

**Implications of Recent Economic Events
for the Cost of Capital to 31 March 2014**

*A Report from Europe Economics for
BSkyB and TalkTalk*

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Introduction

- 1.1 This short report has been commissioned by BSkyB and TalkTalk. Its purpose is to consider the implications for the cost of capital of developments in financial markets and the wider economy since Ofcom's WBA Charge Control Statement of 20 July 2011. Europe Economics has been asked by BSkyB and TalkTalk to consider whether recent events suggest that the cost of capital determined by Ofcom in mid-July should be lower.
- 1.2 This report proceeds as follows:
- (a) First we review recent developments in financial markets, particularly with regards to government bonds markets and the outlook for medium-term economic growth
 - (b) Next we explain why a deteriorating medium-term outlook for sustainable economic growth should naturally be associated with (if any change) a fall in total market returns (the market cost of capital) rather than a rise.
 - (c) Then we consider whether a deteriorating medium-term economic outlook has an impact on the mix of total market returns between that element attributable to the risk-free rate and that element attributable to the equity risk premium.
 - (d) Finally, we draw the previous analysis together into a series of conclusions. Our key conclusion will be that: ***if recent economic events justify any change in the cost of capital, that would be in the direction of a reduction, not an increase.***

Recent Developments in Financial Markets and in Economic Growth Forecasts

- 1.3 From 20 July 2011 to the time of writing of this document (11 October 2011), there have been a number of significant developments in financial markets¹:
- (a) On 21 July, a second Greek bailout package, of €109bn, was announced, including a partial technical default on Greek bonds (equivalent to a haircut of about 21 per cent).
 - (b) Within days, analysts started to express extreme scepticism that the package could be delivered, as Finnish and Slovakian demands for collateral, in the run-up to the negotiations, did not appear to have been adequately addressed; as it became apparent that the authorities would struggle to achieve the 90 per cent required target for voluntary participation in the Greek bond swap; and as the appetite of investors for Greek privatisation assets seemed limited and the Greek government and population's willingness actually to deliver upon privatisation was questioned.

¹ Indeed, much of Ofcom's July analysis was based on data from an earlier period, and by the time of its final judgements, it may not have been in a position fully to absorb the implications of events such as the Portuguese bailout of May 2011. For example, at paragraph 6.35 of its WBA Charge Control statement, Ofcom indicates that it based its decision on the risk-free rate on gilt yields to 31 May 2011.

- (c) In the week commencing 1 August, Italian and Spanish government bond yields exceeded 6 per cent — with Italian bonds exceeding 6.2 per cent and Spanish bonds 6.3 per cent on 4 August.
- (d) On 5 August, Standard and Poors announced it was downgrading US debt from AAA status to AA+.²
- (e) The benchmark FTSE 100 stock market index fell from over 5,900 on 26 July to below 4,800 on 9 August.
- (f) On 7 August, the European Central Bank signalled that it would purchase Spanish and Italian bonds.
- (g) Between 8 August and 11 August, financial regulators in Greece, Belgium, Italy, France, Spain, and the European regulator ESMA announced bans on short selling of banks and other financial companies.
- (h) On 9 August, German government bond yields rose above UK government bond yields for the first time in decades.
- (i) On 18 August, as it became public knowledge that Finland had, as part of the 21 July Greek bailout package, received undertakings that it would be given cash collateral against any loan made, Austria, the Netherlands, Slovenia and Slovakia demanded similar treatment.
- (j) On 6 September Swiss bank UBS released a report “*Euro break up — the consequences*”, arguing that break-up of the Eurozone would lead to a contraction of 40 to 50 per cent of GDP in the first year for weaker economies (e.g. Greece) and 20 to 25 per cent for stronger economies (e.g. Germany), adding “*It is also worth observing that almost no modern fiat currency monetary unions have broken up without some form of authoritarian or military government, or civil war*”.
- (k) On 7 September the German constitutional court ruled that the first Greek bailout did not violate the German constitution, but also ruled that any future bailouts would require specific case-by-case approval by the German Parliament and effectively ruled any debt union or “Eurobonds” scheme a violation of the German constitution.
- (l) On 8 September it is announced that Greek GDP contracted in the second quarter of 2011 at an annualised rate of 7.3 per cent. The OECD cut its forecast for UK 2011 growth to the equivalent of 0.85 per cent annual growth.
- (m) Through the latter half of September, markets continued to be extremely nervous, with full-blown Greek default widely expected to occur before March 2012 (the date of a

² <http://www.standardandpoors.com/ratings/articles/en/us/?assetID=1245316529563>

major €16 billion Greek government bond redemption and interest payment) — on 14 September bonds maturing in March 2012 fell to below 50 per cent of face value and Greek government one-year bond yields reached 148 per cent.

