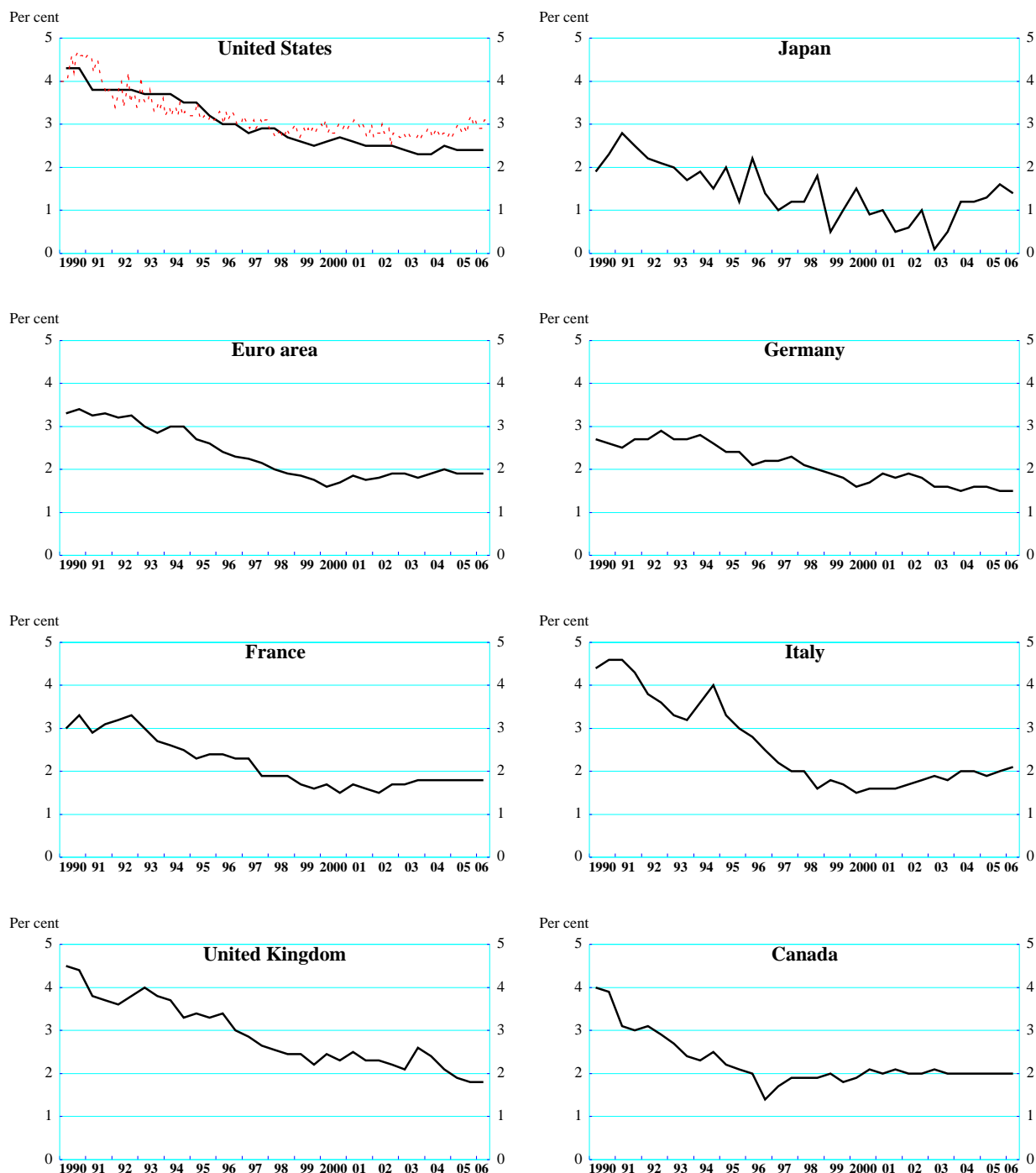
14. Increased monetary policy credibility, evident OECD-wide in low and well-anchored inflation expectations, has probably contributed to reducing the expected average level of policy rates¹¹ as well as to compressing term premia. The evidence from surveys among professional forecasters suggests that long-term expected inflation declined gradually throughout the 1990s, but has moved little since 2000, at least in the United States and the euro area -- a different time pattern is found in Japan (Figure 12). Inflation expectations as implied by yield differentials between nominal and index-linked bonds, on the other hand, would seem to show a rise between 2000 and 2004 in both the United States and the euro area (Figure 13). However, these indicators are notoriously volatile and may be distorted by specific market conditions. In particular, as markets for long-term index-linked bonds are not very deep, differentials may have been affected by a large increase in the demand for those assets by institutional investors in recent years (see Section 5 below).

10. See Laubach and Williams (2003), Wu (2005) and *OECD Economic Outlook 76*, December 2004, pp. 24-25.

11. In principle, lower expected average short rates could be seen as resulting from either a fall in the “neutral” rate or from the expectation of a skewed expected distribution, *i.e.* an expectation that policy rates will be below neutral most of the time.

Figure 12. Survey-based indicators of long-term inflation expectations

— Consensus Forecasts ¹
 - - - University of Michigan Survey of Consumers ²

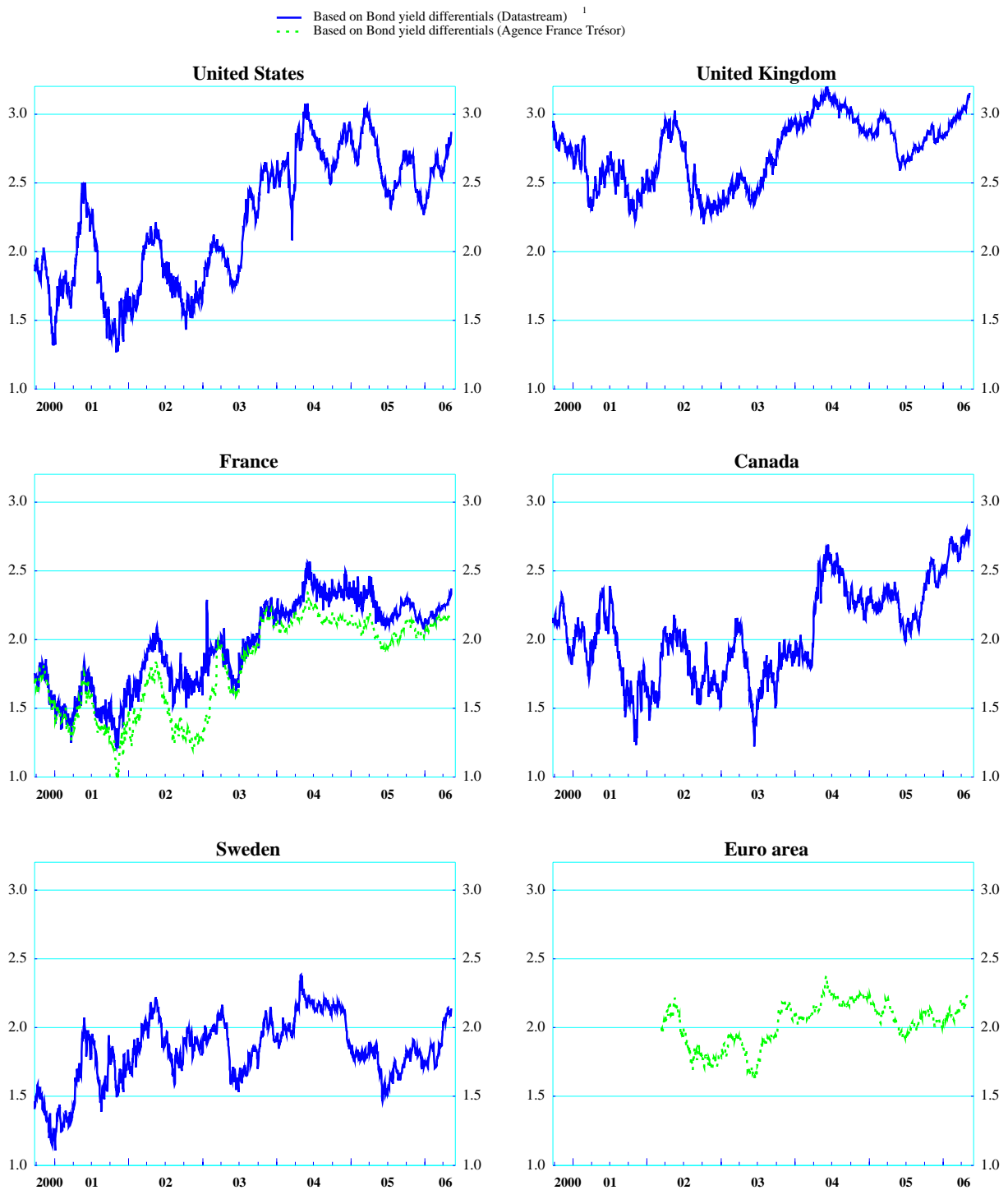


1. Expected CPI inflation 6 to 10 years ahead (mean forecast).

2. Expected CPI inflation 5 to 10 years ahead (median forecast).

Sources : Consensus Forecasts, University of Michigan Survey of Consumers.

Figure 13. Financial market derived proxies for long-term expected inflation



1. Expected inflation implied by the yield differential between government benchmark bonds and inflation-indexed bonds. Government bond yields are for 10-year benchmark bonds. Inflation linked: Merrill Lynch government inflation linked bonds indices. Sources: Datastream, Agence France Trésor.

15. Together with expected inflation, long-term inflation uncertainty also seems to have declined over the last decade-and-a-half (Figure 14, upper panel),¹² and with it presumably market perceptions of the need for large oscillations of policy rates. Some proxies for interest rate uncertainty, such as the dispersion of individual forecasts in surveys among professional forecasters, do in fact show a decline in the 1990s and then again since 2004, after a temporary increase after 2000 (Figure 14, lower panel). As the (perceived) potential for large swings in market prices of long-term bonds has diminished, so probably have the actual and perceived risk of holding them, and hence inflation risk premia (Figure 11). Taking the recent period of rising oil prices, the effect of increased confidence in monetary authorities is most evident in the steadiness of long-term inflation expectations to adverse short-term inflation developments. However, confidence effects are likely to have been felt gradually, and are unlikely to have been a major driving factor in the most recent decline in term premia since the beginning of the tightening-cycle in mid-2004.¹³

16. Rather, there has been a lack of fundamental surprises which could have affected medium-term investor behaviour. A remarkable feature of the recent behaviour of US bond markets has been the muted reaction to the start of policy tightening since mid-2004, in sharp contrast with what happened in 1994. The more effective use by monetary authorities of communication policies to shape public expectations about the future course of interest rates and to influence bond-market responses could have been a factor here, especially the use of explicit announcements regarding the future path of policy rates.¹⁴ A protracted period of low policy interest rates and an effort to guide market expectations through the process of returning the stance to neutral seems not only to have helped reduce uncertainty on future policies, but may also have had a durable effect on market perceptions of what is to be regarded as the “normal” policy stance.

