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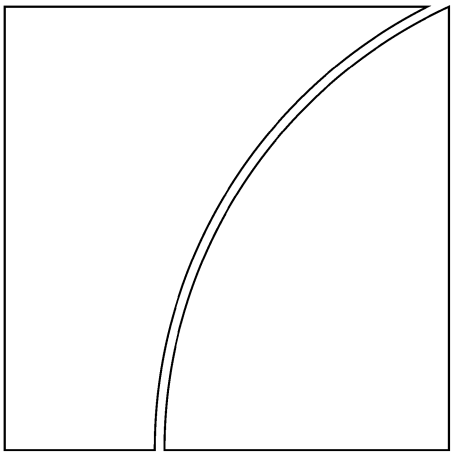

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Is the long-term interest rate a policy victim, a policy variable or a policy lodestar?

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Is the long-term interest rate a policy victim, a policy variable or a policy lodestar?*

Philip Turner*

Abstract

Few financial variables are more fundamental than the "risk free" real long-term interest rate because it prices the terms of exchange over time. During the past 15 years, it has dropped from a range of 4 to 5% to a range of 0 to 2%. By late 2011, cyclical factors had driven it close to zero. This paper explores why. Possible persistent factors are: the investment of the large savings generated by developing Asia in highly-rated bonds; accounting and valuation rules for institutional investment; and financial sector regulation. The consequences could be far-reaching: cheaper leverage; less pressure to correct fiscal deficits; larger interest rate exposures in the financial industry; and a more cyclical bond market. During the financial crisis, central banks in the advanced countries have made the long-term interest rate a policy variable as Keynes had always advocated. This policy focus will draw more attention to the macroeconomic and financial consequences of government debt management policies. Coordination between central bank balance sheet policies and government debt management is essential. With government debt very high for years to come, bond market volatility could confront central banks with unenviable choices.

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Introduction

It is an excellent idea to focus a conference about "what have we learnt from the 2007–2010 financial crisis" on the yield curve. It is an excellent idea because one end of that curve – the long-term rate of interest – has fallen so low that serious questions about monetary policy frameworks and financial stability risks are inescapable.

Because it is a lodestar for the financial industry and for many government policies, it would be reassuring to imagine that the real long-term interest rate is determined by the market. We would like to think that fundamentals such as the underlying saving and investment propensities of the private sector (and the corresponding "habitat" preferences of investors) play the dominant role. All appearances suggest a vibrant market: interest rates markets are among those most heavily traded and prices are indeed very responsive to changes in economic conditions.

Yet there is a major difficulty: the aggregate impact of many official policies – taking quite different forms – has been to increase the demand for government bonds, particularly those in key international currencies. The long-term interest rate can then become a victim of the unintended consequences of such policies.

At the same time, the long-term rate has, during this crisis, become a policy variable. Central banks through their balance sheet policies and governments through their debt management policies have sought to directly influence the long-term interest rate. Although such policies have been billed as exceptional, it should not be forgotten that Keynes regarded the long-term interest rate as a key policy variable.

Hence my question: is the long-term interest rate a policy victim, a policy variable or policy lodestar?

1. Real long-term interest rates

(a) Historical overview

Since 2002, the real long-term interest rate on global risk-free assets – as measured by US index-linked Treasuries – has been low (see Graph 1). That this persisted in both the expansion and the contraction phases of the unusually sharp global cycle over the past decade (and with very different fiscal positions) suggests something fundamental. By late 2011, the real rate had fallen to close to zero.

There has been much debate among economists about the "normal" long-term interest rate. Hicks (1958) found that the yield on consols over 200 years had, in normal peacetime, been in the 3 to 3½% range. After examining the yield on consols from 1750 to 2006, Mills and Wood (2009) noted the remarkable stability of the real long-term interest rate in the UK – at about 2.9%. (The only exception was between 1915 and 1964, when it was about one percent lower). Amato's (2005) estimate was that the long-run natural interest rate in the US was around 3% over the period 1965 to 2001 and that it varied between about 2½% and 3½%.

The low real long-term rate – well below these historical averages – is perplexing on both macroeconomic and microeconomic grounds. The macroeconomic paradox is that the sharp fall to a very low level in the past few years has occurred when the potential growth rate of the global economy, now about 4%, has risen and when investment in the emerging economies has been strong. It has been argued that higher potential growth in recent years should have increased the natural rate of interest.

The microeconomic paradox is that the decline in the real rate has occurred even though the volatility of long-term rates has actually risen. Investors would normally require some compensation – that is, a higher yield – for holding a more volatile asset. The increase in the

variability of long-term interest rate changes that Mark Watson noted in 1999 has persisted (Table 1). He took as the basis of his comparison the period 1965 to September 1978. As might be expected, the standard deviation of interest rate changes over that period fell along the maturity curve – from 0.45 for the Federal funds rate to 0.19 for the 10-year yield. But in recent periods this difference has vanished: the variability of short rates fell has actually fallen but that of long rates has risen. The standard deviation of monthly changes in 10-year yields was 24 basis points over the period from 1999 to 2011.

One possible explanation of this paradox is the sharp increase in the term premium. This rose to about 200 basis points – from less than 100 basis points during the period 1965 to 1978 (last column of Table 1). Unlike the long-term yield, the term premium has not become more volatile in recent years. This may have enhanced the attractions of borrowing short and lending long (see section (b) below).

(b) Consequences of low long-term rates

The persistence of a very low long-term rate of interest has several consequences.

(i) Cheaper leverage

The first is that it has reduced the real interest cost of servicing higher debt/GDP ratios. Graph 2 charts the aggregate debt of domestic US non-financial borrowers – governments, corporations and households – as a % of GDP. From the mid-1950s to the early 1980s, this aggregate was remarkably stable – at about 130% of GDP. It was even described as the great constant of the US financial system. The subcomponents moved about quite a bit – for instance, with lower public sector debt being compensated by higher private debt. But the aggregate itself seemed very stable. During the 1980s, however, this stability ended. Aggregate debt rose to a new plateau of about 180% of GDP in the United States. At the time, this led to some consternation in policy circles about the burden of too much debt. It is now about 240% of GDP. Leverage thus measured – that is, as a ratio of debt to income – has increased. Very many observers worry about this.[1]

Whatever the worries, lower rates do make leveraged positions easier to finance. Once account has been taken of lower real interest rates, debt servicing costs currently are actually rather modest: Graph 3 illustrates this point. On this (hypothetical) calculation, the real interest expense of servicing this debt (the thick line) has been below 5% of GDP since 2003 – much lower than in earlier decades. This explains why the household debt service ratio is now below where it was (the dashed line in Graph 4) in the early 1990s – eventhough debt is much higher.

Stocks of assets have also risen, which partly balances higher debt levels. Note that lower long-term interest rates also boost bond prices and probably other asset prices – so that the asset/liability balances of debtors look better, too.

(ii) Increased tolerance for fiscal deficits

Another, related consequence is that large budget deficits have been easier to finance. The fiscal accounts of the US federal government provide an illuminating example. During much of the 1980s, nominal government interest payments were between 8 and 10% of outstanding debt (see Graph 4). Part of this reflected inflation expectations during that decade. Historically, it has been the burden of interest payments – and not the size of the primary deficit – that has triggered corrective fiscal action (Sims, 2008). Currently, net

[1] For an international analysis of aggregate indebtedness see Cecchetti, Mohanty and Zampolli (2011). They identify the thresholds beyond which the burden of debt lowers growth.

interest payments in the US amount to only a little over 2% of government debt … one has to go back to the 1950s to find a lower debt service rate. So, if Sims is correct, another consequence of low long-term rates may be to delay fiscal correction. (The lowering of long-term interest rates in peripheral euro area countries following the adoption of the common currency had a comparable effect).

(iii) Increased interest rate exposures

The third consequence of low long-term rates is that interest rate exposures in the private sector have risen. Massive public sector debt financed at ever lower real long-term rates implies an increased stock of private sector assets locked into very low real returns. With a rather stable term premium of 200 basis points in recent years, banks and others had willingly assumed maturity exposures. The decline in the term premium from a range of 300–400 basis points between late 2001 and mid-2004 to zero by mid-2006 forced banks and others to reassess, and probably cut, their maturity exposures well before the subprime crisis broke.

Expansionary monetary policies pursued from late 2007 in the wake of the crisis-induced fall in real demand restored the term premium. With yield curves again upward sloping, banks and other financial firms were encouraged to increase their maturity exposures. The term spread (sometimes over 300 basis points) has been rather volatile over the post-crisis period.[2] For most of this time, however, volatility in interest rate derivatives markets has been quite low. Hence using options to limit potential losses from borrowing short and lending long is currently rather cheap: Graph 5 uses a measure of the volatility of three-month/10-year swaps. With a carry-to-risk ratio above 2 since mid-2009, interest rate carry trades in many guises have been encouraged.

The greater their degree of leverage in interest rate exposures, the more attentive investors must be to the interest rate environment. When interest rate expectations change, attempts by investors to close or to hedge their positions can lead to unusually brutal market movements. Many non-linearities can come into play – particularly when prices cross key thresholds that trigger further sales in a market that is already falling.

2. Is the long-term interest rate a policy victim?

(a) Macroeconomic factors: US monetary policy or the global saving rate

The idea that many years of low real long-term rates – or indeed any real variable exhibiting such persistence over time – can be attributed to monetary policy (as conventionally understood) is implausible. But it would be true that the more central banks get involved in "forward guidance" about their future policy rate, the stronger the link could become.[3]

Statistically, the long-term rate has not been closely correlated with the contemporaneous short-term policy rate. Time series of the short-term rate and the long-term rate have been shown to have quite different statistical properties. But there is of course some correlation. A simple regression result using annual data is that, on average over the past 30 years, a 100 basis point rise in the Federal funds rate has been associated with a 24 basis points rise in

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[2] The standard deviation of monthly changes has been 28 bp over the past decade. Historical comparisons, shown in Table 1, show that the term spread has been quite volatile.

[3] The role of overly easy monetary policy in driving down long-term rates, inflating asset prices and causing the financial crisis has been much debated. Shigehara and Atkinson (2011) provide a good review of this question and analyse how far the major international institutions argued for global monetary tightening during the years before the crisis.

the real 10-year yield on US Treasuries. Other studies have reported a similar average relationship. Nevertheless the link between the two interest rates is unlikely to be of constant size over time as investors' assessment of term risk changes as circumstances alter. The coefficient should be time-variant. There have been many periods when there has been no apparent relationship. For instance, during the first 18 months of the pre-crisis period of monetary policy tightening (ie from mid-2004 to end-2005) the US government bond yield did not rise – the famous Greenspan conundrum.[4]

Perhaps the most widely accepted macroeconomic explanation of low long-term rates is the global "saving glut" thesis of Bernanke. The rise in the global propensity to save since 2002 has indeed been remarkable. This rise was almost entirely due to a rise in the marginal propensity to save in developing Asia. Graph 6 shows that the marginal propensity to save in developing Asia has been above 40% for almost a decade. In the years before the sub-prime crisis, it rose to 55%. This is unprecedented for such a large area. Investment ratios in Asia also rose but by less. The aggregate current account surplus of emerging Asia therefore widened.

Because Asia was such an attractive place for foreigners to invest in, this surplus was supplemented by substantial capital inflows. Gross capital inflows into developing Asia (ie the sum of portfolio investment, direct investment and bank lending) amounted to almost $1 trillion in 2010. Given policies of resisting currency appreciation in many Asian countries, current account surpluses and strong gross capital flows have created a surplus for governments to invest in foreign financial assets. Their heavy investment in US securities has driven down long-term yields in US dollar bonds. Warnock and Warnock (2009) estimate that foreign purchases lowered US Treasury yields by 90 basis points in 2005.

(b) "Habitat" choices of investors: hunger for AAA-rated paper

Macroeconomic factors, however, are not the end of the story. It is the "habitat" choices of investors – that is, assets in which they choose to invest their surpluses – that shape the precise impact of fundamental macroeconomic forces on financial markets.