- (n) On 19 September, the *Financial Times* announced that, duplicating the Office for Budget Responsibility (OBR) approach to estimating the economic cycle, the output gap for the UK was markedly lower than previously thought. (This would imply that the sustainable growth rate for the UK had fallen further than the OBR had thought.)
- (o) On 19 September, Standard and Poors downgraded Italy's credit rating to A / A-1 from A+ / A-1+.
- (p) On 20 September, the IMF released its latest World Economic Outlook, downgrading its 2011 forecast for UK growth by 0.4 percentage points to 1.1 per cent, and its 2012 forecast by 0.7 percentage points to 1.6 per cent.
- (q) Over the weekend of 24/25 September, it was widely reported that the G20 planned for Greek bonds to take a 50 per cent haircut.
- (r) In the week of 3 October, Belgian banks Dexia became highly distressed, the French and Belgian governments guaranteed to stand behind the creditors, and a series of sales of the assets were announced.
- (s) On 6 October, the Bank of England announced the recommencing of its quantitative easing programme, with an additional £75bn of asset purchases.

1.4 So, to summarise, the growth outlook has deteriorated markedly over the past few months, especially in connection with the euro crisis and the crisis in the Eurozone banking system. This might not simply be a short-term impact, over a timescale of a few quarters, but might reflect a changed view as to likely economic growth in a number of developed economies over the next decade.

The Relationship between Market Returns and Macroeconomic Conditions

1.5 In this subsection we shall argue the following points:

- (a) When the economy does better, total enterprise returns are greater and vice versa.
- (b) This tends to mean that, when the economic *outlook* is better (i.e. the economy is expected to do better in the future), required total market returns to capital also tend to be higher and vice versa.
- (c) Matters can be somewhat complicated by the fact that total enterprise returns are divided between returns to capital and returns to labour. However, evidence suggests that labour has obtained a fairly stable portion of total returns over the past twenty-five years.

- (d) There is a relationship / positive correlation and causal link between the sustainable growth rate of the economy and the risk-free rate of return, both in theory and in statistical evidence.
- (e) There is good reason to believe the next few years may see quite low growth for the UK economy (indeed, perhaps the economies of many developed countries), with a poor outlook for the ten-year-ahead period, potentially even an outlook for the ten-year-ahead period that could continue to deteriorate for a year or two more, reducing sustainable growth rates and associated with a fall in the risk-free rate.

Impact of the economy on total returns to enterprise

- 1.6 When economic growth is higher, firms tend to have greater earnings. Demand is higher, so the gross value added by businesses increases. Faster economic growth leads to greater total enterprise returns.
- 1.7 So, if economic growth is *expected* to be higher in the future, there are expected to be greater enterprise returns. Total enterprise returns are divided between labour and capital. If the split (the ratio) can be taken as given (or indeed if returns to labour can be taken as fixed), then a rosier economic outlook implies that returns to capital will be greater. If investors, responding to a rosier economic outlook, did not demand higher returns, they would be conceding that labour would take all the benefit from faster growth. Normally, however, capital demands its share of the expected larger pie.
- 1.8 This is the straightforward case, but it is worth noting that there is no iron rule here. If there is a change in the capital/labour split of returns, that could in principle reverse the overall effect or enhance it. For example, poor economic times could coincide with a fall in the share of total returns taken by labour, so that total returns to capital could rise even as total enterprise returns fell — in which case our straightforward case effect would be reversed. Indeed, sometimes during recessions, corporate profitability can actually *rise* as firms take the opportunity to cut costs. As an alternative example, rosier economic times could coincide with labour taking a lower share of total returns — so our straightforward case effect would be enhanced.³
- 1.9 As it happens, evidence suggests that labour has obtained a very stable share of total returns over the past decade — employee compensation was 54.5 per cent of GDP in 2000 and 54.8 per cent of GDP in 2010.⁴ The key change here occurred during the 1980s. In 1970 and 1980 employee compensation was around 59 per cent of GDP, but by 1990 this had fallen to 55 per cent. Since 1990 the proportion has been very stable.

³ Note also the Competition Commission's argument in the Bristol Water case (paragraph 89(a)): "*In steady state growth with constant profit and payout ratios, total profits and dividend payments would increase at a similar rate to the whole economy — but the number of shares would increase unless there were no new equity issues and hence growth in dividends per share would be lower than growth in total dividends, profits and the economy.*"

⁴ Source National Statistics, UK Economic Accounts, Table A3: Gross domestic product: by category of income