4. Global saving-investment behaviour

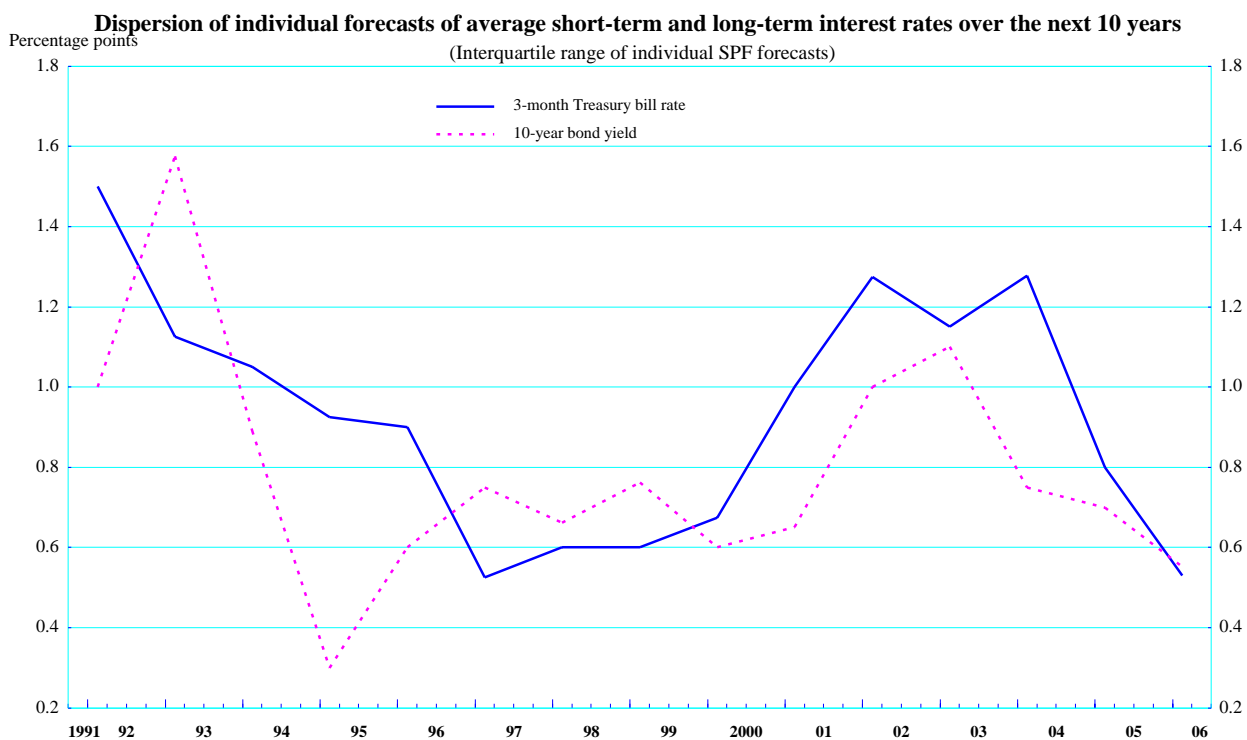
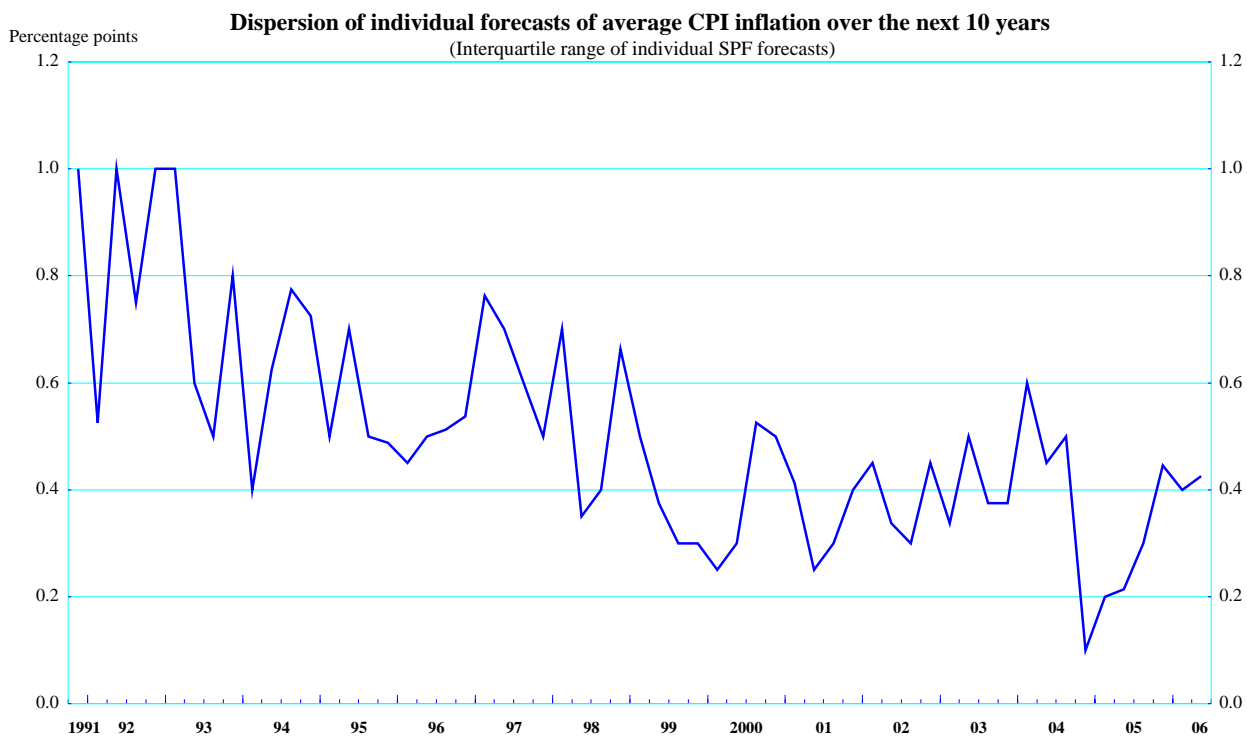
17. Long-term rates may also be looked at from the viewpoint of imbalances between intended saving and investment. It has been argued that, notwithstanding sharp increases in public-sector dissaving, global saving and investment propensities have shifted toward *ex ante* global surplus saving, translating into a world-wide reduction in long-term yields. “Intended” saving and investment are hard to quantify, however, since observed magnitudes are the product of income and interest-rate changes as well as discretionary decisions. With that in mind, this section first looks at sectoral saving and investment behaviour in the major OECD economies and then at the evidence for a so-called “global saving glut” arising because of saving behaviour in Asian economies since the crisis of 1997, and more recently, in oil-producing economies.

12. The figure shows the dispersion of individual forecasts of long-term average inflation in the Philadelphia Fed’s *Survey of Professional Forecasters*, which can be regarded as an indirect measure of inflation uncertainty. The dispersion declined during the 1990s, but has not fallen further since 2000.

13. Empirical research suggests that, bond yields are driven to a significant extent by inflation volatility. See, for example, Ang *et al.* (2005) who find, using a no-arbitrage term structure model that 61% of the variance of the 5-year yield can be attributed to movements in inflation and GDP growth and over 95% of the variance in the 5-year term spread is due to time-varying inflation risk.

14. Bernanke *et al.* (2004).

Figure 14. United States: measures of uncertainty on long-term average inflation and interest rate levels



Source: Federal Reserve Bank of Philadelphia Survey of Professional Forecasters.

Shifts in the saving-investment balance in industrialised countries¹⁵

18. Saving and investment developments in industrialised countries do not seem to provide an explanation for low bond yields. On the saving side, a sizeable upward shift in corporate net saving as a share of gross operating surplus and GDP has been partly offset by lower household saving, with exceptions among the euro-area economies (Figures 15 and 16). But the net increase in private sector saving has been swamped by the deterioration of public sector financial balance, especially in the United States, but also in Japan, the euro area and the United Kingdom. Overall, gross saving in the G7 countries declined from levels well above 20% of GDP in the 1970s and 1980s to record lows of around 16% of GDP in 2004. On the investment side, a lower business fixed investment ratio¹⁶ has been offset only in part by buoyant residential investment (Figures 17 and 18). Thus, in *ex post* terms, the private sector offset to the deterioration in government saving has been significant but limited. At best, private sector saving-investment shifts -- if they were expected to persist -- could partly explain why the large deterioration in government accounts, particularly in the United States, has not had the expected upward effect on bond rates.

19. Shifts in private saving and investment have been driven in part by cyclical factors, which can be expected to be reversed in coming years, but have also reflected some longer-term trends. Housing market booms in several countries have contributed to depressing household saving and to boosting housing investment. The increase in corporate saving has been driven in large part by rising corporate profitability, which is partly cyclical but has also reflected the trend decline in the wage share connected to competition from labour-intensive emerging economies. As for low corporate fixed investment, its sluggish recovery in the current upswing has been attributed in part to the overhang from earlier over-investment in the United States and perhaps to the too timid implementation of structural reforms in the euro area and Japan; however, investment ratios in industrialised countries have been on a declining trend since the 1980s, mainly as a result of the trend decline in the relative price of investment goods.¹⁷

A structural shift in the world's saving-investment balance: the role of Asia and oil-exporters

20. Some observers have emphasised the role of excess saving in emerging market and developing countries as a force behind low interest rates.¹⁸ Mirroring developments in industrialised economies emerging market and developing countries have, in aggregate, seen a very strong increase in saving, displayed by widening current account surpluses. Two-thirds of the increase in the US current account deficit since 1997 (the last time that it was below 3% of GDP) has been counterbalanced by higher external surpluses in emerging Asia (mainly China) and, more recently, in oil-exporting economies. In aggregate, developing countries have turned from borrowers on international capital markets to large net lenders (Figure 19, lower-right panel).