The governments, central banks and sovereign wealth funds in Asia are typically conservative in their foreign investment strategies. Their proclivity for highly liquid, AAA-rated assets of government (or quasi-government) bonds issued in the main financial centres – especially those denominated in dollars – is well known.

In addition, the insurance and bank regulators in the developed world have in recent years reinforced the global appetite for all such AAA-rated assets. Government paper has been especially favoured. Insurance regulators tend to give all local currency government bonds a zero risk weight. Local currency government bonds held by banks also carry a zero risk weight in most – but not all – jurisdictions. But it is important to underline that current international regulations do allow leeway in this matter. Although the zero risk weight is envisaged under the standardised approach of Basel II (which was carried over into Basel III), the internal ratings-based (IRB) approach requires banks to allocate capital according to their own assessment of a country's credit risk. But it seems that few (if any) major international banks actually departed from the zero risk weight. Hannoun (2011) argues that large and sophisticated banks are meant to follow the IRB, and not the standardised approach.[5]

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[4] But there was a more subtle link between the stance of monetary policy and the long-term rate on this occasion. The "measured pace" policy of Federal Reserve tightening deliberately nurtured in markets a sense of interest rate predictability, which made banks and others more willing to assume large maturity mismatches – and so keep long-term rates.

[5] He concludes that the accumulation of sovereign risk on the balance sheets of banks up to 2009 was the result of "market participants' complacent pricing". He points out shortcomings in both the European Union

The use of the government bond yield to discount the future liabilities of pension funds, etc – often at the behest of those who frame accounting rules – also pushed those managing investment funds on behalf of others to purchase government bonds of a similar duration as their liabilities.

Non-government AAA-rated paper has also been nurtured. The low risk weight for AAA-rated assets under the standardised approach of Basel II, for example, provided an unintended invitation to banks and others to "manufacture" new AAA-rated asset-backed securities on the back of risks that were anything but AAA. (This was corrected by the Basel Committee in July 2009, with implementation due by end-2011).

(c) An elastic supply of "new" AAA-rated paper

These strong and growing demands for AAA-rated paper swamped the volume of bonds issued by AAA governments and official international institutions in the years before the crisis. It was sovereign paper that had dominated global issuance of AAA-rated debt securities until the early 1990s. But it was then overtaken by the issuance of asset-backed securities or ABS (that is, including mortgaged-backed securities and covered bonds). ABS issuance of AAA-rated securities rose from about $80 billion in 1993 to almost $1 trillion by 2001, and to a peak of $2.8 trillion in 2006 (Graph 7).[6] During these years, non-financial corporate AAA issuance tended to decline as the population of AAA corporations shrank. Issuance in these five segments of AAA-rated paper, however, have different impacts on the long-term rate. This is because the floating-rate share of ABS and financial institution issuance is much higher than that of sovereign bonds (Table 2). Hence sovereign issuance continued to dominate the supply of AAA-rated fixed-rate issuance – and thus presumably the long-term rate – even in the heyday of ABS issuance. Aggregate fixed-rate issuance actually fell from 2003 to 2007 (Graph 8) – and this perhaps helped to hold down long-term rates.

After the financial crisis broke, the deflation of securitised debt structures based on sub-prime mortgages and other doubtful debts led to a dramatic shrinkage in ABS issuance. Yet the crisis itself also paradoxically favoured alternative AAA-rated paper. Because banks found it harder to issue unsecured debt in capital markets, they reverted to covered bonds – generally backed by their mortgage loans (Graph 7). Confidence in the viability of Fannie Mae and Freddie Mac was shaken during the crisis. They were nationalised in September 2008 – which had the short-term benefit of greatly reassuring those who held their bonds. The spreads on their bonds over US Treasuries fell from 84 bp on the Friday before the announcement of nationalisation to 56 bp on the Monday after.

In the years that followed, there was a substantial rise in non-ABS issuance by the US mortgage agencies. The aggregate issuance of Fannie Mae, Freddie Mac and the Federal Home Loan Banks actually rose from around $550 billion in 2006 to just under $1.2 trillion in 2010 (Table 3). The Federal Reserve became a large purchaser. Adding the issuance of these agencies to pure sovereign issuance from the year the mortgage agencies were nationalised (the black line with white circles shown in Graph 7) shows a very steep rise in the issuance of what are in effect AAA-rated public sector obligations – from just over $1 trillion in 2007 to an annual rate of over $4 trillion in 2010. In 2011, however, there was a substantial decline as issuance by the US mortgage agencies slumped.

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and the United States. The European Union's Capital Requirements Directives, which had introduced a generalised zero risk weight for all EU central government debt denominated and funded in domestic currency, is not in line with the spirit of Basel II. The United States has not yet implemented Basel II (it is still applying the OECD/non-OECD distinction of Basel I).

[6] Note that this phenomenon (ie the replacement of sovereign debt by ABS paper) applied only to AAA rated paper. It did not happen for AA-rated securities.

All this seems to support the much-discussed "shortage of safe assets" thesis. This argument is that, in times of stress or panic, investors accept very low real rates of long-term government bonds as a price of security. During many phases of the 2007–20xx crisis, a flight of investors to core bond markets has indeed been observed – even in the face of such massive issuance. Huge government borrowing and the continued size of issuance related to housing finance (especially the US mortgage agencies which are still under Federal government conservatorship) are not benign forces.

3. High government debt and asset substitutability across maturities[7]

When sovereign debts are so large, and fiscal prospects very uncertain, the risk of large movements in bond prices is surely greater than when fiscal positions are stronger. Many would argue that heavily indebted governments have historically either defaulted or inflated. From their examination of earlier periods of high indebtedness, for instance, Reinhart and Sbrancia (2011) conclude that financial repression in combination with inflation has historically played an important role in reducing government debts. They suggest that similar policies may be used to deal with the current high debt levels but "in the guise of prudential regulation rather than under the politically incorrect label of financial repression." Much recent commentary in the financial press goes in a similar direction.[8] So the links between government deficits, debt and the long-term interest rate deserve a closer look. Section 4 will look at regulatory policies.

Large and persistent budget deficits in the advanced economies have increased government debt. According to BIS estimates of global aggregates, government bonds outstanding amounted to over $43 trillion by September 2011, compared with less than $15 trillion at the start of 2000. There is a huge uncertainty about future budget deficits and their financing. Economists disagree about how quickly deficits should be reduced: some would stress deflation risks and others inflation risks. It is nevertheless certain that government debt/GDP ratios in major countries will continue to rise over the next few years. Even the optimistic G20 pronouncements do not envisage debt/GDP ratios in the advanced countries stabilising before 2016.

There is no consensus among economists on the impact of high government debt/GDP ratios on the level of long-term interest rates.[9] One dimension is that of the Ricardian versus non-Ricardian perspective on the private sector response. In a Ricardian world, high government debt has no effect on the long-term rate of interest as the private sector increases savings to meet future tax liabilities. Another dimension is the nature of the policy response. One characterisation of this is "fiscal dominance" versus "monetary dominance" – a policy choice that excites much debate. In any case, as Woodford and others have shown, the problem is more complex than a simple fiscal versus monetary dominance. Even faithful adherence by the central bank to an anti-inflation monetary rule may not by itself be sufficient to ensure price stability – because government policy frameworks may engender fiscal expectations that are inconsistent with stable prices. Monetisation may not be the only channel for fiscal inflations (Leeper and Walker, 2011).

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[7] The rest of this note draws on Turner (2011), where the issues are set out more fully.

[8] See, eg Milne (2011), who argues that risky assets do not cause crises, but rather it is those perceived as safe that do.

[9] The discussion in this paragraph focuses on local currency debt. In the case of foreign currency debt, however, the markets enforce much lower debt/GDP ratios.

How and when theoretical uncertainty about the impact of high government debt on some equilibrium long-term interest rate will translate into actual bond market movements will depend among other things on market dynamics. Market movements will depend in part on the balance sheet positions of investors, of debtors and of financial intermediaries when expectations change.

The more interest rate exposures are leveraged, the higher the probability of destabilising dynamics once expectations change. Households rushing to lengthen the maturity of their mortgages will force their lenders to cover their new interest rate exposures. This will set off price movements in interest rate markets. Wholesale investors in the markets for bonds and interest rate derivatives (such as banks, pension funds, hedge funds and so on) can act very quickly and on a large scale. When expectations about yields change, efforts by these intermediaries to cut interest rate exposures can magnify the movement of market yields. Lower bond prices can in turn trigger yet further sales. The increased volatility of prices (historic or implied from options prices) would itself raise the measure of market risk used by banks. Such mutually reinforcing feedbacks can further destabilise markets even in the absence of a new macroeconomic shock. Several past episodes of government bond market crisis have demonstrated the force of such effects.

For all these reasons, it seems likely that a long period of high government debt/GDP ratios will increase uncertainty about the future path of interest rates, both real and nominal. It is difficult to know how Ricardian households will be in the face of a global fiscal crisis. And doubts about the nature of the policy response will increase uncertainty about inflation and, perhaps, about future growth. Macroeconomic tail risks have risen in the global economy. At least much market commentary suggests so – some talk about latent inflation risks while others fret about deflation. The credibility of fiscal and monetary policy frameworks in the advanced countries has been weakened by the crisis. And governments' ability to implement effective countercyclical fiscal policies is more constrained when debt is high.

Uncertainty about future interest rates is important because it determines whether investors regard short-term and long-term paper as close substitutes. In a world of perfect certainty about future short-term rates, the maturity mix of debt would have no consequences because debt of different terms would be perfect substitutes for one another. There would be no term premium for longer-dated paper. A high degree of asset substitutability would also support the pre-crisis monetary policy orthodoxy that control of the overnight interest rate (combined with credible communication about the likely path of the policy rate over a near-term horizon) is sufficient for central banks to shape macroeconomic developments. Changes in the overnight rate and expected future overnight rates feed through quickly to at least the near end of the yield curve. Transmission of policy rate changes to the whole structure of interest rates is thus effective.

But uncertainty about the path of future interest rates (and differences in investor preferences) will make debt of different maturities imperfect substitutes. As uncertainty increases, term premia would rise and become less stable. Because of this, changes in the mix of short-term and long-term bonds offered by the government will change relative prices and thus influence the shape of the yield curve. At the same time, monetary policy based on setting the policy rate becomes less effective: the lower the degree of asset substitutability, the weaker the transmission of changes in the overnight rate to other interest rates. Hence government debt management policies (or central bank purchases of bonds) become more effective exactly when classic monetary policy reliant on the overnight rate works less well.

4. Increased regulatory demands to hold government bonds: financial repression?

The global financial crisis has not only given governments massive debts to finance but has also given rise to (or reinforced) rules requiring regulated financial firms to hold more

government bonds. Although such rules are part of post-crisis efforts to make the financial system safer, there are concerns of financial represssion.

Institutional investors such as insurance companies and pension funds have liabilities that extend far into the future, and they have been hard-hit by a period of low long-term interest rates. Such firms use some variant of a long-term interest rate to discount their future liabilities in the instruments they sell. Many insurance companies have liabilities from products (sold in earlier years) that offer guaranteed minimum returns that are now above the current level of interest rates on government bonds. Those meeting the commitments of defined-benefit pensions made at a time when long-term rates were higher face a similar problem.

The new European supervisory framework for insurers, Solvency II, contains several provisions that will induce insurance companies to increase their holdings of government bonds. Peter Praet's recent report throws much useful light on this (BIS, 2011c). All European government bonds in domestic currency – even euro area periphery debt – are classified as risk-free and thus carry a zero capital requirement. Capital requirements for other bonds are calculated by multiplying the rating-based risk factor by the duration of the bonds – thus penalising such long-term paper. Finally, the regulatory treatment of AAA-rated covered bonds appears more lenient than that of corporate bonds, which effectively attract a capital charge similar to that of equities.