- 1.10 So, if the proportion of returns to labour does not change dramatically over the period to 2014 — and it seems unlikely to change materially over such a short timescale — then a fall in total returns should be expected to be associated with a fall in returns to capital.
- 1.11 If a period of elevated/depressed returns is relatively brief — for example, if it occurs only for a year or two in the recovery phase from a recession — then although actual returns to capital may be higher/lower, the required rate of return will not. Over the lifetime of an investment, there will naturally be some years in which actual rates of return are below the cost of capital and others in which actual rates of return are higher. But overall, average expected rates of return will equal the cost of capital.
- 1.12 On the other hand, periods of slower or higher growth could be more sustained than this. The benchmark period for consideration in regulatory cost of capital analysis is ten years (e.g. the yield and premium on ten-year bonds constitute the benchmark for risk-free rate and debt premium analysis), though Ofcom sometimes considers shorter periods than this (e.g. in its analysis of the risk-free rate in the WBA charge control statement, Ofcom placed clear weight on five year gilt yields — see paragraphs 6.35ff).
- 1.13 Lastly, we observe that economic “shocks” affecting the sustainable growth rate can be both good and bad in nature. There might be new technologies that raise the sustainable growth rate (e.g. by stimulating more rapid innovation); there might be periods of sustained bad weather damaging harvests (e.g. for a couple of decades).
- 1.14 Thus, if all that has happened since July is that the short-term economic outlook over the next few quarters has deteriorated, that might not have any impact on the cost of capital — neither up nor down. But if the ten-year-ahead economic outlook has deteriorated since July, we should expect total required rates of return to capital to have fallen.

Relationship between the sustainable growth rate and the risk-free rate⁵

Theoretical relationship

- 1.15 It is common to think of the risk-free rate of return as an exogenous taste variable — if not actually constant, then at least fixed by factors outside portfolio decision-making. We think of the risk-free rate as a measure of impatience, of how much we would rather have things today than tomorrow.
- 1.16 However, though there is much in this, it is not quite the whole story. For the risk-free rate is not simply the return any one individual would require to hold a risk-free asset. Rather, it is the return that *would be available* from such an asset. As such, (a) it reflects collective tastes, rather than those of any individual — the “taste” of the market; and (b) it reflects an (albeit notional) equilibrium condition.

⁵ The material that follows is drawn from the Europe Economics Working Paper 2011.1, “The Sustainable Growth Rate, Total Market Returns, and the Risk-Free Rate”. More detailed statistical analysis is available upon request.

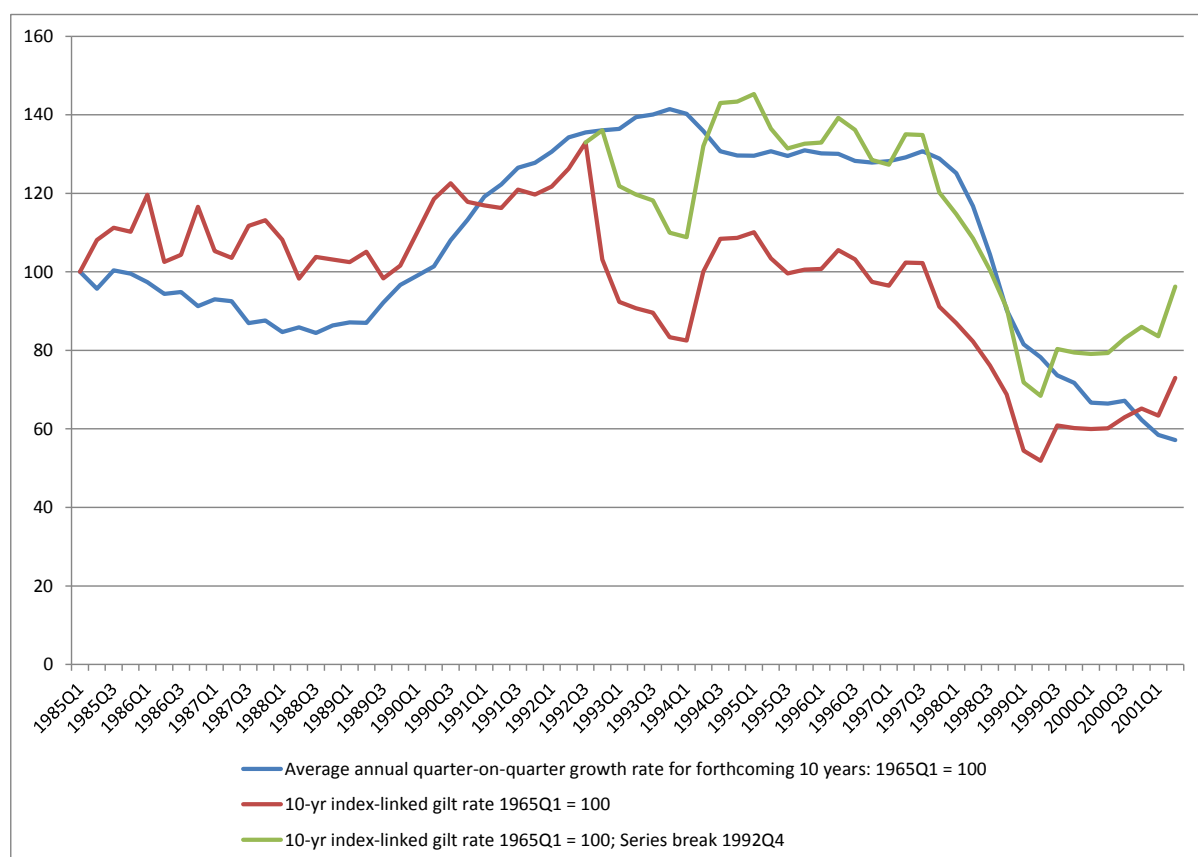
- 1.17 In standard long-term economic growth models, such as the Ramsey-Cass-Koopmans model, a key equilibrium condition is that (absent population growth) the sustainable growth rate of the economy equals the risk-free rate.⁶ Indeed, in corporate finance theory the risk-free rate of return is sometimes viewed as arising from the sustainable growth rate (i.e. causality runs from the sustainable growth rate to the risk-free rate).
- 1.18 For our purposes here, we need not fully endorse either of these positions. Instead, we make the more limited claim that one should expect changes in the risk-free rate to be correlated with changes in the sustainable growth-rate.
- 1.19 We can make this thought more concrete by considering the likely relationship between the sustainable growth rate and our best proxy for the risk-free rate, namely yields on government bonds. If, for example, yields on medium- to long-term government bonds are very low, we should interpret that as an indicator that the sustainable growth rate of the economy is expected to be very low. Why? Well, consider an investor that is willing to buy a government bond at a very low yield. That investor is choosing to purchase that government bond in preference to, for example, shares or bonds in any other business in the real economy. But that must indicate that expected returns for the real assets of these other real economy businesses are expected to be low or very volatile. Let us set aside the high volatility case for now, and focus on the case in which returns of these real economy businesses are low. If returns to all real assets are low, over the medium- to long-term, then the economy can only be expected to grow slowly over the medium- to long-term. But the sustainable growth rate is simply the rate at which the economy can grow over the medium- to long-term. So (setting aside issues of policy mistakes etc. that might eventually be rectified), when government bond yields are very low, one plausible explanation is that the sustainable growth rate of the economy is very low.