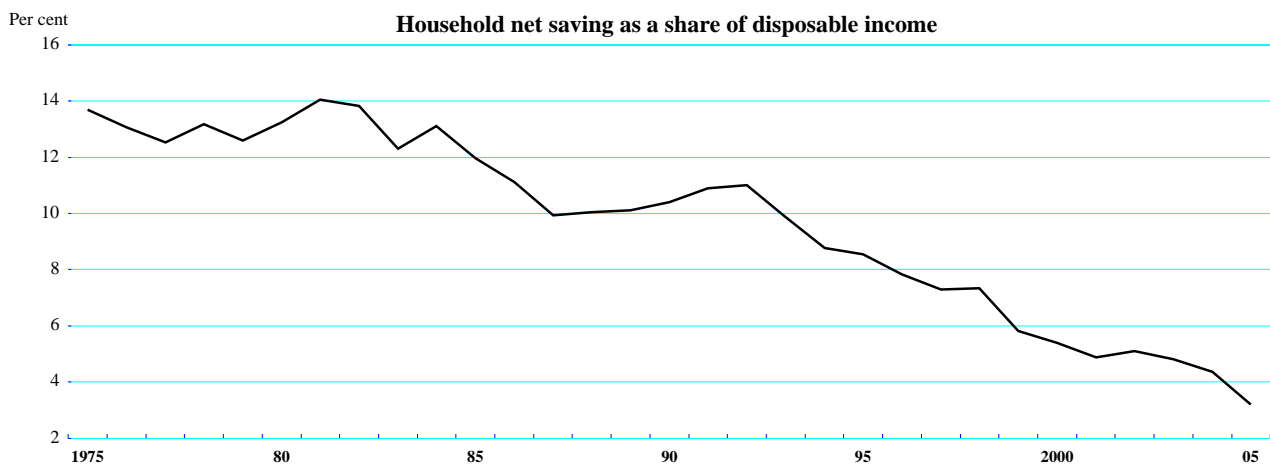
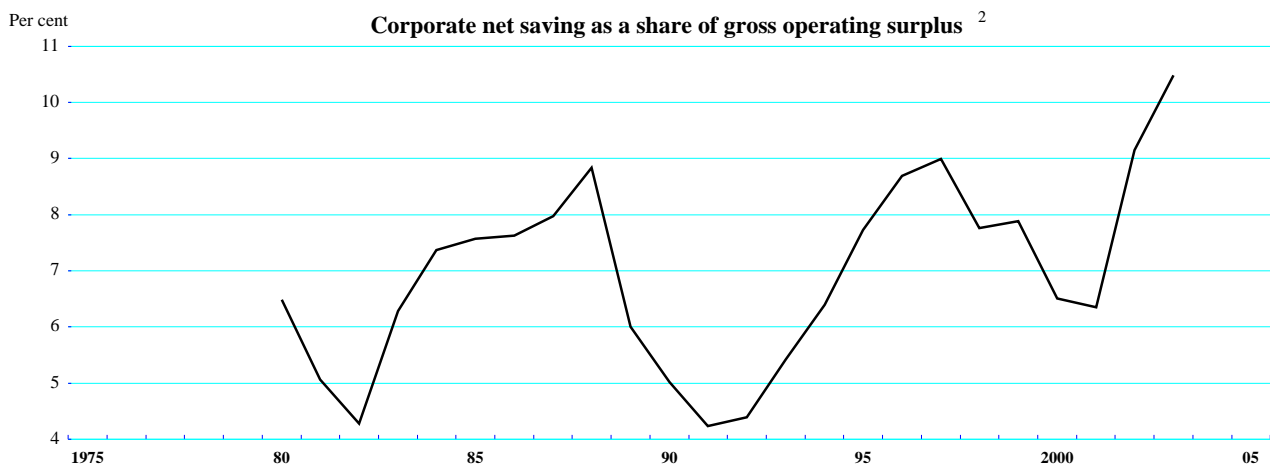
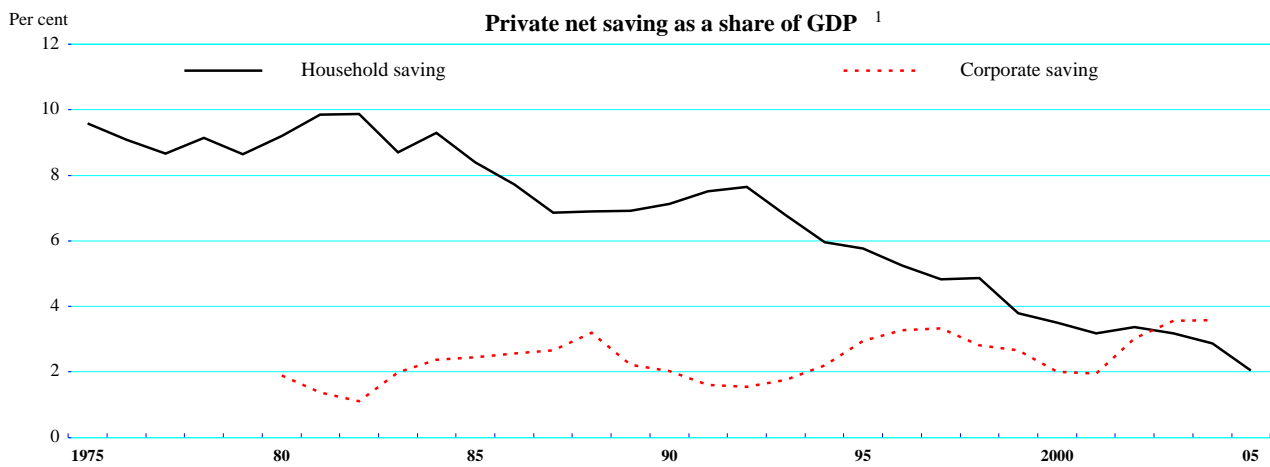
15. It should be noted that it is difficult to compare savings rates across countries, and hence cross-country aggregates should be viewed with a sound amount of caution. See Boissinot and Catte (2006) on the issue.

16. It should be mentioned in this respect that lower investment ratios with respect to GDP do not necessarily imply lower investment in volume terms as investment prices have declined in relative terms in recent years.

17. See Rajan (2006). Measured at constant prices, gross investment ratios have been approximately constant. Net investment ratios, however, have been declining even after correcting for relative price changes, as the switch to ICT-intensive investment has been accompanied by more rapid depreciation: see *OECD Economic Outlook No. 79* 2006, Box I.1 for a discussion.

18. See Bernanke (2005) and Roubini and Setser (2005).

Figure 15. Private saving in the G7 economies

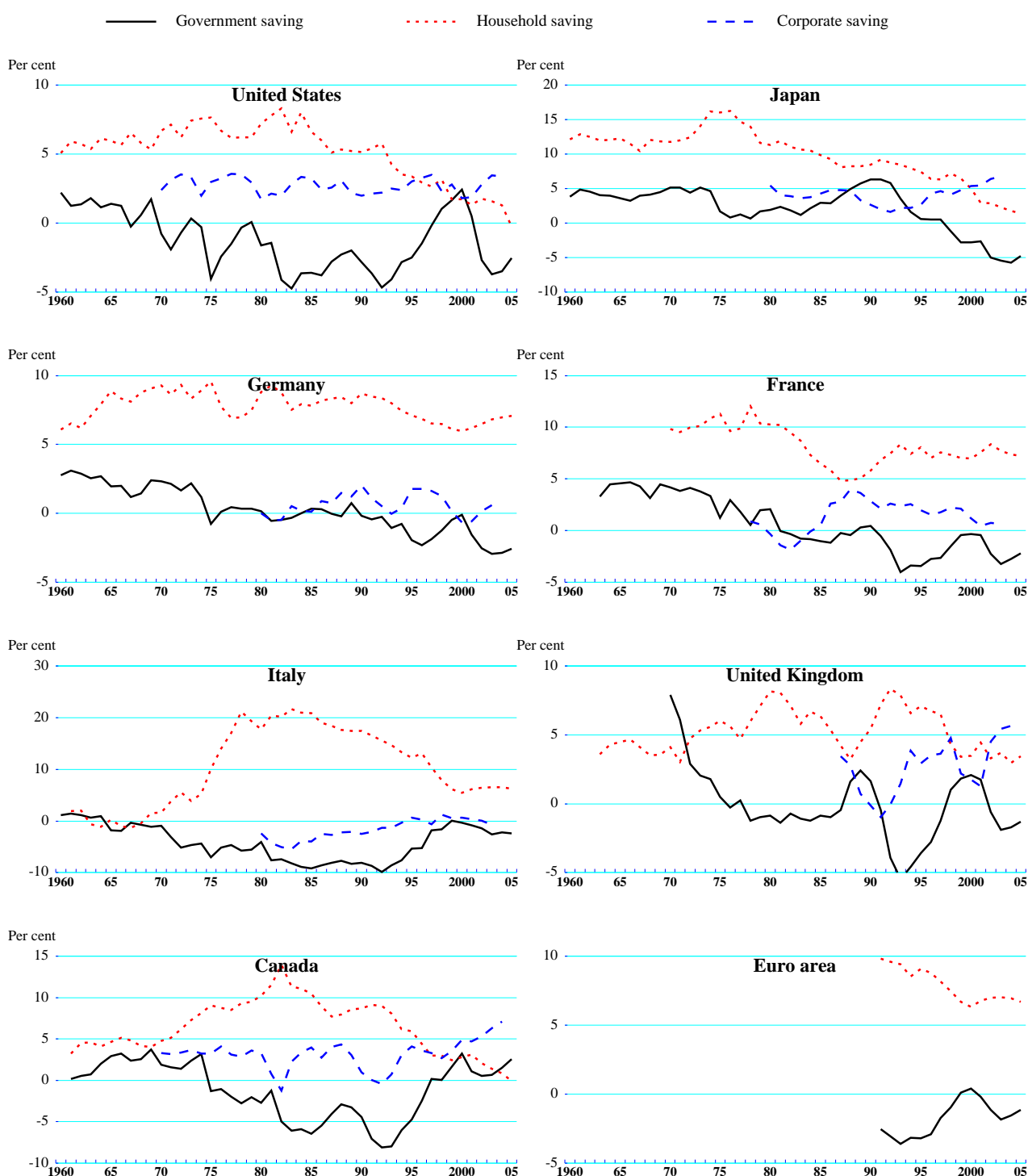


1. Net saving is defined as gross saving minus fixed capita formation (depreciation).

2. Data for Germany and France, from 1980 to 1990, are constructed using the growth rate of the ratio of corporate saving with the capital income that accrues to the business sector; for the United Kingdom 1985 data are used to proxy the series from 1980 to 1984. Data for Japan are based on the ratio of corporate saving with the capital income that accrues to the business sector.