Secondly, insurers' demand for government bonds may be made more procyclical. For example, a sharp decline in the value of total assets coming from a decline in prices of the risk assets of an insurance company (for instance, equities and corporate bonds) will reduce the solvency ratio of the company. If the firm cannot raise new capital, it could be forced to sell its equities (which carry a significant risk weight and thus capital requirement) and buy government bonds (which carry zero capital requirement). Such rebalancing could destabilise markets by reinforcing downward pressure on equity prices and upward pressure on bond prices.[10] A sharp rise in equity prices would have the opposite effect, and encourage firms to sell low-yielding government bonds when economic prospects improve and equity prices rise.

Thirdly, Solvency II will require insurers to use the government bond yield to calculate the present discounted value (PDV) of their liabilities. This means that the simplest way to minimise the volatility of the gap between the market value of assets and the PDV of liabilities is to hold as assets those bonds used to define the discount rate. A similar logic is increasingly applied to pension funds, trustee-managed accounts and so on.

The choice of the government bond yield to calculate the PDV of future liabilities is to some extent arbitrary. And regulators have in the past been willing to relax the rules in difficult market circumstances – when rigid maintenance of the rules would have forced sales and aggravated market instability.[11]

Regulators in advanced countries are also requiring banks to increase their holdings of liquid assets. There is much debate as to what form such assets should take. One dimension of this is the choice between short-dated bills and long-term bonds. Traditionally, liquidity rules have required banks to hold short-dated government bills to meet liquid asset ratios. The UK imposed such ratios up until the 1970s, and long-term government bonds did not qualify. The

[10] Institutional investors are often procyclical without any official encouragement. Keynes criticised the procyclical behaviour of pension funds in the 1930s. He resigned as Chairman of the National Mutual over their sales of US equities after the 1937 recession (Tily, 2010).

[11] Gyntelberg et al (2011) point out that the Danish FSA in October 2008 temporarily allowed pension funds to replace the government bond yield by the (higher) mortgage bond yield to compute the market value of future liabilities – to bring it more in line with the valuation of assets. In other countries, insurance regulators recently relaxed the rules on recognising the full impact of falling government bond prices in some euro area countries.

practice in some other countries, and that envisaged under Basel III, is to allow government bonds of all maturities as liquid assets in meeting the Liquidity Coverage Ratio.[12] If banks hold long-term bonds, they are exposed to maturity mismatches and interest rate risks. On the other hand, if banks hold short-term government bills, it is the government that faces comparable refunding risks. A key issue, then, is whether the banks or the government is best placed to bear such risks.

The second choice is between private sector and public sector paper. The Bank of England's preference in its discount operations for commercial bills – and not government bonds – in the 19th century lasted well into the 1920s. Nowadays the preference is for public sector paper. Allowing banks to meet liquidity rules by holding short-term debt securities issued by other banks would probably increase systemic risk by magnifying bank-to-bank contagion. But it is always worth exploring how greater use could be made of reliable private sector paper. For instance, the greater acceptance of high-quality private sector debt products issued by non-financial firms or households (eg credit card debt) could help securitisation markets recover. Securitised products that are based on liabilities that are due to mature over approximately the next 12 months would have the attractive self-liquidating properties that exchange bills had in the 19th century. The accuracy of credit ratings assigned to such short-term paper could be regularly tested as maturing paper falls due within short intervals – quite unlike the ratings on very long-term debt!

A final dimension that could be of great systemic importance is that forcing banks and other financial firms to increase their holdings of bonds issued by their own governments will accentuate interconnections between banks and sovereign risk. Fabio Panetta's recent report (BIS, 2011b) analyses the many ways that increased sovereign risk can undermine local banks. The balance sheets of banks are weakened when the value of the government bonds they hold falls or becomes more volatile. The value of such bonds as collateral for wholesale borrowing from other banks can be severely eroded.[13] This report shows how important these contagion links have been in the current euro area crisis. When fiscal trajectories are unsustainable, therefore, the authorities will need to watch potentially dangerous interaction between heightened sovereign risk and regulatory policies that induce banks to hold large stocks of government debt.[14]

It is clear from this brief overview that a number of policies (of regulators, of accountants, of trusteeship rules) led regulated firms to increase their holdings of government bonds. Viewed from the microeconomic perspective of an individual firm, these rules or practices are eminently rational. But their aggregate impact could be harmful. For instance, such regulations may inadvertently reinforce the procyclical behaviour of investors: the appetite for safer assets such as government bonds tends to rise in pessimistic phases of financial market cycles. A related aspect is that increased holdings of government bonds by leveraged and large investors such as banks could increase bond market volatility in periods when expectations become unstable. As Hannoun (2011) has pointed out, these herding effects are not inevitable: the internal ratings-based approach of Basel II did encourage banks to discriminate between countries of different creditworthiness – and not apply a uniform zero weight for all.

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[12] That is, those issued in domestic currency by the sovereign or the central bank in the country. Note that Basel III does not designate government securities as the only qualifying liquid assets. See Hannoun (2011).

[13] Davies and Ng (2011) note that the share of European repo transactions collateralised by Greek, Irish or Portuguese bonds fell by more than half from the second half of 2009 to the second half of 2010.

[14] When fiscal trajectories are unsustainable, this report argues that "the preferential treatment given to government debt (particularly that which is lower-rated) relative to private debt may be less justified."

5. The long-term rate as a policy variable?

(a) Monetary policy and the long-term interest rate

Recent central bank operations in government debt markets have in effect made the long-term interest rate a policy variable. This is usually presented as wholly exceptionally – justified because of the zero lower bound (ZLB) constraint on further monetary easing once the policy rate is close to zero. The argument is that policies that shorten the maturity of debt held by the public (ie selling Treasury bills and buying government bonds) may lower long term yields without raising short-term yields, which are glued close to zero at the ZLB.

Yet the case for central bank purchases or sales of government debt is actually much more fundamental. It rests on the imperfect asset substitutability across the yield curve. As argued above, it is uncertainty about the path of future interest rates that makes debt of different maturities imperfect substitutes.

(i) Keynes and the National Debt Enquiry

The general argument that central banks could be more effective by acting directly in bond markets is a very old one. Keynes was probably the most famous proponent. Open market operations in long-term government debt were central to his analysis in *Treatise on Money* of how central banks could combat slumps.[15] Keynes argued for what he called "open market operations to the point of saturation":

> "My remedy in the event of the obstinate persistence of a slump would consist, therefore, in the purchase of securities by the central bank until the long-term market rate of interest has been brought down to the limiting point."[16]

He felt that central banks had "always been too nervous hitherto" about such policies, perhaps because under the "influence of crude versions of the quantity theory [of money]." He repeated this analysis in *The General Theory*:

> "The monetary authority often tends in practice to concentrate upon short-term debts and to leave the price of long-term debts to be influenced by belated and imperfect reactions from the price of short-term debts – though … there is no reason why they need do so."[17]

Contrary to popular myth, he did not believe that there had been a liquidity trap in the 1930s: it was a theoretical possibility that had not been tested "owing to the unwillingness of most monetary authorities to deal boldly in debts of long term".

He went on to suggest that the "most important practical improvement which can be made in technique of monetary management" would be to replace "the single Bank rate for short-term bills" by "a complex offer by the central bank to buy and sell at stated prices gilt-edged bonds of all maturities".

It is true that there was a massive conversion of government debt to a lower coupon in 1932, which Keynes hailed as a "great achievement" for the Treasury and the Bank of England. Short-term rates were cut sharply. But his more general advice for aggressive central bank

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[15] The focus of his analysis was on the asset side of the central bank's balance sheet and thus mirrors the Federal Reserve's rationale for its recent Quantitative Easing. Unlike Hawtrey (for instance), he did not focus on the liability side – that is the impact on commercial bank deposits.

[16] Keynes (1930), pp 331–2. One constraint he saw was that a central bank acting alone would simply induce capital outflows: he felt the newly established BIS could encourage internationally coordinated central bank efforts to reduce long-term interest rates. Per Jacobsson, Economic Adviser at the BIS at the time, also strongly supported policies aimed at reducing long-term rates.

[17] Keynes (1936), page 206.

purchases of debt (or the equivalent change in issuance) went unheeded. Government debt remained long term: in the mid-1930s, only 3% of bonds had a maturity of less than five years and 86% of bonds had a maturity in excess of 15 years. Susan Howson's (1975) study of British monetary policy in the 1930s found that this limited the effectiveness of the cheap money policy instituted once Britain had left the gold standard: debt management policy ran counter to the monetary policy intent of low short-term rates.

During World War II, low interest rates became a key ingredient of wartime finance. In the closing months of World War II, with the UK facing huge government debts, Keynes, an influential member (with Meade and Robbins) in the UK Treasury's National Debt Enquiry (NDE), argued against the "dogma" of financing debt at long maturities. Governments should not "fetter themselves … to a counter-liquidity preference" but should accommodate the preferences of the public for different maturities.

In the NDE, Keynes won the argument he had lost in the 1930s. The Permanent Secretary to the Treasury, who summarised the Enquiry's conclusions, made a point of noting that the Enquiry had taken as given Keynes's view that the long-term rate of interest could be controlled by determined official action. This view, he noted, "would now command a wide measure of agreement among economists". The proposed "programme of initial procedure" as he put it – the idea was to adapt this policy in the light of experience – was: "the Treasury bill rate to be brought down to ½% and 5-year bonds to be issued at 1½% and 10-year bonds at 2% to be issued on tap, a new series to be started annually" (Tily, 2010).

But Keynes did not want the long-term rate to go to zero. It was, he said, "socially desirable" that rentiers should get some return on their capital.[18] He argued that this was necessary for viable pension provision for unsophisticated, small investors (widows and orphans was his phrase) and for university endowments (dear to his heart).

This line of reasoning has found significant echoes in some recent work. In his analysis of maturity transformation by financial intermediaries which have (uncertain) long-term liabilities, Tirole has developed this Keynesian tradition further. In the presence of macroeconomic shocks that affect everybody simultaneously, he argues, private sector assets are not useful. Instead what is needed is an external risk-free store of value such as government bonds. A prolonged period of low rates of interest on government bonds can make some pension products offered by such firms unviable. Tirole (2008) therefore argues that:

> "liquidity premia [on] risk-free assets [are] a useful guide for the issuing of government securities both [in total] and in structure (choice of maturities) … a very low long rate signals social gains to issuing long-term Treasury securities. A case in point is the issuing by HM Treasury of long-term bonds in reaction to the low rates triggered by the 2005 reform of pension funds requirements."

In arguing for an elastic supply of 10-year bonds at 2% in 1945, the NDE had made a similar point: this would allow insurance companies to offer "annuities on joint lives, calculated on the basis of a low rate of interest" and so encourage "the habit of thrift".

(ii) The Radcliffe Report

The Radcliffe Report in 1959 strongly reiterated Keynes's view that policy should consciously influence the long-term rate of interest. But it did so because of worries about an inadequate central bank response to inflation, not deflation.

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[18] Meade, who believed that investment was more interest rate sensitive than Keynes did, disagreed. His view was that the long-term rate of interest could be reduced to near zero to counter depression but should rise to meet any inflationary threat. His diary entry for 26 February 1945 reads: "in my mind the real social revolution is to be brought about by the most radical reduction in interest rates which is necessary to prevent general deflation". See Meade (1990), page 46.

As HM Treasury made quite clear in its evidence to Radcliffe, the authorities cared more about maintaining stability in the bond market than about macroeconomic control:

> "No attempt is made to use official purchases and sales in the market for the specific purpose of raising or lowering the level of medium and long-term interest rates … [because this] would create market uncertainty and so impair the prospects of continuing official sales of securities … Such operations would involve a serious risk of damage to confidence and to the Government's credit."

Many of the economists who gave evidence to Radcliffe disagreed with this policy orientation. Several argued that a main effect of monetary policy on aggregate demand worked through the long-term interest rate. R F Kahn reiterated the view that both Keynes and Meade had expressed in the NDE, namely that the:

> "authorities … including the Bank of England … and those responsible for managing the national debt … are capable, within very broad limits, of achieving any desired structure of interest rates … provided they are not worried about the quantity of money."

The Radcliffe Report sided with the economists – and against the Treasury. A key conclusion was that "the structure of interest rates rather than the supply of money [was] the centre piece of the monetary mechanism." In this, government debt management was to play a central role. The Report concluded with five main points. Among them a clear – and all-too-often overlooked – statement of the importance of the long-term interest rate as an objective of monetary policy.