Statistical relationship

- 1.20 Consider the following graph.

⁶ Ramsey, F.P. (1928), "A mathematical theory of saving", *Economic Journal*, 38, 152, pp543–559. Cass, D. (1965), "Optimum Growth in an Aggregative Model of Capital Accumulation", *Review of Economic Studies*, 37 (3), pp233–240.

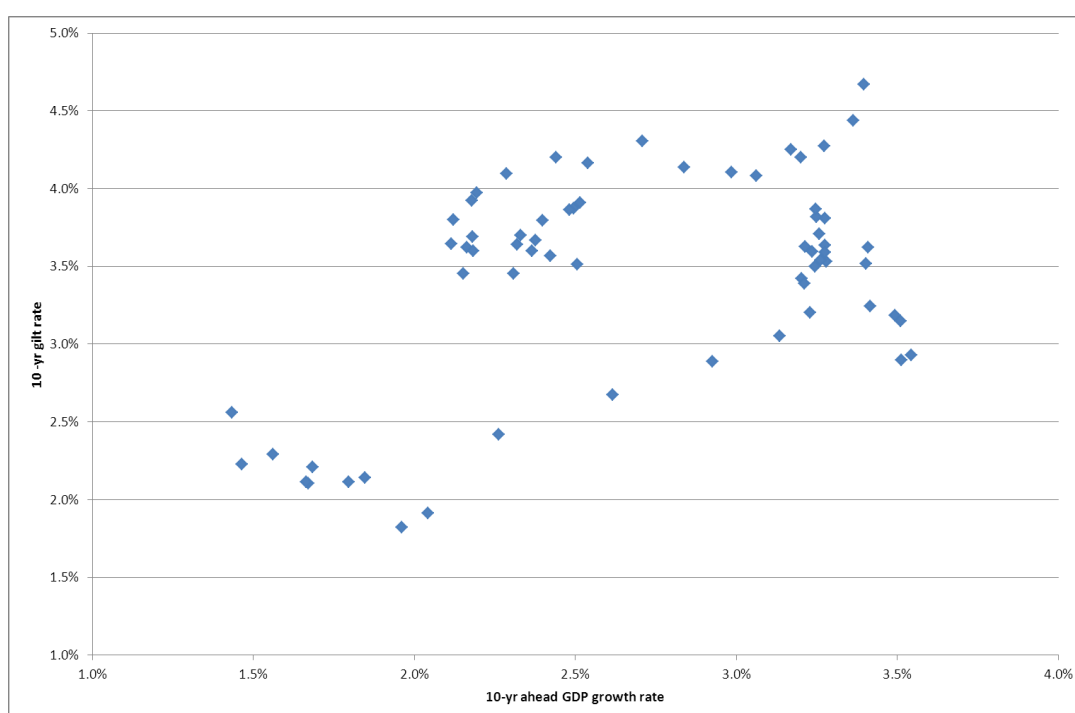
Figure 1: Comparison of normalised GDP series with quarterly growth (1985Q1 = 100)