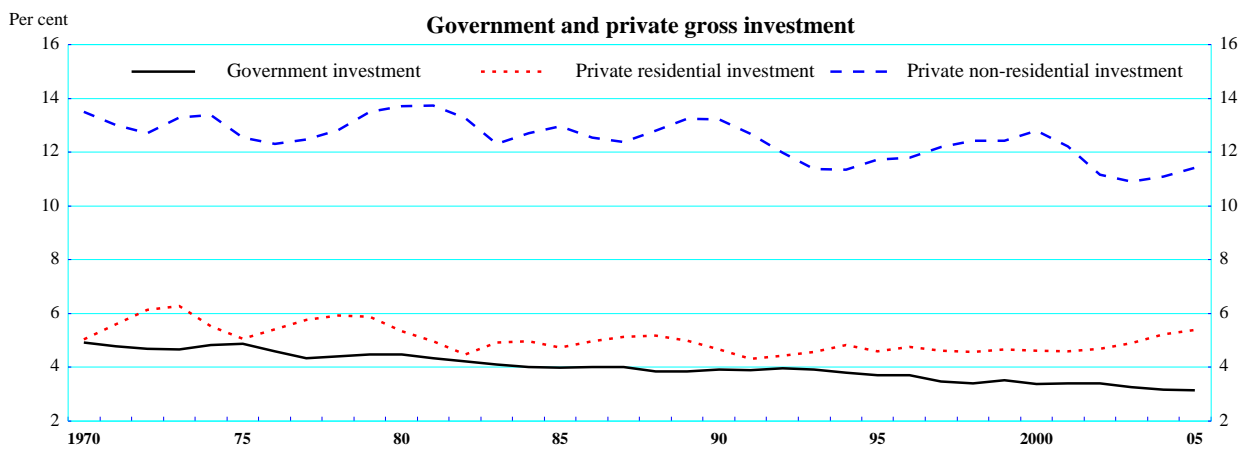
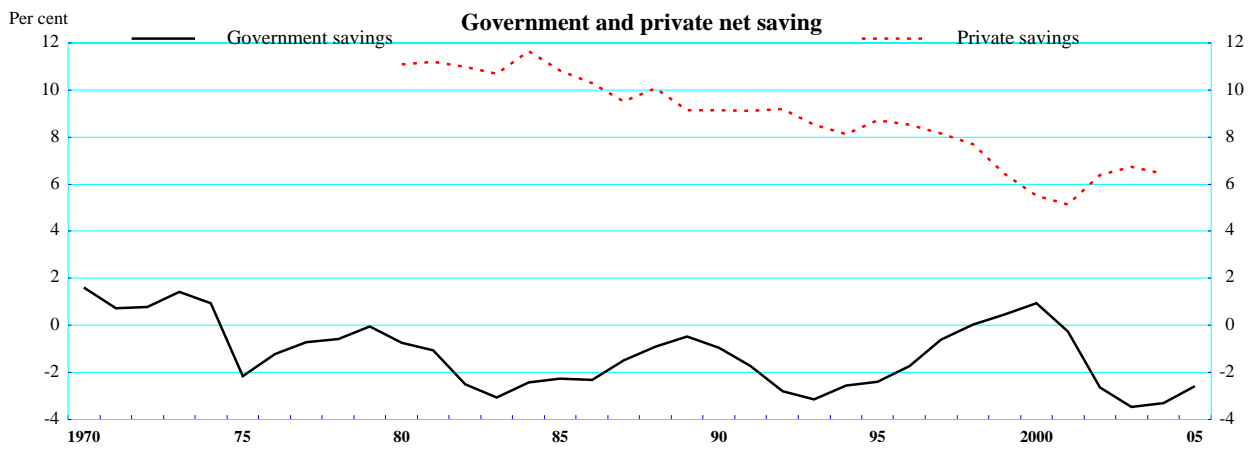
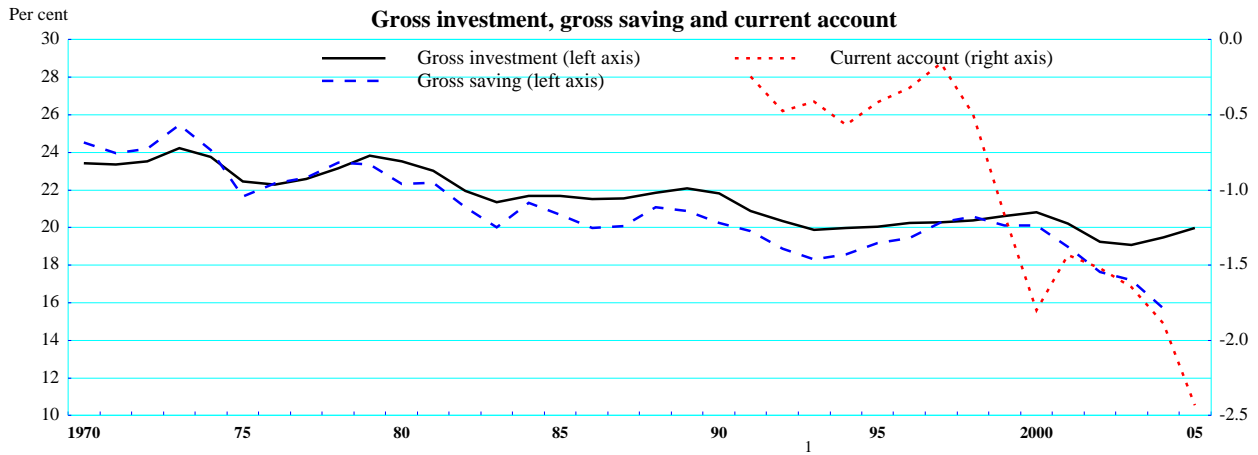
Source: OECD.

Figure 16. Household, corporate and government net saving in the major economies ¹
(In per cent of GDP)



1. Net saving is defined as gross saving minus fixed capital formation (depreciation).
Source: OECD.

Figure 17. Aggregate saving and investment in the G7 economies
(In per cent of GDP)



1. Net saving is defined as gross saving minus fixed capital formation (depreciation).
Source: OECD.

Figure 18. Private and government gross investment in the major economies
(In per cent of GDP)