> "There is no doubt that … monetary policy … can … influence the structure of interest rates through the management of the National Debt which, if burdensome to the financial authorities in other respects [ie increasing debt servicing costs], affords in this respect an instrument of single potency. In our view debt management has become the fundamental domestic task of the central bank. It is not open to the monetary authorities to be neutral in their handling of this task. They must have and must consciously exercise a positive policy about interest rates, long as well as short.

The Report argued that policy reliance on short rates alone had proved ineffective. It noted that, in one tightening phase in the early 1950s, higher short rates were followed by higher long rates only after a long lag. This lag made the eventual movement in long rates procyclical, rising when the downturn was already underway. It would have been better to have directly encouraged the rise in long rates right at the beginning of the tightening phase. Moving all rates up improves the chances of timing countercyclical monetary policy correctly.

The Report explicitly countered the Treasury view on the need to support the bond market by arguing that greater efforts "to foster greater understanding outside official circles … of the intentions of the authorities would reduce the risk of perverse reactions in the market [from bond sales]".

Their recommendation for greater activism in moving long-term rates, however, fell on deaf ears. With government debt around 130% of GDP, it is perhaps not surprising the authorities were reluctant to countenance any rise in debt servicing costs.

(iii) Tobin and Friedman

It was Tobin (1963) who developed the theoretical models of how central bank operations in long-term debt markets work. He stressed the importance of the policies of government debt finance – for the long-term rate of interest. Central banks in effect issue the shortest duration official debt in their operations to implement monetary policy. From the perspective of portfolio choice, government issuance of short-term debt is like monetary expansion. Tobin puts this point well:

> "There is no neat way to distinguish monetary policy from debt management, [both] the Federal Reserve and the Treasury … are engaged in debt management in the broadest sense, and both have powers to influence the whole spectrum of debt. But

> monetary policy refers particularly to determination of the supply of demand debt, and debt management to determination of the amounts in the long and nonmarketable categories. In between, the quantity of short debt is determined as a residuum."

Milton Friedman had made exactly the same point in 1959: he devoted the third chapter of his *A program for monetary stability* to debt management, saying that "open market operations and debt management are different names for the same monetary tool". For him, central bank purchase of bonds could be the "major weapon" in a crisis to lower long-term yields relative to the expected path of short-term rates. See Nelson (2011).

Tobin went on to argue for the use of debt management (ie shifting between short-dated and long-dated paper) as a countercyclical policy to influence private capital formation, and thus real output. His conclusion was that:

> "The Federal Reserve cannot make rational decisions of monetary policy without knowing what kind of debt the Treasury intends to issue. The Treasury cannot rationally determine the maturity structure of the interest-bearing debt without knowing how much debt the Federal Reserve intends to monetise".[19]

His analysis was that of portfolio choice under uncertainty (which he had used in his famous interpretation of Keynes's liquidity preference theory). Official sales of debt trigger portfolio rebalancing effects that can take many forms.

Nobody disputes the logic or importance of such portfolio rebalancing effects. But there is much controversy about magnitudes. This is probably because the degree of substitutability across asset classes is not stable but rather depends on macroeconomic and financial conditions. This makes empirical estimation very hard.

(b) Government debt management and the long-term interest rate

Imperfect substitutability between assets of different maturities means that government debt management choices matter for the long-term interest rate. In principle, such choices could be made independently of macroeconomic or monetary developments. In practice, they are probably not.

(i) Macroeconomic responses of government debt managers

The average maturity of issuance of US government debt, for instance, has shown quite wide variation over the years. In recent years, the underlying policy objective has been to lengthen the (comparatively short) maturity of US government debts: see Graph 9. Whether pursuit of this objective has proved justified (ex post) on microeconomic grounds is not clear. The discussion of the term premium in section 1 (larger in recent decades and no more unstable than in the 1960s and 1970s) suggests shorter-dated financing would have been cheaper. For the purpose of this paper, however, it is the link with the macroeconomic policy stance that is of most interest. There is statistical evidence that, over the past 30 years, the maturity of outstanding US debt has tended to be shortened when the Federal funds rate is low.[20] This may reflect the fact that debt managers deliberately take advantage of unusually low near-term market rates when the central bank's policy stance is accommodating. In this sense, debt issuance and monetary policy work in the same direction.

There is also evidence that larger fiscal deficits tend to lead to a lengthening of maturities in the following year. Debt managers often say that longer maturities are indeed needed to

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[19] His suggestion was that full responsibility for Federal government debt management be assigned to the Federal Reserve, not the US Treasury.

[20] The evidence is set out in Turner (2011), pp 30–31.

spread out higher debt over longer time periods. The academic literature on this link has focused on the role of debt management in providing fiscal insurance (Missale, 2011). Faced with a deterioration in its fiscal position (according to reasoning based on an intertemporal budget constraint), a government seeks to reduce the market value of its debt. It can drive up the long-term rate by lengthening the maturity of its issuance. At the limit, it could overfund its budget deficit – issuing long-dated paper on a massive scale and buying short-term assets from the private sector. Faraglia et al (2008) have shown this is not what happens. Their explanation is that potential private buyers of government debt would face credit constraints and that the government would have to hold risky private assets. The assumption of market completeness is therefore not satisfied.

Whatever the reasons, debt management choices do seem to have responded to the stance of both monetary policy and fiscal policy. But endogeneity does not reflect a conscious view that debt management policies could be deliberately adjusted to serve fiscal or monetary policy objectives.

How large the macroeconomic impacts of more activist debt-management policies would be depends on the strength of portfolio-balancing and the substitutability between short-term and long-term debts. For the reasons discussed above, such substitutability will not be uniform either across countries or over time. The experience of one country will not necessarily be a good guide to what would happen in another country. What works in one episode will not necessarily work in another. Nevertheless, it is not difficult to imagine circumstances in which such policies can be highly effective. In times of crisis, for instance, a large (but temporary) decline in asset substitutability (because of greater macroeconomic uncertainty, banks with weakened balance sheets less able to take interest rate risks etc) will make activist debt management policies more effective.

(ii) Coordination between central banks and debt managers

It is clear that activism motivated by macroeconomic objectives in both debt management policies by the Treasury (or DMO) and central bank balance sheet policies would create coordination problems. A central bank could not take optimal decisions in response to macroeconomic developments if it did not take account of how the Treasury would respond. How any policy towards the long-term rate is made operational would matter. A target range could be set for the rate itself (as Keynes advocated): in this case, the central bank balance sheet/government debt issuance becomes endogenous. Or the authorities could set quantity targets for sales or purchases (as in the recent policies of quantitative easing) leaving the market to determine the rate. Different coordination mechanisms would be applied according to which mode of operation is selected.

Without mechanisms to ensure the consistency of different policies, QE operations decided by the central banks could well be contradicted by Treasury financing decisions. Remember that the government's balance sheet is much larger in normal times than that of the central bank. The central bank's balance sheet is more elastic perhaps – because it can create liabilities on a very large scale to finance assets. But if its policies just induce the opposite reaction of the debt manager (taking advantage of an unusual configuration of interest rates), its theoretical elasticity will have less practical effect. Recall the famous "Operation Twist".[21] When the Federal Reserve used open market operations to flatten the yield curve by shortening the average maturity of Treasury debt in the early 1960s, the US Treasury in effect worked against this policy by ultimately lengthening the maturity of issuance.

[21] See Swanson (2011), who explains that it began as a joint FRB-Treasury programme – unlike the later programmes. Chadha and Holly (2011) estimate that the Federal Reserve's purchases of $8.8 billion under this programme is the equivalent of $225 billion when scaled at today's GDP.

What about the recent QE policies in the United Sates? QE cannot be analysed without taking account of changes in Treasury debt management policies. The US Treasury has been lengthening the average maturity of its outstanding debt in recent years. This is difficult to square with QE, which aims to shorten the maturity of bonds held by the public. One simple approach is to examine elements of the consolidated balance sheet of the Treasury and the central bank. The first table in Tobin's 1963 classic paper – which summarised the structure of Federal government debt in the hands of the public – is a good place to start. (But it is, of course, a highly stylised characterisation of the monetary impulse of changes in debt maturity).

With the adoption of QE after the crisis, reliance on short-term debt and Federal Reserve obligations was increased. Between the end of FY2007 and the end of FY2009, currency and Federal Reserve obligations more than doubled (Table 4). Short-term marketable securities outstanding also doubled with an almost $2 trillion expansion in money and short-dated paper, this clearly represented a very significant easing of policy. What might be called "monetary financing" in the first two years of the crisis went from 34% to 43%.

But in the third year of the crisis, the maturity of Treasury debt issuance changed in a restrictive direction. Monetary financing actually declined from 43% at end-September 2009 and to 35.5% at end-September 2010. In the most recent period, QE was partly offset by longer-dated Treasury issuance.

Table 5 provides further data on maturity choices. It shows that the Federal Reserve's portfolios of US Treasuries with a maturity of two years or more rose by $759 billion; US Treasury issuance was $1303 billion. Hence Federal Reserve policies reduced the volume of new long-dated paper to be sold to the public, which tended to lower bond yields. But note, however, that Treasury issuance was of longer maturity than Federal Reserve purchases. The average maturity of new issuance placed with the public rose to about 7½-8 years – as the average maturity of Federal Reserve purchases was a little below that of gross Treasury issuance. This compares with an average maturity of new issuance of four years in 2006 – the year before the crisis. Hence the maturity of government debt held by the public has risen substantially during the recession – notwithstanding Federal Reserve purchases.

Somewhat different issues arise in the euro area which does not have a single fiscal authority. Hoogduin et al (2010) point out that the Maastricht Treaty did not constrain national debt managers in the euro area – even though their local decisions (for example, to issue short-dated paper) could have monetary implications. They show that, in the euro area, a steepening of the yield curve had led national debt managers to shorten the duration of their issuance.

More work is needed on the complex interaction between monetary policy and debt management policy. Paul Fisher's recent report (BIS, 2011a) on potential interactions between sovereign debt management and central banks provides an authoritative account of (difficult) coordination issues. This report analyses have circumstances can alter the nature of policy spillovers involved. It considers practical steps to ensure effective coordination.

Conclusion

Policy victim, policy variable or policy lodestar – what best describes the long-term interest rate? This question was prompted by the observation of a strong, apparently secular, decline in the real long-term interest rate to a very low level. This decline has helped the balance sheets of banks, pension funds and other investors in such securities. Yields have fallen despite an extraordinary expansion in the issuance of AAA-rated fixed-rate paper in the past few years – thanks to large fiscal deficits and government guarantees for the US mortgage agencies.

Has the long-term interest rate become the victim of government policies? The aggregate impact of many quite distinct policies – the investment of foreign exchange reserves, the regulation of the insurance and banking industry, valuation rules for pension funds and so on – on the long-term interest rate has become more marked than a decade or so ago. These policies have contributed to a lowering of the real risk-free long-term interest rate – and this has been largely unintended. By how much we do not know – so we cannot compute where the long-term rate would be in the absence of such policies. Such policies may also have made the long-term interest rate more procyclical – falling more when economic prospects weaken and rising more sharply when growth recovers.

How powerful such effects have been is an empirical question. There are, of course, several countervailing forces. As Hervé Hannoun has pointed out, the IRB approach under Basel II did try to encourage large and sophisticated banks to be more discriminating in their sovereign exposures. All regulated investors should have their own risk management policies. Another countervailing force is that non-regulated investors can exploit any mispricing caused by regulation. Greater financial market depth creates arbitrage opportunities that can be used to circumvent regulation. The integration of global capital markets tends to weaken the impact of one country's regulations.

The second element is that the crisis responses of central banks in many advanced countries have in effect made the long-term interest rate a policy variable. Perhaps this is purely temporary and exceptional, motivated by a wish to implement further monetary easing when short-term rates are already at zero. But there is nothing new in the view that central banks can be more effective when they intervene directly in bond markets. Keynes was perhaps the best known advocate. Milton Friedman shared his opinion that central banks, in a crisis, should purchase government bonds to drive down long-term yields. Regarding the long-term rate as a policy variable would inevitably focus more attention on the macroeconomic and financial consequences of government debt management policies. As Goodhart (2010) has argued, these policies will no longer be regarded as the exclusive domain of debt managers constrained by technical benchmarks.