1.21 In this graph we compare the average quarterly yield on ten-year index-linked bonds (in red) with the actual average growth rate over the subsequent ten years (in blue).⁷ To make the relationship easier to see, we have “normalised” both series so that, as they begin in the first quarter of 1985, we call them both 100. Because they look ahead ten years, the data in this graph ends at the beginning of 2001 (we’ll look ahead below). We can see that movements in the red graph mirror movements in the blue graph fairly well, though not perfectly. (The correlation between the red and blue graphs is 0.49, which is certainly respectable.) If we believe that the introduction of inflation targeting in the fourth quarter of 1992 can be treated as a game-changing event, we can compare the right-hand end of the blue graph with the green graph instead – seeing that the mirroring becomes even better. (The break-adjusted series has a correlation of 0.83, which is very high.) In an Appendix we confirm that the series does indeed exhibit a statistically significant structural break in the fourth quarter of 1992.

⁷ Note that the data used here reflects the revisions to historic GDP data published by the Office for National Statistics in October 2011.

Figure 2: Scatter plot of GDP growth versus gilt rate (raw values)



Caveats

1.22 We focus on ten-year index-linked gilt yields and growth rates here. Five-year gilt yields can be significantly affected by policy expectations — e.g. in a recession policy interest rates may be set low, dragging down the five-year gilt yield. Since our data begins only in 1985, the use of twenty-year values would make our dataset very short (just five years instead of fifteen). However, we acknowledge that there is a compromise here. The actual growth rate could, in principle, deviate materially from the underlying sustainable growth rate even over a ten-year horizon. For example, one interpretation of our non-break-adjusted series could be that actual growth rates were below sustainable growth rates during the 1980s but then above sustainable growth rates during the 1990s (perhaps “catching up” on the “lost growth” of the 1980s). One implication of this reflection is that it is not obvious, despite the higher correlation, that our break-adjusted series is really the better series for correlating to ten-year-ahead growth rates.

Predictions of model

1.23 These caveats notwithstanding, the upshot of our analysis is that the close relationship that theory predicts between the risk-free rate and the sustainable growth rate appears to be borne out in practice. The sustainable growth rate of the economy appears to have been fairly stable from the mid to late 1980s, risen somewhat in the early 1990s, and fallen fairly rapidly from the second quarter of 1997 to below its late 1980s trough.

1.24 In the following graph, using the correlation between the break-adjusted series for the index-linked gilt rate and the sustainable growth rate to model the sustainable growth rate,

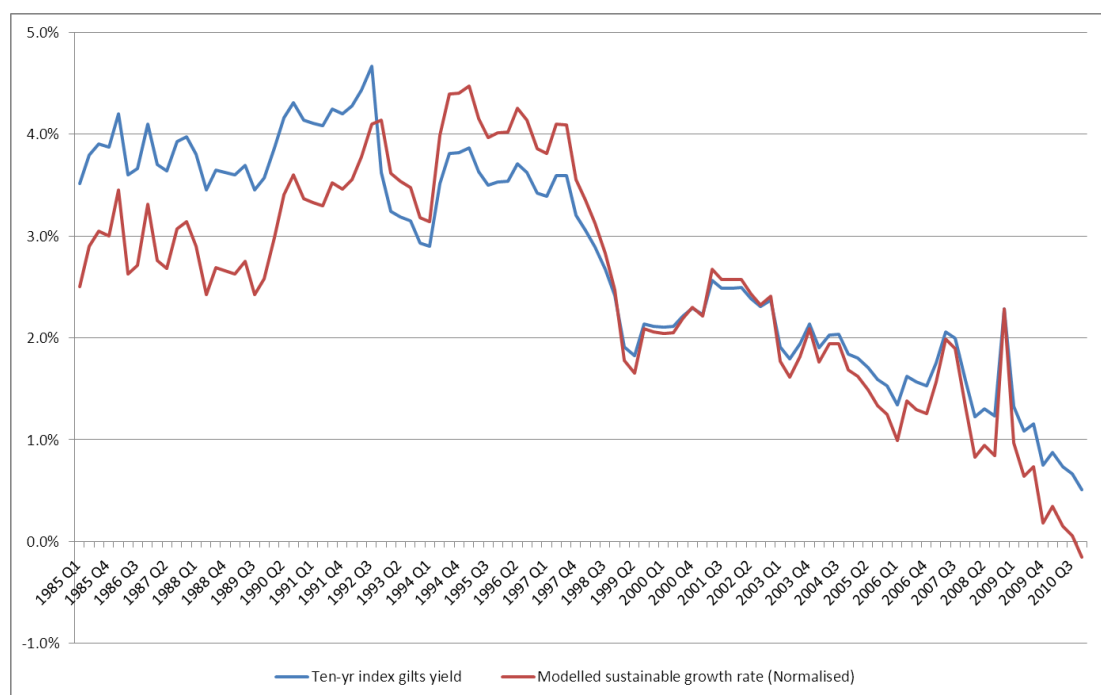
we assume the sustainable growth rate was 2.5 per cent at the start of 1985 and that changes in the risk-free rate and sustainable growth rates are proportionate to one another.⁸