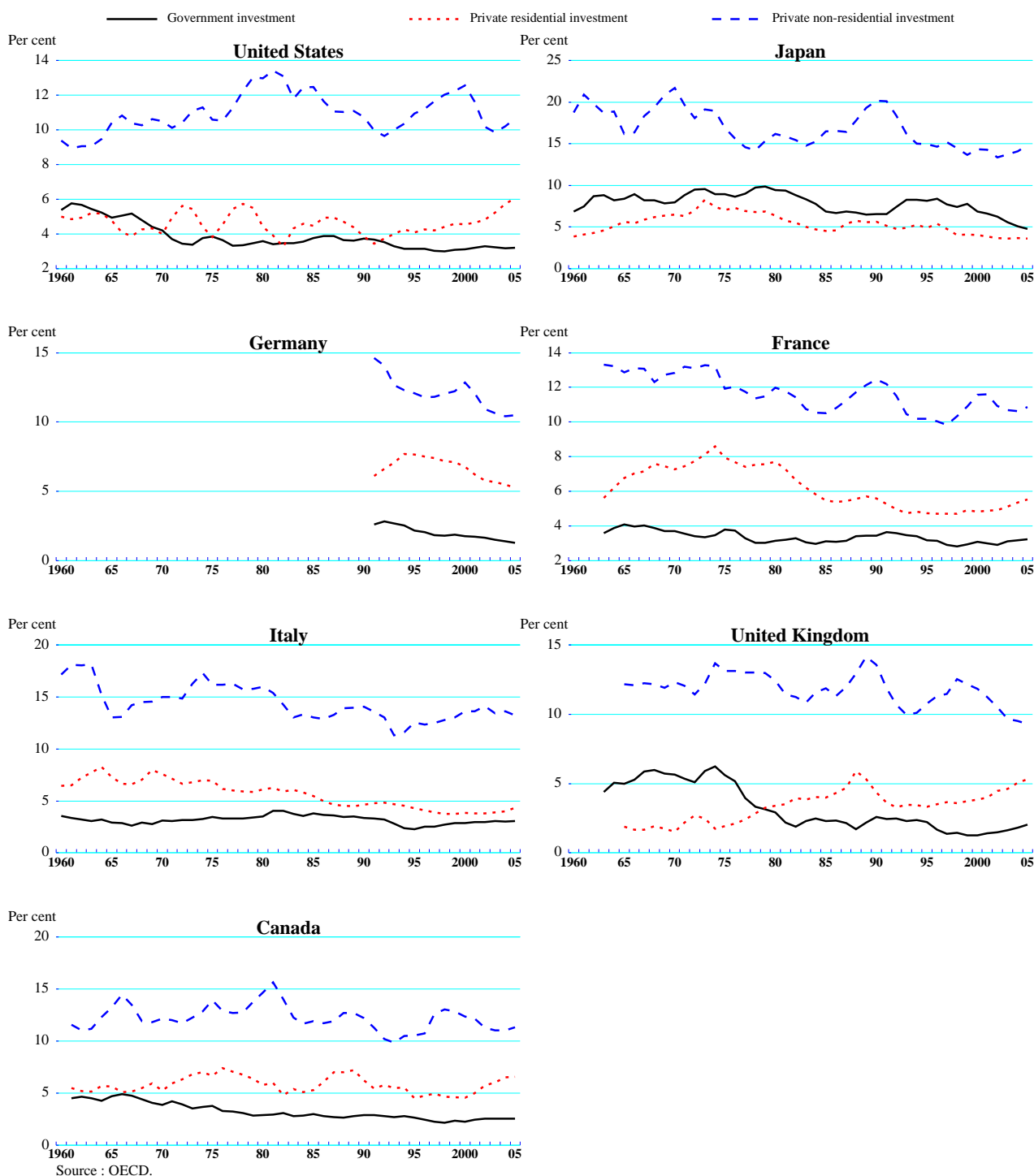
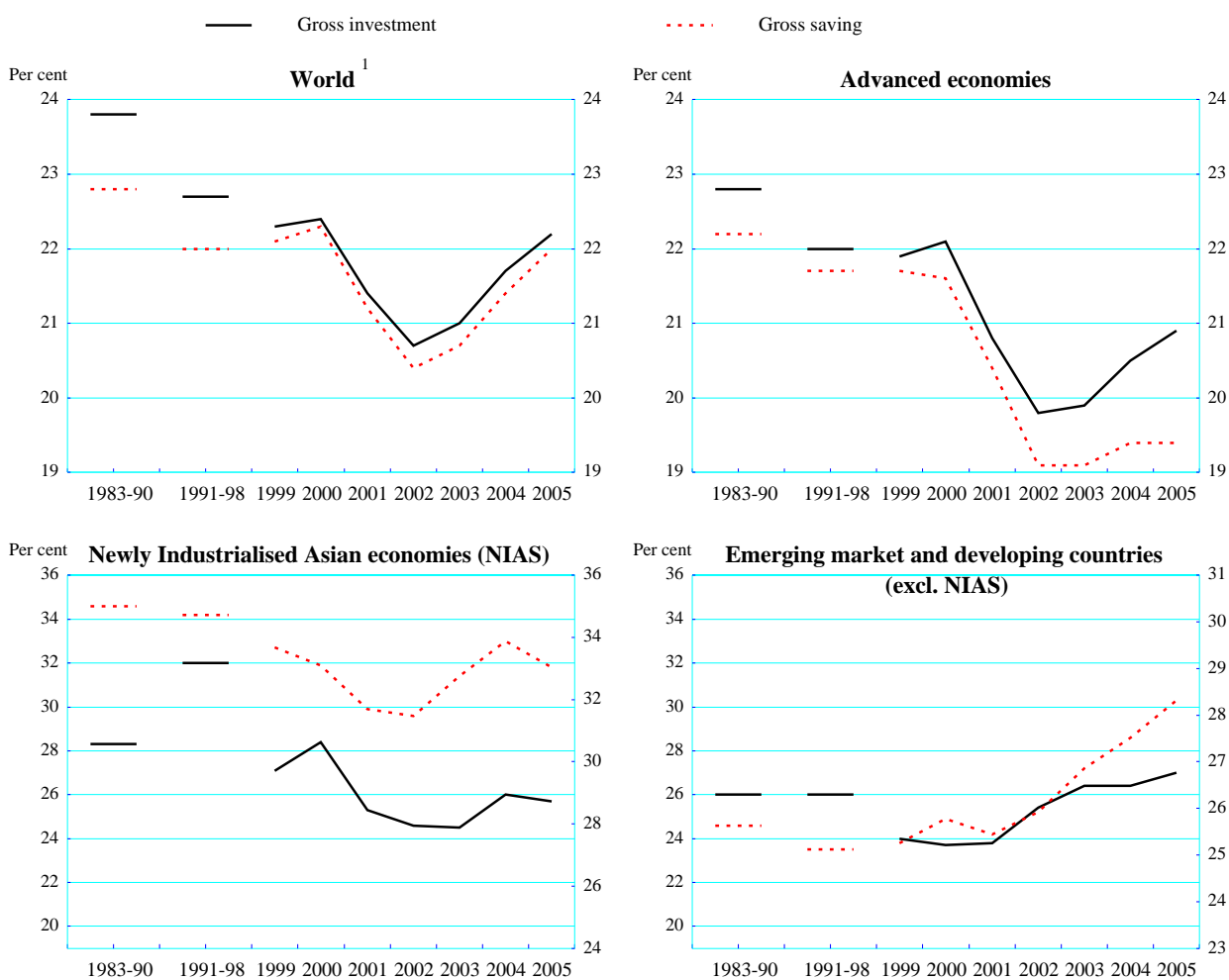


Figure 19. Gross investment and saving - a global perspective
(In per cent of GDP)



1. By definition, world investment equals world savings. The difference shown here represents statistical errors (also often referred to as the World Current Account Deficit).

Source : IMF, World Economic Outlook

21. There is some evidence to suggest that the emerging-market saving shift has been more than just a passive response to developments in the industrialised world. Following the 1997 financial crisis many East Asian countries increased their saving and reduced capital spending to below historical norms. A noteworthy feature is the strong increase in the Chinese surplus which, in a situation of structurally high saving in the household and business sectors, was in recent years mainly driven by increased public sector saving. As a result, the total saving-to-GDP ratio has increased from a stable 40% up to 2000 to 50% in 2004.¹⁹

19. This behaviour reflects, to some degree, the limited access of households to credit, political uncertainty and concerns over ageing in the absence of an adequate social safety net. This trend seems likely to persist (see *OECD Survey of China* 2005), and to outweigh that towards higher investment ratios which have emerged more recently. However, it is probably less important as a factor behind low interest rates than official reserve build-up which constitutes the bulk of the foreign asset accumulation of emerging markets.

22. The timing of the regional shift in global savings is reasonably consistent with the decline in global interest rates since both the rise in emerging-market saving and the decline in industrialised countries' investment have been occurring progressively over past years; proxied by capital flows, the saving shift appears as a significant determinant of bond yields in regression analysis.²⁰ Moreover, there has been an acceleration in emerging market saving since 2004, as reflected in increasing current account surpluses both in China and oil exporting economies. However, shifts in the global saving-investment balance *by themselves* are unlikely to provide a full explanation either of why the yield curve has flattened or why bond yields are particularly low in the United States.

5. Portfolio considerations

23. In addition to factors related to monetary policy or saving and investment, long-term real yields are also likely to have been influenced by portfolio shifts across financial instruments and countries. A number of factors may be involved here: official accumulation of foreign reserves among mainly Asian economies seeking to stabilise their currencies, recycling of increased oil revenues, changes in portfolio preferences due to ageing, especially on the part of pension funds, and a switch from equities to bonds due to the experience of the stock-market downturn.

Official reserve accumulation and petrodollars

24. A large portion of the assets accumulated through current account surpluses in emerging Asia, notably in China, and also in Japan²¹ have accrued in the form of foreign exchange reserves (Figure 20). Global reserve accumulation in 2004 was roughly three times the 1999-2001 average and this ratio is estimated to have increased in 2005. Asia has accounted for roughly three-quarters of global reserve accumulation, with the share of China growing steadily.²² The motivation for maintaining large official dollar assets is somewhat different across economies, but for most developing and emerging economies it is the authorities' concern about the potential negative implications of exchange rate appreciation for economic activity and the long-term external balance, with the ensuing need for absorbing the foreign currency inflows by accumulating reserves. From this it has been argued that Asia can now be seen as part of an expanded dollar bloc that is willing to provide the external funding the United States requires.²³ The implications are that, insofar as Asian central banks peg their exchange rates to the dollar, their demand for US bonds will be inelastic to interest rates. Moreover, official capital flows into US bonds tend to encourage private inflows, as private investors see Asian central banks as ensuring the continuation of low long-term US rates and a relatively strong US dollar.

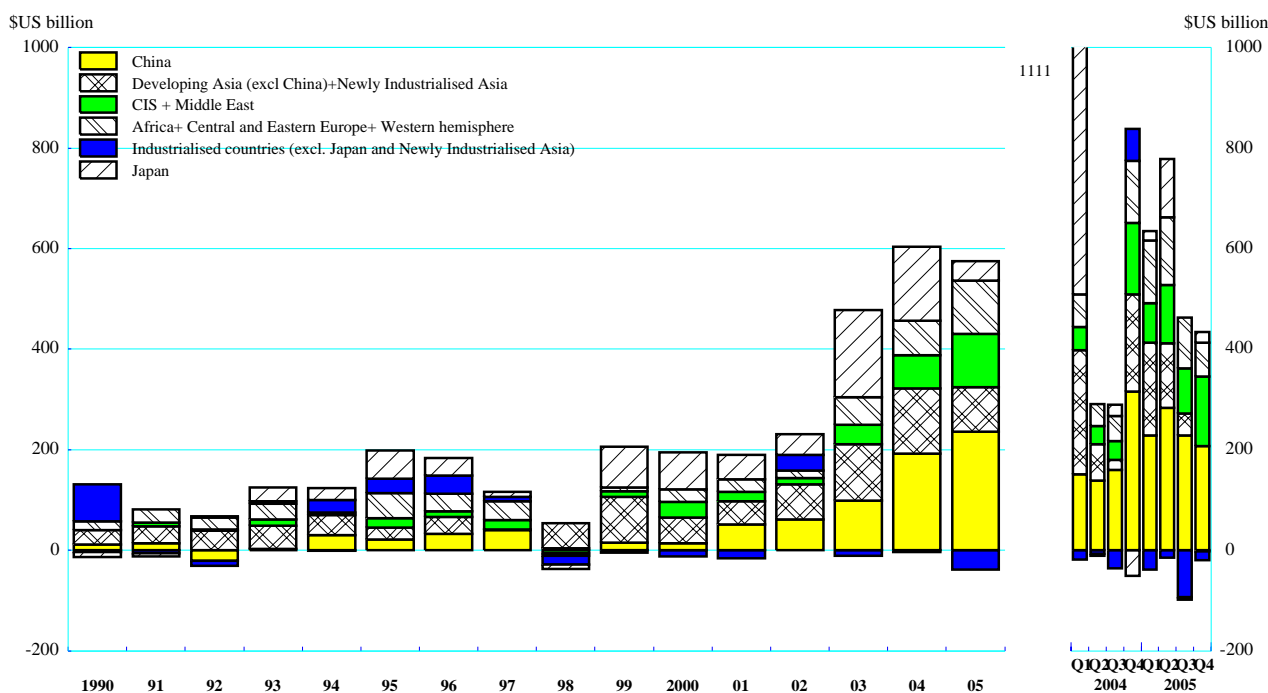
20. Warnock and Warnock (2005) estimate that if capital flows into the United States went back to average levels, this would lead to a rise in interest rates by around 100 basis points (and if they stopped altogether interest rates may rise by up to 150 basis points).