The fundamental issue is the degree of asset substituitability across the yield curve: uncertainty about the path of future interest rates makes debt of different maturities imperfect substitutes. A prolonged period of high government debt/GDP seems likely to increase such uncertainty. If so, the long-term rate may come to be regarded as a policy variable for some considerable time. It is not difficult to envisage many, quite different scenarios. The euro area crisis has concentrated attention on sovereign risk. Another scenario centres around inflation risk. For example, a sharp upward hike in bond yields triggered by an inflation scare that is regarded as unwarranted in official circles might lead to calls for direct central bank or government action in the bond market. The purported rationale could be counter the consequences of "excessive market volatility", not to provide government direction to a market price. But central banks will naturally be wary about unwarranted optimism about their ability to steer long-term rates for any length of time when budget deficits and government debt are very high.

The third, and contradictory, element is that the long-term interest rate is still taken by many as a key market signal to guide policy. It is widely used as a policy lodestar. It is important for guiding macroeconomic policies because it can be used to measure expectations of inflation and growth. Such expectations about an uncertain future can weigh heavily in deliberations about macroeconomic policies. It can be central to many microeconomic policies because of its influence on the discount rate. Public sector investment decisions depend on the discount rate applied to future costs and benefits. Ramaswamy (2012) has shown how sensitive choices about pension provisions are to the long-term rate of interest.

This paper argues great caution is needed in drawing policy implications based on the real long-term interest rate currently prevailing in markets. This interest rate has moved in a wide range over the past 20 years. At present, it is clearly well below longstanding historical norms. Several explanations come to mind. But not enough is known about how far the long-term rate has been contaminated by government and other policies. Nor is the

persistence of such effects clear. And the various policies will have impacted different parts of the yield curve in ways that are hard to quantify.

The concluding note of caution is this: beware of the consequences of sudden movements in yields when long-term rates are very low. Accounting and regulatory changes may have made bond markets more cyclical. There is no evidence that bond yields have become less volatile in recent years. Indeed, data over the last decade or so mirror Mark Watson's well-known finding that the variability of the long-term rate in the 1990s was actually greater than it had been in the 1965–78 period. A change of 48 basis points in one month (ie not so unlikely since only twice the standard deviation shown in Table 1) would have a larger impact when yields are 2% than when they are 6%.

With government debt/GDP ratios set to be very high for years, there is a significant risk of instability in bond markets. Greater volatility in long-term rates may create awkward dilemmas in the setting of short-term rates and decisions on central bank holdings of government bonds. Because interest rate positions of financial firms are leveraged, sharp movements could also threaten financial stability.

References

Amato, Jeffery (2005): "The role of the natural interest rate in monetary policy". *BIS Working Paper* no 171. March.

Bank for International Settlements (2011a): *Interactions of sovereign debt management with monetary conditions and financial stability*. CGFS Papers no 42. May. www.bis.org/publ/cgfs42.htm

——— (2011b): *The impact of sovereign credit risk on bank funding conditions*. CGFS Papers no 43. July. www.bis.org/publ/cgfs43.htm

——— (2011c): *Fixed-income strategies of insurance companies and pension funds*. CGFS Papers no 44. July. www.bis.org/publ/cgfs44.htm

Cecchetti, Stephen G, M S Mohanty and Fabrizio Zampolli (2011): "The real effects of debt". Symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, 25–27 August.

Chadha, Jagjit S and Sean Holly (2011): "New instruments of monetary policy" in *Interest rates, prices and liquidity – lessons from the financial crisis*, Cambridge University Press.

Davies, Michael and Tim Ng (2011) "The rise of sovereign credit risk: implications for financial stability ". BIS *Quarterly Review*. September. www.bis.org/publ/qtrpdf/r_qt1109.htm

Faraglia, Elisa, Albert Marcet and Andrew Scott (2008): "Fiscal insurance and debt management in OECD economies". *The Economic Journal* no 118. March. pp 363–86.

Friedman, Milton (1959): *A program of monetary stability*. Fordham University Press. New York.

Goodhart, Charles (2010): *The changing role of central banks*. BIS Working Papers no 326. www.bis.org/list/wpapers/index.htm

Gyntelberg, Jacob, Kristian Kjeldsen and Mattias Persson (2011): "The 2008 financial crisis and the Danish mortgage market" in *Global Housing Markets* (eds Ashok Bardhan, Robert Edelstein and Cynthia Kroll). John Wiley & Sons.

Hannoun, Hervé (2011): "Sovereign risk in bank regulation and supervision: where do we stand?". FSI presentation at Abu Dhabi, 26 October. www.bis.org/speeches/sp111026.htm?ql=1

Hicks, John (1958): "The yield on consols", Paper read to the Manchester Statistical Society in March 1958 and submitted in evidence to the Radcliffe Committee. Revised and reprinted in *Critical Essays in Monetary Theory*, Oxford University Press 1967.

Howson, Susan (1975): *Domestic monetary management in Britain 1919–38*. University of Cambridge. Department of Applied Economics. Occasional Paper 48.

Keynes, J M (1936): *The general theory of employment interest and money*. Volume VII, Collected writings of John Maynard Keynes. Macmillan for the Royal Economic Society.

——— (1930): *A Treatise on Money Vol 2,* Volume VI, Collected writings of John Maynard Keynes. Macmillan for the Royal Economic Society.

Leeper, Eric M and Dodd B Walker (2011): "Perceptions and misperceptions of fiscal inflation". *BIS Working Paper* no 364. December. www.bis.org/publ/work364.htm

Milne, Richard (2011): "Beware of safe havens when seeking the next financial crisis". *Financial Times*, 28 June.

Mills, Terence and Geoffrey E Wood (2009): "Two and half centuries of British interest rates, monetary regimes and inflation". Mimeo. October.

Missale, Alessandro (2011): "Sovereign debt management and fiscal vulnerabilities". Mimeo.

Nelson, Edward (2011): “Friedman’s monetary economics in practice”. Finance and Economics Discussion Series. 2011–26. Federal Reserve Board. April.

Radcliffe Report (1959): *Committee on the working of the monetary system*, Cmnd 827, HMSO, London.

Ramaswamy, Srichander (2012): *The sustainability of pension schemes*. BIS Working Paper no 368. January. www.bis.org/publ/work368.htm

Reinhart, Carmen and Belen Sbrancia (2011): *The liquidation of government debt*. NBER Working Paper no 16893. March. (*BIS Working Paper* no 363).

Shigehara, Kumiharu and Paul Atkinson (2011): *Surveillance by international institutions: lessons from the global financial and economic crisis*. OECD Economics Department Working Paper no 860. May.

Sims, Christopher A (2008): “Stepping on a rake: the role of fiscal policy in the inflation of the 1970s”. Mimeo. October.

Swanson, Eric (2011): “Let’s Twist again: a high-frequency event-study analysis of Operation Twist and its implications for QE2”. *Brookings Papers on Economic Activity*. Spring, pp151–188.

Tily, Geoff (2010): *Keynes betrayed: the General Theory, the rate of interest and ‘Keynesian’ economics*. Palgrave Macmillan.

Tirole, Jean (2008): “Liquidity shortages: theoretical underpinnings”. *Banque de France Financial Stability Review*. February.

Tobin, James (1963): “An essay on the principles of debt management”, *Fiscal and debt management policies*, Prentice-Hall, Reprinted in James Tobin *Essays in Economics: Volume 1* (1971). Markham Publishing Company, Chicago.

Turner, Philip (2011): *Fiscal dominance and the long-term interest rate*. Financial Markets Group, London School of Economics. Special Paper No 199. March. www2.lse.ac.uk/fmg/workingPapers/specialPapers/PDF/SP199.pdf

Warnock, F and V Warnock (2009): “International capital flows and US interest rates”, *Journal of International Money and Finance*, vol 28, pp 903–19.

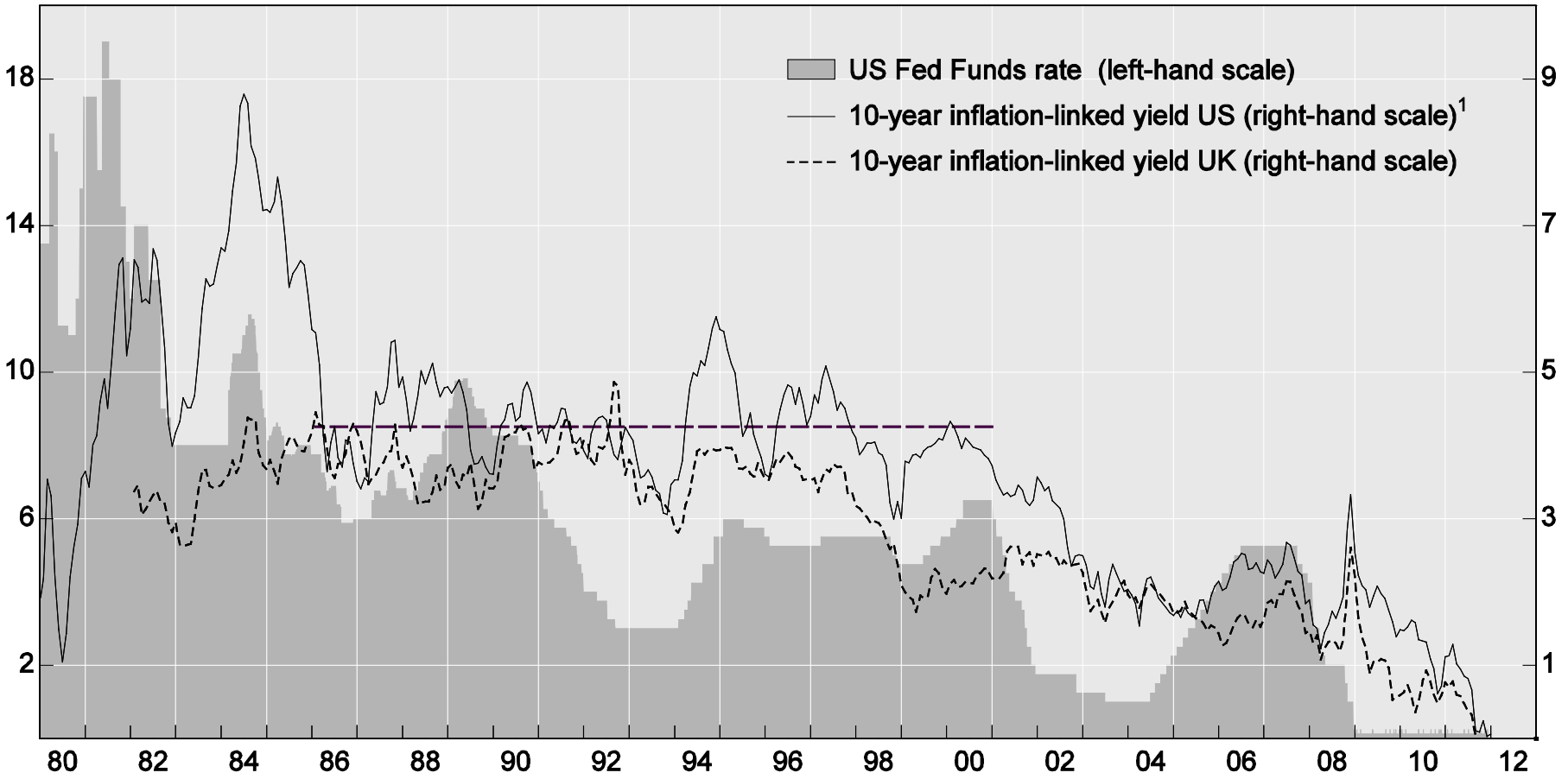
Watson, Mark W (1999): “Explaining the increased variability of long-term interest rates”. Federal Reserve Bank of Richmond. *Economic Quarterly*. Volume 85/4.