⁸ Our model explains movements in yields by a constant, the change in regime occurring in 1992Q3, and GDP, as set out in the following table.

Model				
Dependent Variable: YIELD				
Method: Least Squares				
Sample: 1985Q1 2001Q2				
Included observations: 66				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.020568	0.002454	8.380193	0.0000
BREAK	-0.010731	0.000983	-10.91737	0.0000
GDP	0.725478	0.095041	7.633279	0.0000
R-squared	0.840297	Mean dependent var		0.034323
Adjusted R-squared	0.835227	S.D. dependent var		0.006840
S.E. of regression	0.002776	Akaike info criterion		-8.890969
Sum squared resid	0.000486	Schwarz criterion		-8.791439
Log likelihood	296.4020	Hannan-Quinn criter.		-8.851640
F-statistic	165.7408	Durbin-Watson stat		0.733382
Prob(F-statistic)	0.000000			

Technically, this is a model of levels. In the model represented in Figure 3, we assume that the sustainable growth rate in 1985Q1 is equal to the actual 10-year growth rate for the next ten years ahead (2.50 per cent, versus a value of 2.0 generated by the model in the table). Changes in the level of yields from our model then constitute changes in the level of yields from this 2.5 per cent startpoint. The effect is that the levels in the model represented in Figure 3 are around 0.5 per cent above those generated from the model in the table. For this reason the modelled sustainable growth rate in Figure 3 is described as “Normalised”.

Figure 3: Modelled sustainable growth rate versus gilts yield



1.25 So, according to our model, the sustainable growth rate peaked at about 4 per cent in the mid-1990s, and had fallen to about 2 per cent by the end of 2000. The rate rises a little until 2002, when it starts falling again. There is a brief odd blip up in mid-2007, and then the spike in late 2008 (which surely reflects a sudden rise in sovereign default risk – i.e. the model is breaking down as the index-linked gilt yield is no longer nearly-risk-free). From the first quarter of 2009 we also get a downward distortion, as quantitative easing is estimated by the Bank of England to take perhaps a whole percentage point off yields.

Why the Sustainable Growth Rate is Likely to be Low

1.26 As noted above, the interpretation of bond yields from late 2008 is problematic as they may have been subject to a number of distortions. However, is it credible that the entirety of falls in these variables reflects passing market distortions, as opposed to the sustainable growth rate having fallen? We point to six key factors that suggest it might indeed be credible that the sustainable growth rate has fallen materially:

- (a) Increased public spending / taxation relative to GDP
- (b) Increased level of government debt relative to GDP
- (c) High corporate sector debt relative to GDP
- (d) High household debt relative to GDP
- (e) Increased demographic pressures

1.27 We shall now consider each of these cases in turn. We emphasize that in each case what we propose is that a relevant factor has arisen in recent years that would tend to

depress the rate of overall economic growth for long enough to affect the future long-term sustainable growth rate. Though a number of these factors might eventually be turned around, we suggest that they will persist for the timescale relevant to a price control lasting from 2011 until Spring 2014.

Reduced public spending relative to GDP

- 1.28 There is extensive academic empirical literature on the relationship between levels of public spending, tax and GDP growth. Broadly stated, the conclusion of this literature is that once public spending is above about 25 per cent of GDP, further increases (while potentially beneficial from a socio-political standpoint) reduce the long-term growth rate of the economy (especially if such increases take the form of greater government consumption expenditure, as opposed to investment expenditure or transfers).
- 1.29 For our purposes we ignore the socio-political debate and, instead, focus on the well-established and long-established empirical results concerning public spending, taxation and growth rates.
- 1.30 Regarding the impact of public spending, two particularly important recent studies are the following:
- (a) Afonso, A. & Furceri D. (January 2008), "*Government size, composition, volatility, and economic growth*", European Central Bank working paper 849:
"a percentage point increase in the share of total revenue (total expenditure) would decrease output by 0.12 and 0.13 percentage points respectively for the OECD and for the EU countries"
- (b) Mo, P.H. (2007), "*Government expenditure and economic growth: the supply and demand sides*", Fiscal Studies 28 (4), pp497-522:
"a 1 percentage point increase in the share of government consumption in GDP reduces the equilibrium GDP growth rate by 0.216 percentage points"
- 1.31 The literature on the impacts of taxation gives similar results. The definitive study in that literature was that of Leibfritz, W., Thornton, J. & Bibbee A., "*Taxation and Economic Performance*" OECD Economics Department Working Papers 176 (1997). They find that a 10 percentage point increase in the tax to GDP ratio reduces the growth rate by 0.5 – 2 percentage points — or equivalently that each additional percentage point reduces the growth rate by 0.05-0.2 percentage points. (The more recent Afonso & Furceri paper quoted above finds that a one percentage point increase in the share of tax in GDP reduces growth by 0.12 percentage points.)
- 1.32 The practitioner rule of thumb here is that each additional percentage point rise in sustained levels of public spending/tax should be expected to take 0.1-0.15 per cent off the growth rate of the economy.