21. In Japan, in addition, the low short and long-term domestic interest rates associated with the quantitative easing monetary policy have encouraged private outflows into US corporate and agency debt.

22. As a result, official dollar reserves in China (including Hong Kong) have now surpassed those in Japan; these amount to around \$1 trillion and \$800 billion, respectively. Reserve accumulation in China and in some other countries exceeded the value of current account surpluses, which would seem to indicate that capital inflows into Asian countries have indirectly found their way into US treasury bonds (via Asian central banks).

23. See Dooley *et al.* (2003, 2004, 2004a, 2005).

Figure 20. Estimated reserve accumulation (excluding gold) by region



Note . Estimated year-on-year changes in reserves for yearly data. Estimated annualised quarter-on-quarter changes for quarterly data.
 Data on reported changes in reserve levels have been adjusted in an attempt to correct for revaluation effects due to US\$-Euro currency fluctuations.
 Sources : International Monetary Fund and OECD calculations.

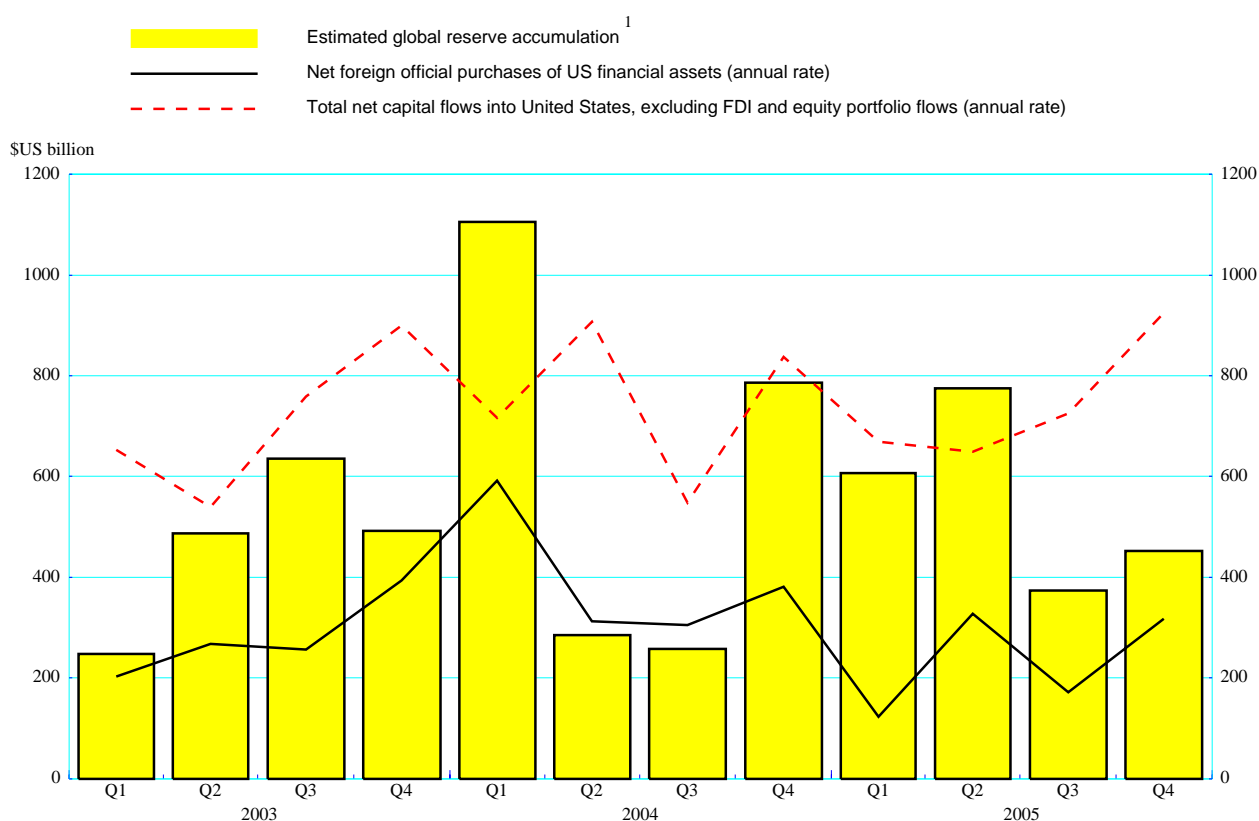
25. The argument has the virtue of being consistent with the stylised facts, while helping to explain the relatively marked downward effect on US bond rates and the flattening term structure. The timing of the recent fall in US term premia, starting in 2004 and deepening in 2005, seems to match that of the increase in both reserve accumulation and petrodollar recycling. The impact of reserve accumulation on current US interest rates has been quantified by different econometric studies in a range from 40 to 100 basis points.²⁴ The importance of official flows may actually be even higher than these econometric estimates suggest, as reserves held offshore through intermediaries are not recorded in US statistics as official purchases.²⁵ Given this limitation, it is also questionable whether official dollar purchases really became less important in 2005, as the official US balance of payments data would indicate (Figure 21). According to IMF data, global reserves continued to increase very strongly in 2005. Although their

24. Warnock and Warnock (2005) estimate that US rates would have been 60 basis points higher if official flows had been zero in 2004 and early 2005, which is significant but relatively modest given that zero official flows are a relatively strong assumption. See also Bernanke *et al.* (2004), Truman (2005), Goldman Sachs (2004) and JP Morgan (2005).

25. See Higgins and Klitgaard (2004). McCauley (2005) estimates that about one-quarter of the stock of official reserve holdings are held offshore, and their share in the net accumulation can vary considerably from year to year. See also Roubini and Setser (2005).

currency composition is not known and the ratio of global reserves held as dollars can fluctuate from year to year, the BIS estimated the historically normal ratio to be around two-thirds. If that ratio were to have held in 2005, the continued reserve accumulation in US dollar assets would have continued to be substantial (Box 2). This would not be inconsistent with US balance of payments data, if the proportion of dollar reserves held outside US institutions or security depositories has increased.²⁶

Figure 21. Estimated global reserve accumulation versus net foreign official purchases of US financial assets



1. Estimated annualised quarter-on-quarter changes. Data on reported changes in reserve levels have been adjusted in an attempt to correct for revaluation effects due to US-Euro currency fluctuations.

Sources : US Bureau of Economic Analysis, International Monetary Fund and OECD calculations.

26. As a result of the surge in the oil price, more recently there has also been a massive transfer of revenues towards oil exporting countries which, to the degree it is being recycled through financial markets, would add to official capital flows. So far, increasing current account surpluses in oil-exporting countries have only shown up to a very limited extent in foreign exchange reserves (in spite of the fact that a number of them have fixed or managed exchange rates that are heavily oriented towards the US dollar).²⁷

26. In principle, the discrepancy between the two sets of data could also be explained by a decline in the share of reserves held in US dollars. However, there is no evidence of a trend toward reserve diversification, which would also be difficult to reconcile with the appreciation of the US dollar in 2005.

27. While the current account surpluses of oil exporters massively increased in 2005, probably by around \$320 billion to a total of around \$370 billion, the estimated reserve accumulation was somewhere around \$50 billion, which is fairly small in comparison with the approximately \$500 billion of reserves that non-oil exporters are likely to have accumulated in 2005.

However, a significant share of oil producers' current account surpluses has been accumulated by and invested through other official institutions (stabilisation funds, official investment funds, etc.) As investments by both private agents and state investment funds of oil exporting countries are more likely to be yield-oriented, the share of these investments going into US bonds is probably smaller than the corresponding share in central bank reserves; nonetheless, a substantial proportion would have gone into dollar-denominated assets, including US bonds.²⁸ Box 2 gives some speculative estimates of this.

Box 2. The Bretton Woods II debate, central bank reserve accumulation, and oil-producer recycling

There is currently a debate as to whether the global situation resembles a "Bretton Woods II" system. The "Bretton Woods II" hypothesis argues that a number of developing and emerging market countries, especially in emerging Asia (particularly China), have adopted a strategy of *de facto* pegging their exchange rates to the dollar. Given strong consumption growth in the United States, the result has been sizeable current account surpluses in Asian countries, and an increasing US current account deficit, largely financed by official flows from Asian central banks (mainly China). The comparison of the current situation with the Bretton Woods system has been criticised on a number of grounds, but mainly with respect to its potential durability.¹ However, both the emerging Asian economies -- especially China -- and the US could have an interest in its continuation. For China it is a means of providing strong growth in industrial employment, which Chinese policymakers appear to see as crucial for political stability. To the degree that strong export growth necessitates (or is perceived to necessitate) a very competitive exchange rate, Chinese authorities seem to be prepared to buy up whatever amount of foreign currency they deem necessary.

Making a rough adjustment of reported changes in the stock of reserves for currency fluctuations, central banks world-wide are estimated to have accumulated reserves worth in the order of \$500 billion in 2004, of which around \$400 billion by developing and emerging market countries (including Middle East and CIS oil exporters).² In 2005 reserve accumulation continued at a roughly similar pace as in 2004, and annualised estimates for the first three quarters are even somewhat above 2004 levels. As in 2004, Asian countries, as well as developing countries and oil exporters accounted for the overwhelming share of this (see Figure 20).

Estimating the share of US dollar assets in total reserve accumulation requires some assumptions, since the composition of global reserves is not known. Assuming that reserve accumulation for 2005 will come out in the order of \$500-600 billion and that two-thirds of central bank reserve accumulation has gone into US bonds -- in line with the historical share as estimated by the BIS -- central banks (excluding those of oil exporters) would have invested somewhat below \$400 billion in US bonds (of which around \$300 billion from Asia). If oil exporting countries as a whole (including entities other than central banks) are assumed to invest in US bonds about a third of their current account surpluses (which may be on the high side), that would amount to approximately \$120 billion in 2005,³ in which case the recycling of oil revenues would be playing a growing role, but would remain nonetheless a less important driver than central bank reserve accumulation. Such calculations can only be taken as illustrative, however, as neither the currency composition of central banks' reserve accumulation nor the final destination of financial investment flows from oil exporters is well understood.