Graphs and tables

Graph 1

REAL LONG-TERM TREASURY YIELDS

In per cent



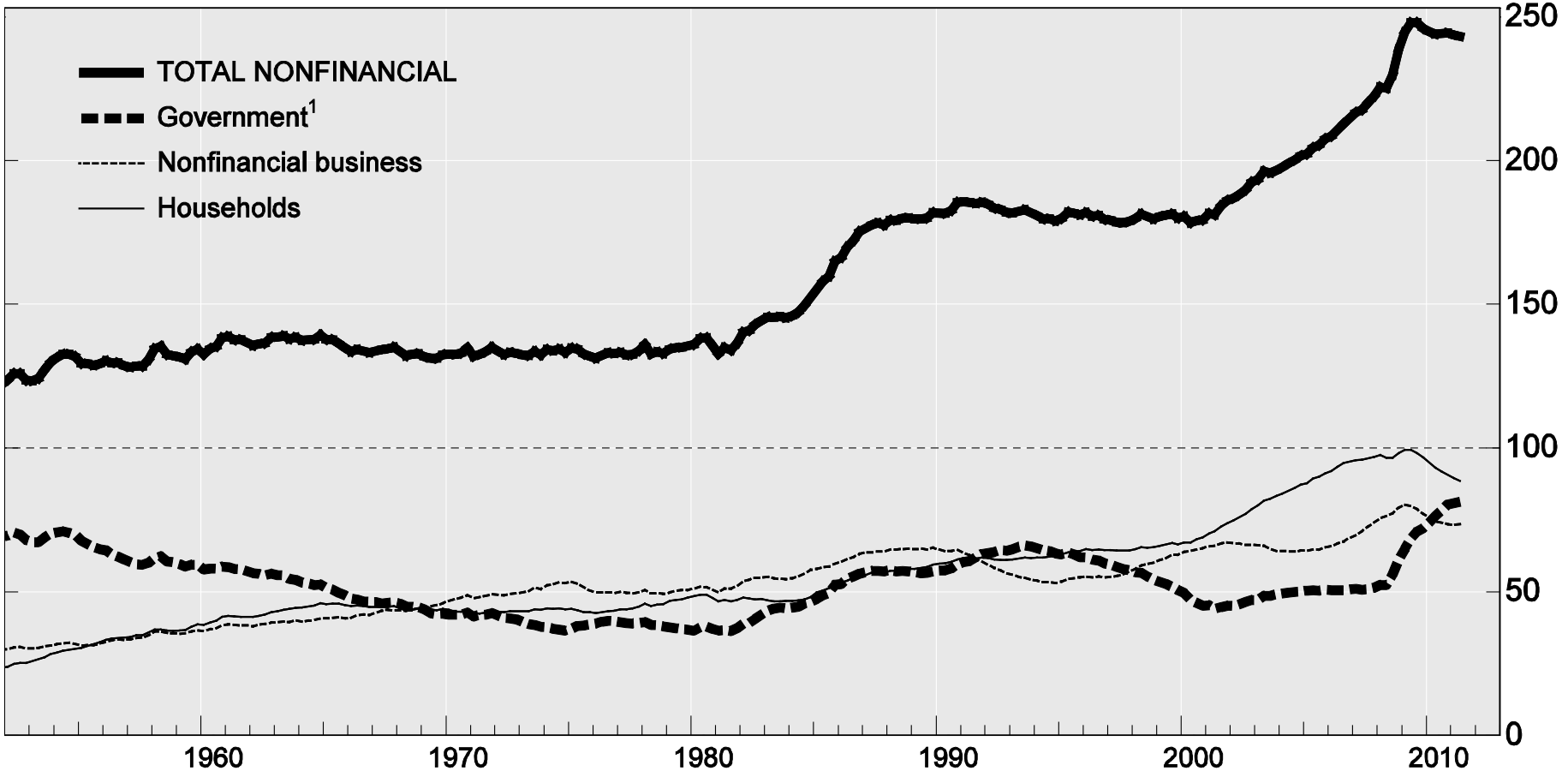
[1] Ten-year Treasury Inflation Indexed zero coupon yields (TIPS); prior to 1999, return on ten-year zero coupon bond deflated by centered three-year moving average of core PCE inflation. The horizontal dotted line indicates the 1986–2000 average of the 10-year US real (4.26%). The average of the Fed funds rate over that period was 5.82%, shown on the left-hand scale.

Sources: National data; BIS calculations.

Graph 2

OUTSTANDING DEBT OF DOMESTIC US NONFINANCIAL BORROWERS

As a percentage of GDP

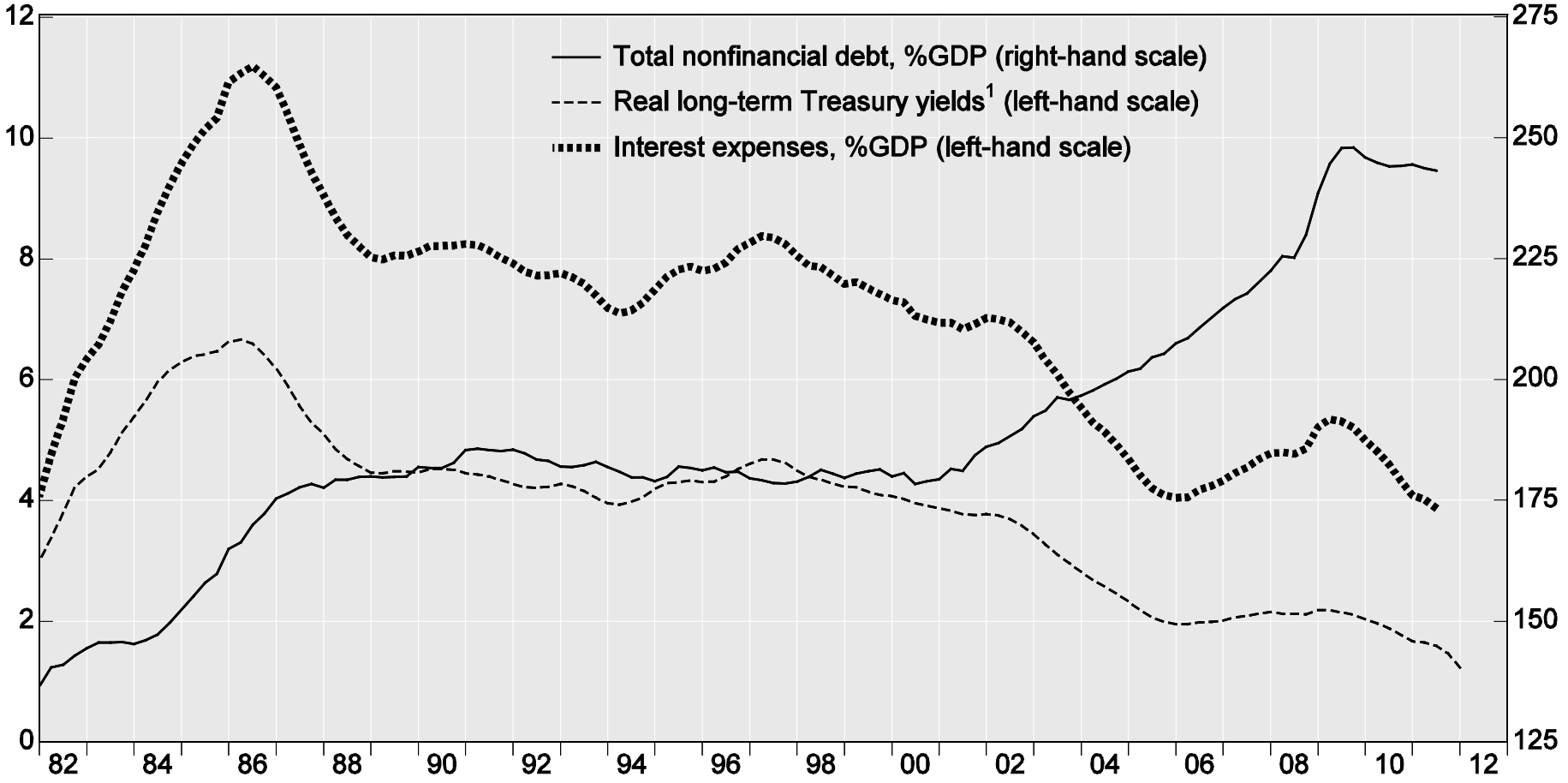


[1] Federal plus State and Local.

Sources: Board of Governors of the Federal Reserve.

Graph 3

LIGHTENING THE INTEREST EXPENSE OF HEAVY DEBT

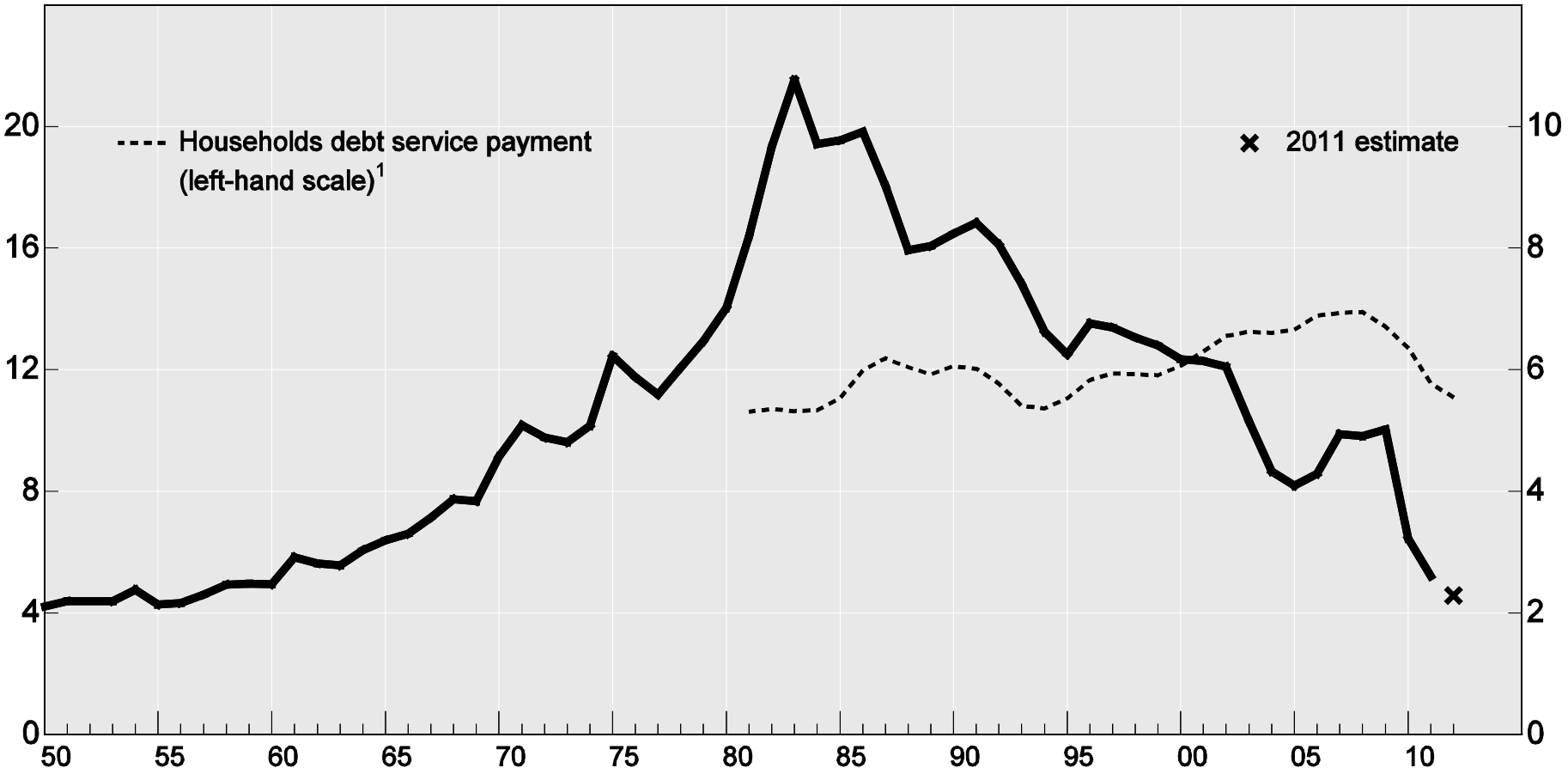


[1] Four-year moving average, shown at end.