- 1.33 Total managed expenditure in the UK reached a trough of 36.3 per cent of GDP in financial year 1999/2000.⁹ This was the lowest figure recorded since straightforwardly comparable records began in the early 1960s. It peaked at 47.6 per cent in 2009/10 — a rise of 11.3 percentage points over a decade.
- 1.34 During the high-public-spending period of 2008/9-2014/15, which is projected to involve an average level of 44.6 per cent of GDP, growth is likely to be depressed. We note that the ten-year average was below 42 per cent of GDP for every ten-year period commencing each year between 1985/6 and 2001/2, and levels of around 40 per cent were typical. So 44.6 per cent constitutes a rise of two to four percentage points of GDP. Using the practitioner rule of thumb, a two to four percentage point increase in public spending relative to GDP implies a 0.2-0.6 per cent fall in sustainable growth rates.

A high level of government debt relative to GDP

- 1.35 In their August 2011 Bank for International Settlements paper, Cecchetti et al.¹⁰ analyse the impact of various forms of debt upon growth rates. Their conclusions are that, beyond a threshold level, debt is damaging to growth. That threshold level in respect of government debt is around 80-100 per cent of GDP.
- 1.36 On UK government definitions, UK general government gross debt relative to GDP is projected to peak at 87.2 per cent of GDP in 2013/14.¹¹ This compares with 37.0 per cent in 2001/2. The average from 1990/1 to 1999/2000 was 44.1 per cent. The previous peak on straightforwardly comparable statistics was 64.2 per cent in 1976/7. On Cecchetti et al.'s definitions, public sector debt rose from 42 per cent of GDP in 1990 to 54 per cent in 2000 and 89 per cent in 2010.
- 1.37 Cecchetti et al. find that an additional ten percentage points of GDP of debt, above the threshold, reduces annual trend growth by around 0.1 percentage points. In the pessimistic case that, for the UK, the crossover threshold is at 80 per cent of GDP, an additional seven percentage points of debt would correspond to a fall in GDP growth of around 0.07 per cent.

A level of corporate sector debt relative to GDP

- 1.38 On Cecchetti et al.'s figures, UK corporate sector debt rose from 93 per cent of GDP in 2000 to 126 per cent in 2010. The threshold level for corporate sector debt, above which it reduces trend growth, is about 90 per cent of GDP. Each additional ten percentage points of debt above this level reduces trend growth by around 0.05 per cent. So being

⁹ Source: public finances databank: http://www.hm-treasury.gov.uk/d/public_finances_databank.xls

¹⁰ Cecchetti, S.G., Mohanty, M.S. & Zampolli, F. (2011), *'The real effects of debt'*, prepared for the "Achieving Maximum Long-Run Growth" symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, 25–27 August 2011 — <http://www.kc.frb.org/publicat/sympos/2011/2011.Cecchetti.paper.pdf>

¹¹ Source: Public Finances Databank, August 2011 version: http://www.hm-treasury.gov.uk/d/public_finances_databank.xls

30 per cent above the threshold would be expected to reduce trend growth by around 0.15 per cent.

A high level of household debt relative to GDP

- 1.39 UK household debt rose from 75 per cent of GDP in 2000 to 106 per cent in 2010. Cecchetti et al. believe that there should be a similar threshold level for household debt, similar to that applying for government and corporate sector debt. They state that their best guess as to this level is around 85 per cent of GDP. However, it should be noted that in their statistical tests, though 84 per cent was their models' highest likelihood value for the threshold, the results were far from statistically significant.
- 1.40 A related possibility, which Cecchetti et al. did not (directly) explore, is that household debt has its effect upon growth primarily through increasing the likelihood of financial crises. Banking sector crises have a huge effect in their model: each additional year of crisis takes 0.27 percentage points off annual growth for the succeeding five years.