The main issue looking forward is for how long the massive reserve accumulation observed in recent years will continue. In the case of oil exporters, barring further increases in oil prices their net asset accumulation is likely to slow down rapidly as oil revenues are gradually re-spent, in line with previously observed behaviour. On the other hand, it is more difficult to predict how reserve accumulation by Asian central banks will evolve. At the root of the question of whether China will continue to accumulate reserves lies the question of how long it will continue to consider it in its own interest to maintain a largely fixed exchange rate against the dollar. Interest groups supporting continuation of export-led growth and opposing currency appreciation remain powerful. However, such a policy does not necessarily need to be associated with an *expanding* current account surplus, as outside the general government sector the growth of domestic investment has largely matched the growth of savings. The increase in the current account surplus in 2005 may have been a temporary phenomenon due to the use of administrative investment controls, and could stabilise as those restrictions are eased. In the short and medium term the current account deficit is expected to stay at current levels,⁴ and pressures for a rebalancing may emerge in the longer term. At the same time, as long as China is perceived to be economically successful it is likely to continue to receive capital inflows, or at least is unlikely to experience massive outflows. Authorities will therefore need to keep accumulating reserves if they want to prevent the exchange rate from appreciating, even though this may involve increasing strains on domestic monetary policy, with low domestic interest rates contributing to resource misallocation and making it more difficult to control inflationary pressures.

1. See Roubini and Setser (2005), Eichengreen (2004) and Goldstein and Lardy (2005). The "Bretton Woods II" hypothesis has also been widely criticised in Asia as reflecting an Atlantic-biased view of the global financial system. Recent efforts by Asian governments (including central banks and treasuries) to develop area-wide bond markets, as exemplified by the successful launch of Panda bonds, would all indicate their unwillingness to be incorporated as part of a dollar bloc.
2. Japan's reserves rose by roughly \$135 billion (almost entirely in the first quarter of 2004). Non-OECD Asia accounted for roughly two-thirds of the reserve accumulation of developing and emerging countries, with China accounting for roughly two-thirds of the non-OECD Asian accumulation.
3. The overall surplus of oil exporting countries was over \$350 billion in 2005 (estimated based on IMF projections; IMF, 2005).
4. See *OECD Economic Outlook* No. 78, December 2005.

28. For several -- partly political -- reasons it is also likely that most investment into US assets would be channelled via intermediaries so as to obscure their real owners

Pension fund portfolios and shifts between asset classes

27. Current low levels of long-term interest rates may also partly reflect shifts in portfolio composition connected to demographic trends. Aggregate household saving depends to some degree on the age structure of the population, and will fluctuate with changes in the share of prime savers (people aged between 40 and 59) and of “potential dissavers” (people above 60). At least until 2010 these shifts should be broadly supportive for household saving in the G7 zone. In addition there may be a shift in preferences towards bonds as risk management considerations would induce individuals to shift their portfolios gradually to less risky assets with age. Any such shift is likely to be mediated to a large degree through pension funds. Pension funds have always been important buyers of high-quality fixed-income securities, but their demand for long-term bonds may have further strengthened in recent years as a result of the 2000-01 experience²⁹ and recent regulatory and accounting changes which forced them to adopt a much sharper focus on the management of the interest rate risk that they face on the liability side of their balance sheets.³⁰ However, there may not be sufficient quantities of suitable instruments available for pension fund investments to fit the retirement pattern arising from the projected increase in retirees in almost all G-7 countries after 2010.

28. Indeed, the asset value of (autonomous) pension funds in the G-10 countries is much larger than the amount of outstanding long-term government bonds, a feature that is especially prevalent in the United States, the United Kingdom, Canada and Switzerland. While the excess demand is not apparent for G-10 pension funds in aggregate at the maturity range of up to 10 years, in the United States and the United Kingdom, cash-flow matching attempts by all of the countries’ pension funds would be unsuccessful over both short and longer-run horizons.³¹ The extent to which authorities have facilitated the development of longer-dated bond markets has differed, but the average duration of all G-10 government debt has been roughly stable since 2004 (and there has been a marked fall in the US from almost six years in 2001 to below four in 2005).³²

29. However, much of the evidence here is still partial and anecdotal. The shift to bonds appears to be most marked where equity allocations of pension funds had previously been relatively high.³³ The

29. Many pension funds experienced large funding gaps after the 2001 stock market downturn and, possibly even more importantly, because of the decline in interest rates, which implied large increases in the present value of the pension liabilities.

30. See, for example, *BIS Quarterly Review* March 2005. In some major OECD economies the assets held by pension funds are equivalent to around 20% of total financial assets.

31. See Schich and Weth (2006).

32. From the supply side, probably the most notable recent supply development was the issuance of bonds with maturities of 50 years and durations exceeding 20 years. Such bonds were recently issued both by the French and the UK governments and other countries are considering the issuance of such instruments. The United Kingdom has recently issued 50-year inflation-indexed debt. The US Treasury reintroduced the 30-year bond in February 2006, after it had discontinued its issuance in October 2001. From an issuers’ perspective, ultra-long-term bonds allow them to lock in the current relatively low borrowing costs for a very long horizon.

33. In the United States, it appears that the insurance agency for private pension plans, the Pension Benefit Guaranty Corporation, has bought large amounts of long-dated government securities to reduce the mismatch between assets and liabilities of the funds for which it becomes trustee when an underfunded corporate pension plan becomes insolvent. In the United Kingdom, pension fund bond allocations rose from 25 to 39% between 1998 and 2004 after minimum funding requirements for UK pension funds were introduced in 1997, and inflation-linked 50-year gilt yields hit all-time lows in early 2006 with spreads of 38 basis points.

available flow-of-funds data show such a shift in the United Kingdom³⁴ starting in the late 1990s but not, at least so far, in the United States.³⁵ However, those data may not fully capture the portfolio shifts liable to have had an impact on market prices, for several reasons. First, there may have been a switch to longer maturities within bond portfolios. And secondly, it appears that pension funds have been making an increasing use of derivative instruments to align the composition of their asset portfolios with their liabilities.³⁶

30. On the other hand, low yields on government bonds do not seem to be the result of a generalised “flight to quality”. Figure 22 shows that the OECD’s synthetic indicator for risk premia on higher-risk bonds is currently quite well explained by fundamentals. These include such factors as ample liquidity and low expected corporate default rates, the latter as proxied by actual default rates or projected defaults on the part of rating agencies (see Box 3). In aggregate there would seem to be no marked misalignment in the riskier bond segment, provided that current perceptions of default risks are realistic -- which cannot be taken for granted. The relatively high aversion towards equity risk as compared with bonds may not yet have returned to normal, but -- if anything -- investors’ willingness to hold equities rose throughout 2005, which would not help explain why “cyclically adjusted” yields on bonds were falling at the same time.

Box 3. Are risk premia on relatively risky bonds too low?

In order to evaluate whether risk premia on higher-risk bonds are at levels that would be consistent with underlying fundamentals, or whether there are significant misalignments, a procedure similar in spirit to previous OECD work is used.¹ More precisely, for both the United States and the euro area, the spreads between high-yield, high-grade and emerging-market bonds with benchmark government bonds are first calculated. A common factor that captures the shared part in movements of these spreads is then identified and interpreted as a synthetic indicator for risk premia on bonds. The final step is to evaluate what drives this indicator of risk premia.

The cyclical position of the world economy, liquidity, short-term interest rates and expected corporate default rates emerge as the main explanatory variables (and combined have a very high degree of explanatory power):

$$\text{Synthetic Indicator} = 9.2 - 0.27 [-2.1] * \text{Global Liquidity} - 0.44 [-4.4] * \text{OECD Cyclical Position} \\ + 1.6 [2.5] * \text{Global Real Short Rates} + 8.0 [17.0] * \text{Expected Global Corporate Default Rates}$$

Figures in square brackets are t values; the $R^2 = 0.82$.

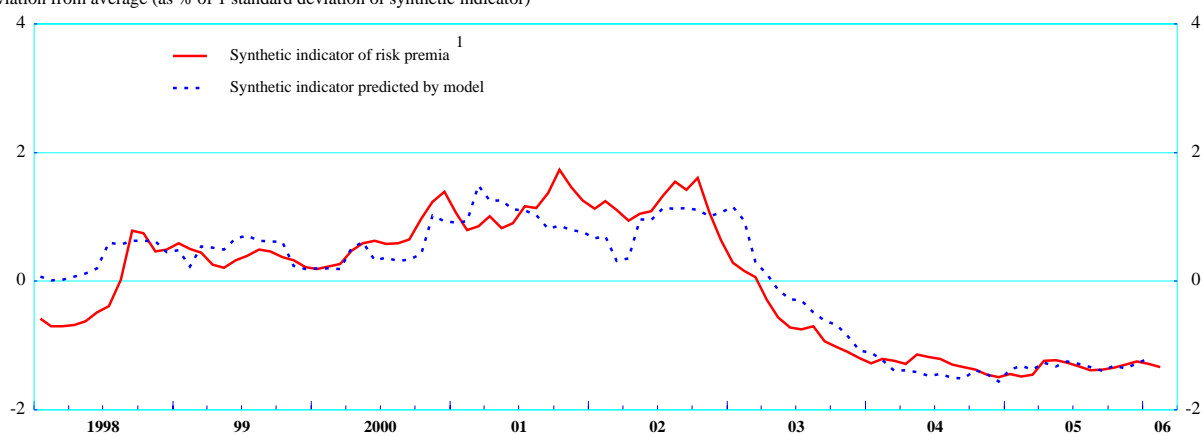
Risk premia tend to fall when the cyclical outlook improves, are positively related with short-term rates and negatively related with liquidity and with corporate default rates, either actual or expected (as forecast by Moody’s). While current risk spreads seem to be relatively well aligned with the above fundamentals, this assessment hinges critically on the assumption that expected default rates are not based on too optimistic assumptions. This cannot be taken for granted, as rating agencies have been repeatedly criticised for being “behind the curve”. Moreover, the synthetic indicator is intended to summarise risk premia on different bond classes, so the finding that it is aligned with fundamentals does not mean that risk spreads on any single bond class are well aligned with fundamentals -- it would, for example, not be surprising if it turned out that emerging market bond risk is currently priced too low.