Sources: Board of Governors of the Federal Reserve.

Graph 4

NET INTEREST PAYMENTS AS % OF US FEDERAL DEBT

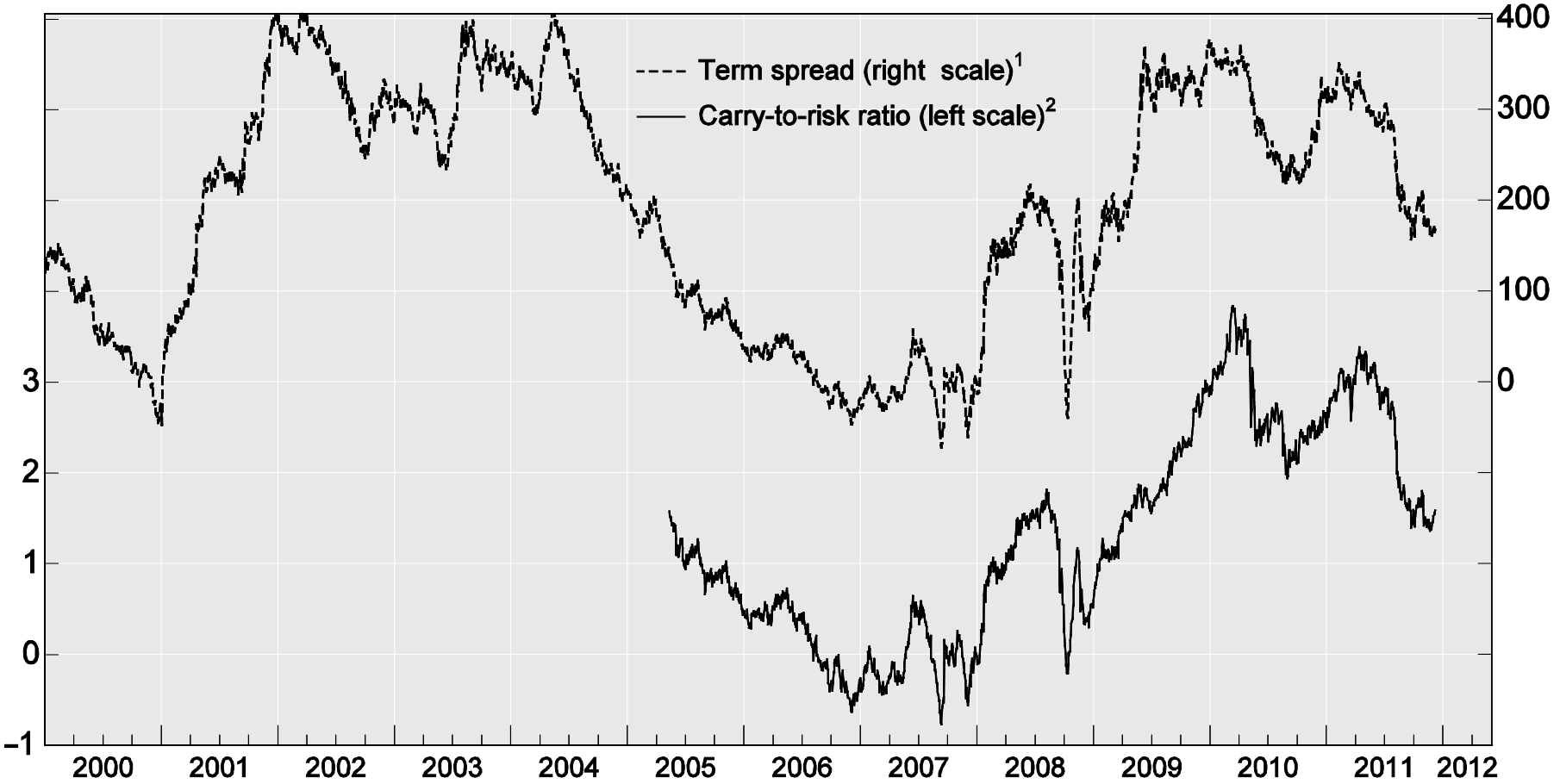


[1] As a % of disposable personal income.

Sources: Economic Report of the President and Board of Governors of the Federal Reserve.

Graph 5

INCENTIVES FOR INTEREST RATE CARRY TRADES



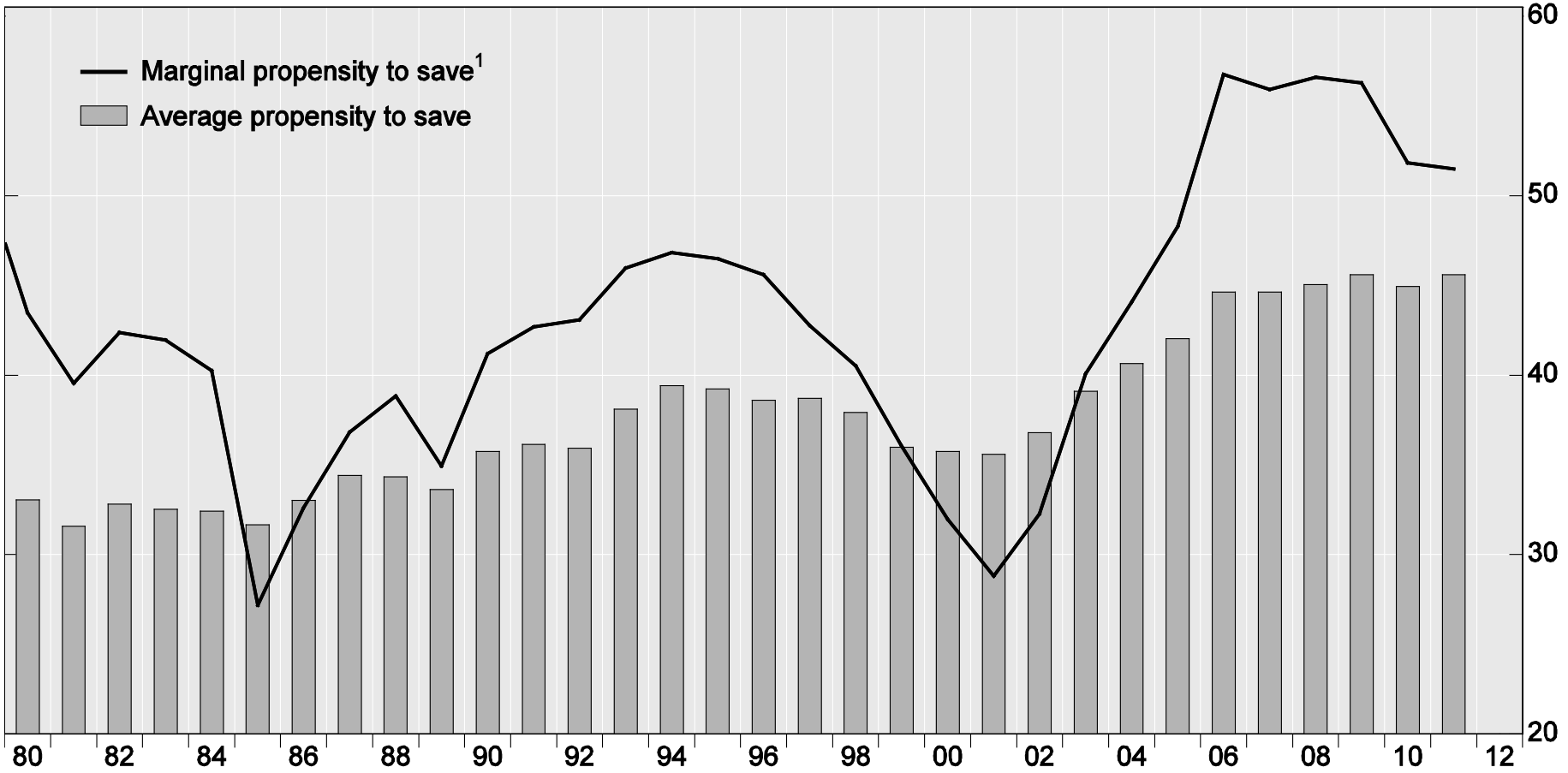
[1] Ten-year swap rate minus three-month money market rate, in basis points. [2] Defined as the differential between 10-year swap rate and three-month money market rate divided by the three-month/10-year swaption implied volatility.

Sources: Bloomberg; BIS calculations.

Graph 6

THE PROPENSITY TO SAVE IN DEVELOPING ASIA

As a percentage of GDP



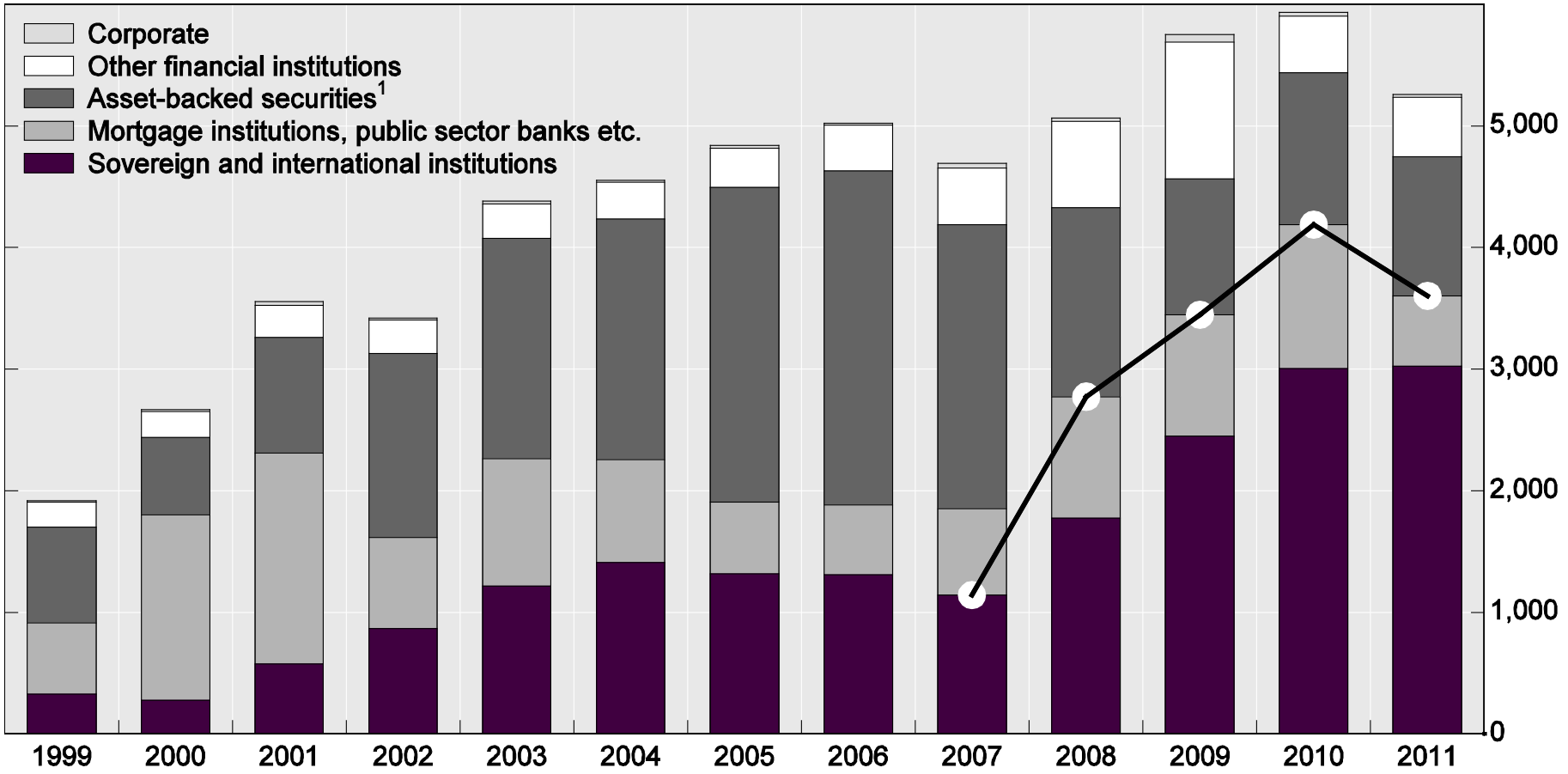
[1] Calculated over 7 years.

Sources: IMF World Economic Outlook; World Bank World Development Indicators.

Graph 7

ISSUANCE OF AAA-rated SECURITIES

In billions of US dollars



Note: For 2011, full-year estimate based on January to October data.

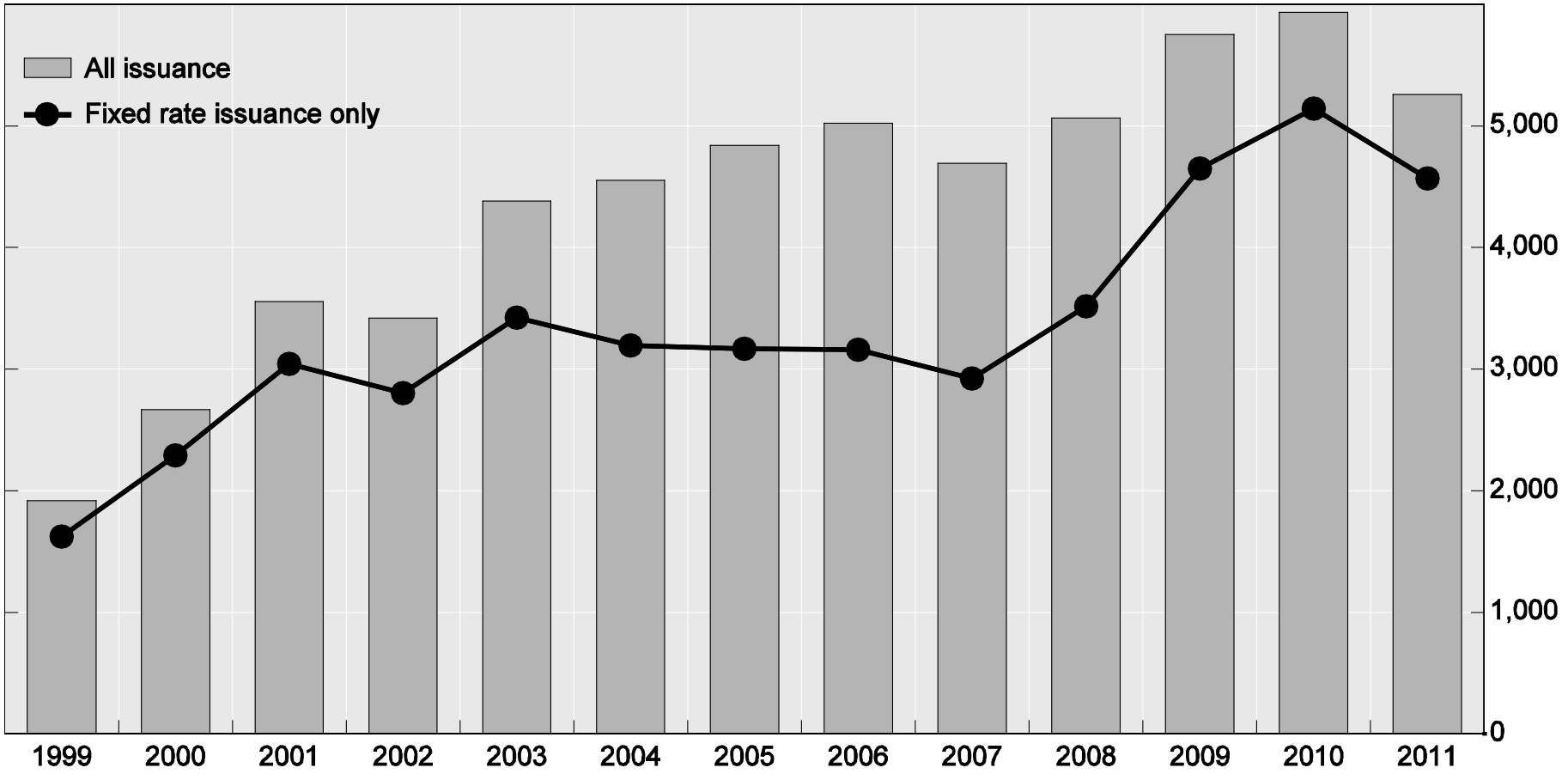
[1] ABS, MBS and covered bonds.

Sources: Dealogic; BIS calculations.

Graph 8

ISSUANCE OF AAA-rated SECURITIES: FIXED-RATE

In billions of US dollars



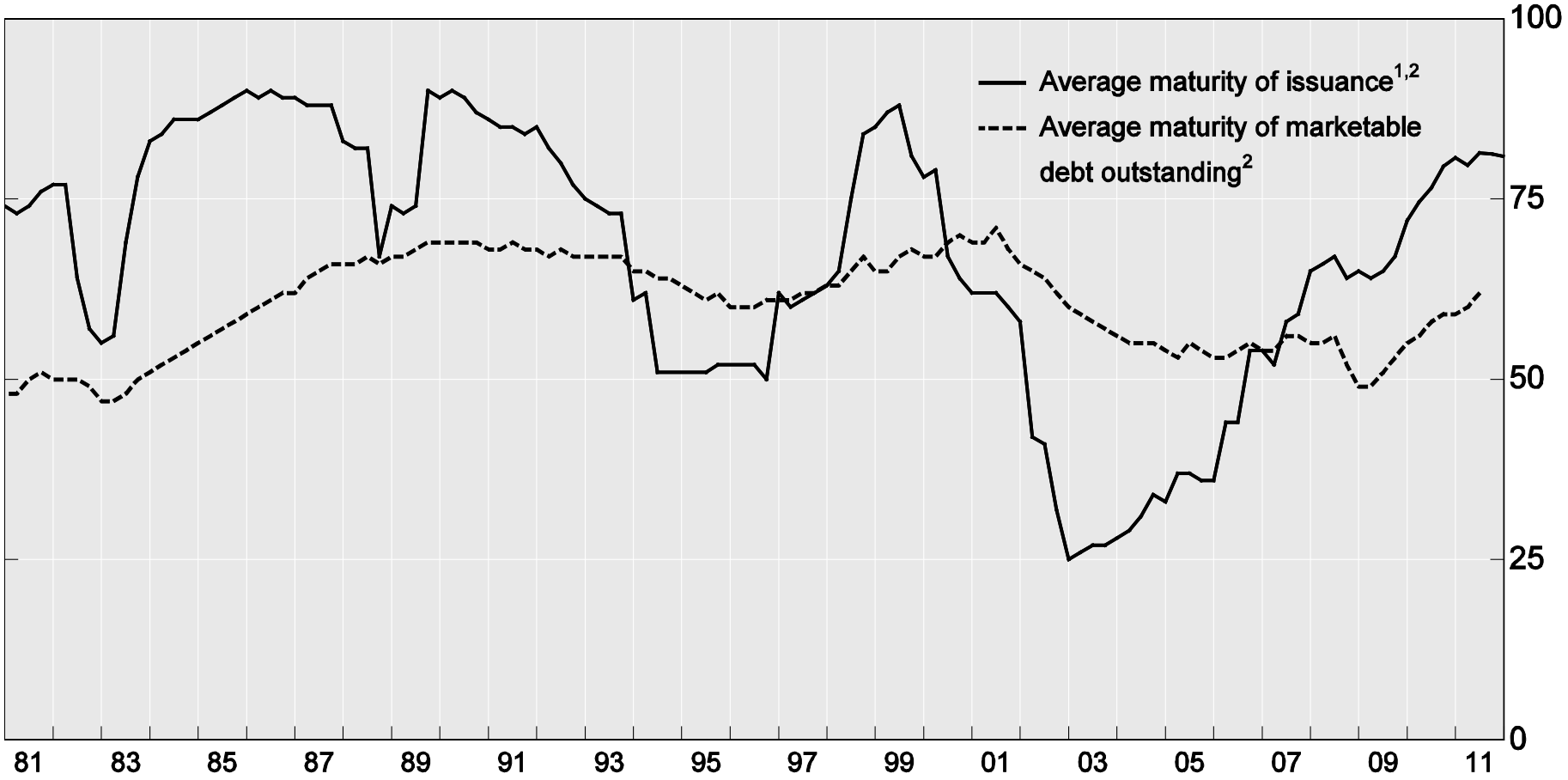
Note: For 2011, full-year estimate based on January to October data.

[1] ABS, MBS and covered bonds.

Sources: Dealogic; BIS calculations.

Graph 12

MATURITY OF US GOVERNMENT BONDS



[1] One-year moving average; shown at the end. [2] In months.

Source: Datastream; US Treasury; BIS estimates.

Table 1

Standard deviations of interest rate changes[1]

	Fed funds	3-month T-bill	10-year nominal yield	10-year real yield	Term premium[2]	Term premium average
1965.1 to 1978.9	0.45	0.37	0.19	na	0.33	0.85
1986.1 to 1998.12	0.24	0.20	0.25	0.25	0.23	1.94
1999.1 to 2011.11	0.20	0.21	0.24	0.20	0.29	2.08

[1] Standard deviation of the first differences (ie $R_t - R_{t-1}$) of the monthly averages of daily observations of interest rates measured in percentage points. [2] 10-year nominal yield less 3-month Treasury bill rate.

Sources: DataStream, National data; BIS calculations.

Table 2

Floating rate issuance of AAA-rated securities by sector

As a % of total AAA issuance

	Sovereign[1]	ABS[2]	Mortgage institutions[3]	Other financial firms	Non-financial corporations
2000	0	38	4	30	4
2005	1	59	9	21	22
2010	1	37	16	20	4
2011 Jan-Oct	3	34	16	24	11

[1] Includes international institutions. [2] Asset-backed securities including MBS and covered bonds. [3] Mainly the US agencies – Fannie Mae, Freddie Mac and the Federal Home Loan banks.

Source: Dealogic, BIS calculations

Table 3

AAA-rated issuance by mortgage institutions, public sector banks[1]

$ billion

	2000-05[2]	2006	2008	2009	2010	2011 Jan-Oct
US agencies	1057	567	996	985	1185	480
Europe and Japan	26	6	1	8	1	0
Total	1083	573	997	993	1186	480

[1] As shown in Graph 7. [2] At average annual rate. [3] Fannie Mae, Freddie Mac and the Federal Home Loan banks.

Source: Dealogic, BIS calculations

Table 4

Composition of marketable US Federal government debt held by the public

$ billion

End of fiscal year (Sept)	Marketable securities		Currency & Federal Reserve obligations	Total	Money, Federal Reserve obligations and short-term debt
	(<or = 1 year)	(> 1 year)			
	(a)	(b)	(c)	(d)	= (a+c) % d
1st 2 years of crisis					
2007	955	3474	834	5263	34%
2009	1986	5002	1780	8768	42.9%
	+1031		**+946**		
3rd year of crisis					
2010	1784	6692	1896	10372	35.5%
	–202		**+163**		
Latest QE					
2011 June	1529	7785	2633	11947	34.8%

Sources: This is an update of that in Tobin (1963) using US Treasury Bulletin; Federal Reserve Flow-of-Funds.

Table 5

Activity in US Treasuries

Change from 12 November to 30 June 2010

	$ billion	**Average maturity (years)**
Federal Reserve's portfolio	759	6.9
Stock of Treasury debt	1303	7.2
Treasury debt *minus* Fed's holdings	544	7.8

Note: This is a summary of issuance of bonds with maturities of two-years or more.

Source: FRBNY and US Treasury.