1. Sløk and Kennedy (2005).

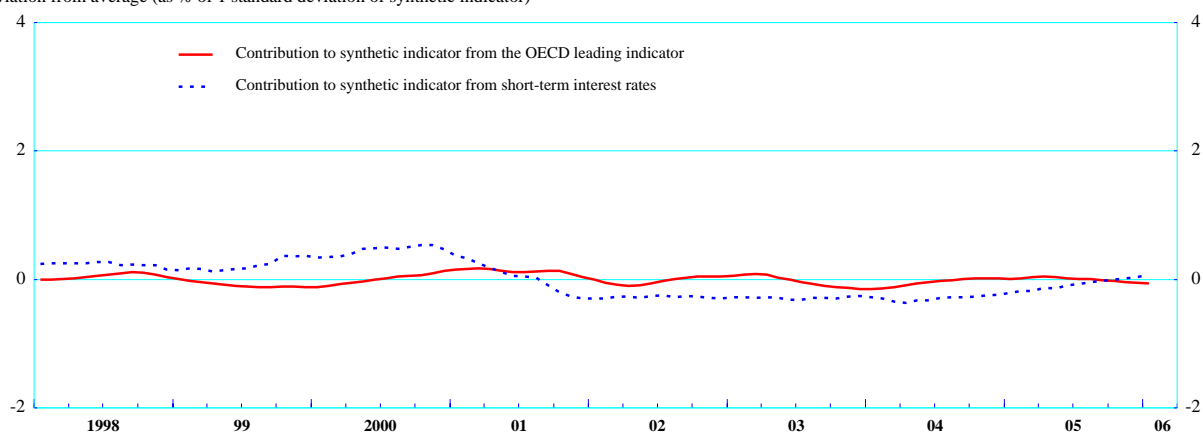
34. A concern in the United Kingdom has been that falling yields on long-term bonds increase the present value of company defined-benefit pension liabilities, which induces companies to buy more long bonds in order to match assets to liabilities, which further drives down bond yields and increases corporate pension liabilities -- a destabilising process which has led to demands for the government to increase the supply of long bonds.
35. According to US flow of funds data, in 2003-2004 private, federal and state and local pension funds combined were net sellers of Treasury securities, and their purchases of government agency-backed, corporate and foreign securities were broadly in line with earlier trends.
36. See “When the spinning stops”, *The Economist*, 26 January 2006.

Figure 22. Actual and predicted synthetic indicator of risk premia

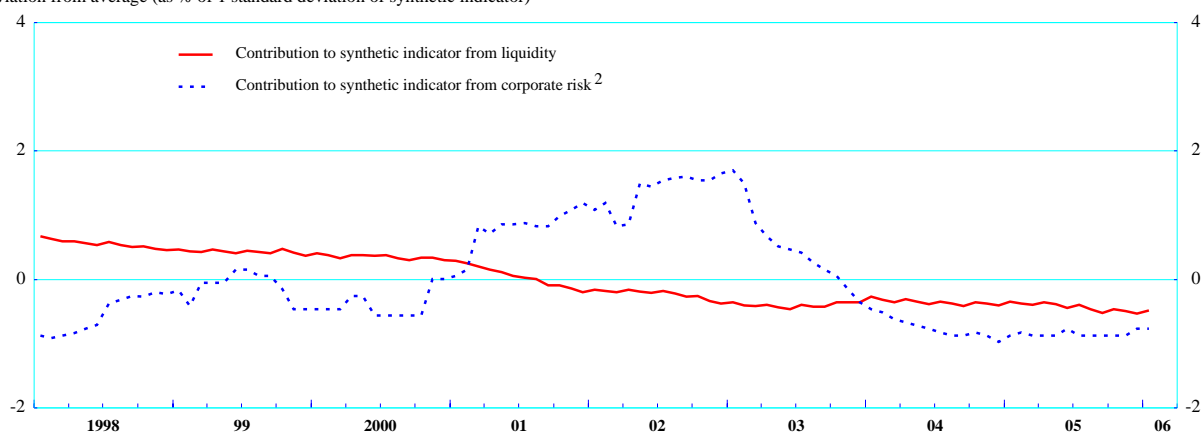
Deviation from average (as % of 1 standard deviation of synthetic indicator)



Deviation from average (as % of 1 standard deviation of synthetic indicator)



Deviation from average (as % of 1 standard deviation of synthetic indicator)



1. The synthetic indicator is calculated as the first principal component accounting for 60% of the shared variation of the risk premia on US and euro-area high yield and high grade corporate bonds, as well as equity risk premia. In addition the risk premia on emerging market debt was also included.

For details on the methodology, see Slok, T. and M. Kennedy, 'Explaining risk premia on bonds and equities', Economic Studies, No 40.

2. Companies that default as a percentage of all rated global companies; 12-month trailing average.

Sources: Datastream, Moody's, Moody's KMV, BIS calculations, OECD calculations, Main Economic Indicators, OECD.

31. Summing up, portfolio reallocations associated with a new distribution of world savings seem to be an important element for understanding why bond yields have been generally low in recent years, and are probably the single most important reason why — in “cyclically adjusted terms” — they fell further between mid-2004 and end-2005. As far as US yields are concerned, the official reserve story fits rather well with atypically low long rates (via declining term premia), provided that data on global reserve accumulation are in fact capturing an increase in reserves in US dollars held offshore. The effects from high and increasing reserve accumulation in Asia are likely to have been reinforced — at least to some degree — by the recycling of increased oil revenues since 2004. The pension fund story could fit with a flattening yield curve insofar as it has been affecting the demand-and-supply balance in longer-term bond segments only in recent years, but that is difficult to corroborate and its impact would be less marked in continental Europe. Portfolio factors related to the collapse of stock prices in 2000 can also help explain why high-yield bond spreads have been low in recent years. None of these portfolio factors could, however, have had such a strong effect on global bond yields if they had not been operating against a background characterised by an increased monetary policy predictability and low inflation volatility, which has favoured stability in longer-term expectations.

6. How might the situation unwind?

32. The above discussion suggests that the categories of factors discussed in the three previous sections have all played a part in driving long-term interest rates lower, although probably at different times over the past 10-15 years. Lower inflation expectations and inflation uncertainty played a major role during the 1990s. An increased propensity to save in emerging economies (and cutbacks in investment, except in China) has been a major driver since the Asian crisis of 1997. And portfolio shifts toward bonds -- as a result of both official reserve accumulation and a reluctance to move back into equities on the part of private investors — seem to have been the dominant factor in narrowing term premia since 2004. Since these factors have been cumulating, they are all part of the explanation for the current low level of bond yields.

33. Because some of those factors are likely to be lasting while others can be expected to unwind, their relative importance may have implications for assessing whether long rates will increase and the speed at which any adjustment may take place. The following checklist summarises a tentative assessment of how each of the elements may play out:

- Inflation expectations and perceived inflation risks are likely to remain moderate. Nevertheless, to the extent that current expectations of relatively low future policy rates reflect an extrapolation of recent experience, there is a risk that those expectations may prove to be over-optimistic. A reassessment might be triggered, for example, if new inflationary pressures were to force central banks to act more aggressively than markets are now anticipating. Moreover, to the extent that the more muted reaction of bond rates to changes in policy rates tends to weaken monetary policy transmission, it may end up requiring larger movements in policy rates.
- While cyclical and other temporary factors have been affecting saving-investment balances in industrialised countries, the net effect of their unwinding is uncertain. On the one hand, business fixed investment should accelerate once the phase of corporate restructuring is concluded. On the other hand, some degree of fiscal consolidation in the three major economies would tend to raise national saving. And a cooling off of housing markets would be expected to lead both to higher household saving and lower housing investment.
- As regards saving-investment balances in developing and emerging economies, only some of the factors that have led to *ex ante* excess net saving are likely to unwind. Current account surpluses in oil-exporting countries should narrow relatively quickly based on past re-spending patterns. In

the case of Asian and other developing countries, if surpluses were motivated by a desire to strengthen financial positions, they will no longer be needed when the balance sheet adjustment is judged to have been completed, although when this will be the case is more difficult to predict. However, the reasons behind high savings are diverse -- from a lack of job and income security (including a social safety net) to caution brought about by ongoing restructuring -- and some of them may well persist. This is also true in the case of China, where it is also difficult to predict how the tension between distortions in the economy that induce overly strong investment and attempts to contain it through administrative controls will play out.

- Reserve accumulation in US dollars by China and other Asian countries will probably continue if these economies continue to experience current account surpluses and capital inflows. Although major changes in their exchange rate policies are unlikely in the short term, a slowdown in the pace of reserve accumulation cannot be excluded, either as a result of concern for the effects on domestic variables or because of international pressure to reduce trade surpluses. At the same time, dramatic portfolio shifts out of US bonds are unlikely given the largely non-yield oriented motives behind asset accumulation by official holders and their awareness that the effect of any such shift would be considerably amplified by the responses of private investors and could trigger large capital losses. This, however, does not rule out some form of quiet asset diversification.
- A normalisation of relative attitudes toward risk on equity and bond assets seems to be in progress and should go on, particularly if further stock market gains help memories of earlier losses to fade. On the other hand, however, the rebalancing of pension funds' and life insurance companies' asset portfolios from equities to bonds should continue in coming years as the large baby-boom cohorts draw closer to retirement.

34. On the whole, the analysis suggests that bond yields are unlikely to go back to the levels that prevailed in the 1980s or the early 1990s, as several of the factors identified as driving them lower are set to persist and will probably outweigh the factors making for an upward correction. While uncertainty about the level of prospective short-term rates may increase as output gaps are closed (and this may have been a factor in the bond-market adjustment in the first half of 2006), the hard-won credibility of monetary policy should endure and the beneficial effects of globalisation and competition on inflation seem well established. High *ex ante* net saving on the part of oil-producing countries may be expected to run its course, and investment ratios in industrialised economies could rise, but high saving may be of a more structural nature in countries such as China. Some of the compression in term premia could unwind if portfolio preferences were to shift against fixed income instruments, or expectations of corporate default rates were to change, but the pace of reserve accumulation in Asian economies is unlikely to slow dramatically given the perceived importance of exchange rate stability for development.

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