Demographic effects

- 1.41 In the Cecchetti et al. model, a one standard deviation increase in the dependency ratio (the ratio of the non-working to working population), or an increase of around 3.5 percentage points in that ratio, is associated with a 0.6 percentage point reduction in future average annual growth.
- 1.42 Dependency ratios in the UK have been projected to rise significantly. The number of people of state pensionable age was projected, by the government in 2009¹², to increase by 32 per cent from 11.8m in 2008 to 15.6m by 2033, whilst the number of working age is projected to rise by just 14 per cent from 38.1m to 43.3m.

Intermediate conclusion on the potential depressing effect upon the sustainable growth rate

- 1.43 If all achieved together, the potential depressing effect of the impacts we have described could be very large.
- (a) 0.2-0.6 per cent for increases in public spending
 - (b) 0.07 per cent for excessive government debt
 - (c) 0.15 per cent for excessive corporate indebtedness
 - (d) An unclear amount for the reduction in household indebtedness
 - (e) Some material amount for the reduction in the increase in dependency ratios

¹² <http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2008-based-projections/statistical-bulletin-october-2009.pdf>

- 1.44 Altogether, these effects suggest that it is indeed credible that the UK's sustainable growth rate could, as gilt rate movements over the past few years imply, have fallen by more than a percentage point below the 2.5 per cent rate commonly believed in the early-to mid-2000s and assumed in most government forecasts of that era.
- 1.45 If economic conditions have recently deteriorated even further, with peak levels of government and household debt likely to rise even higher, creating greater impediments to medium-term growth and making harder the task for the government to reduce public spending relative to GDP, then the risk-free rate might even have declined over the past couple of months. Following its recession of the early 1990s, Japan only achieved an average annual GDP growth rate of 1.2 per cent in the period 1992 to 2001, and indeed still only grew at an average of 1.0 per cent annually from 2001 to 2010.¹³ That compared with an average annual growth rate of 5 per cent from 1981 to 1990 — a drop of four percentage points. A fall of only perhaps one and a half per cent in the UK's sustainable growth rate, following the most global and most serious financial crisis in history, in a country that begins at above Cecchetti et al.'s thresholds in all sectors, would be a very fortunate result.
- 1.46 Policymakers are, of course, taking steps to address the poor growth outlook. The government aims to take government spending below 40 per cent of GDP by 2015/16; government debt is scheduled to fall to 83.5 per cent of GDP by 2015/16; the corporate sector has somewhat deleveraged; the government has announced more rapid rises in the retirement age to reduce the degree of rise in the dependency ratio. There may be scope for more rapid rises in other areas as well, such as public sector productivity. But the key effects of these measures are not expected to have their main impact on the outlook for growth until 2015/16, and even then they would be mainly affecting the growth rate for the decade or so thereafter. The current price control ends at the end of March 2014 — enhancements in the sustainable growth rate that will not arise (if they do arise at all) until after 2015/16 are broadly irrelevant to our discussion here.

The Equity Risk Premium when the Economic Outlook is Poor

- 1.47 Periods of passing volatility in financial markets can drive temporary elevations in the Equity Risk Premium (ERP). That was the explicit reason for elevation in the ERP judgements of Ofwat and NATS in 2009 and 2010, and in its 2009 Openreach copper business judgement Ofcom indicated it took account of arguments that the ERP might be elevated by 50 basis points in its choice of an ERP of 5 versus its previous choice of 4.5.
- 1.48 However, there are two key points that should be borne in mind:
- (a) An elevation of 20 per cent in the ERP in periods of particular volatility / financial markets distress, as in the Ofwat or NATS judgements, was argued to be a temporary phenomenon, reflecting special transitory market conditions. The distress level of

¹³ Source: IMF World Economic Outlook 2011

ERP should not necessarily be conceived of as a “new normal”. It could be a mistake, for example, to aim up on the ERP in a crisis, then lock in that new elevated ERP, forgetting where it had come from.

- (b) Although it is possible that a post-crisis ERP might not be identical to a pre-crisis level — after all, the crisis might reflect a change in risk appetites — it is important to recognise the mathematical implications of the argument above that expected total market returns fall when the economic outlook is worse. Thus, if there is an elevation in the ERP, there should be expected to be at least an offsetting drop in the risk-free rate — and if total market returns are indeed reduced, the drop in the risk-free rate would typically be expected to exceed the rise in the ERP.

Conclusion

- 1.49 Since the time of Ofcom’s 20 July 2011 WBA Charge Control Statement, market conditions have been volatile and opinions on the economic outlook (and related risks) have deteriorated considerably. We emphasize that what both theory and empirical evidence suggest is that when the economic outlook is worse, total market returns to capital fall (rather than rise). Thus, if Ofcom is to reconsider its 20 July 2011 cost of capital judgement in respect of LLU and WLR charges, the key question should be: **how much to reduce the cost of capital in the light of these events**. It is not impossible that the appropriate level for the ERP could be higher, if market turbulence increases markedly. But this would be likely to be more-than-offset by a fall in the risk-free rate, such that total market returns to capital fall.

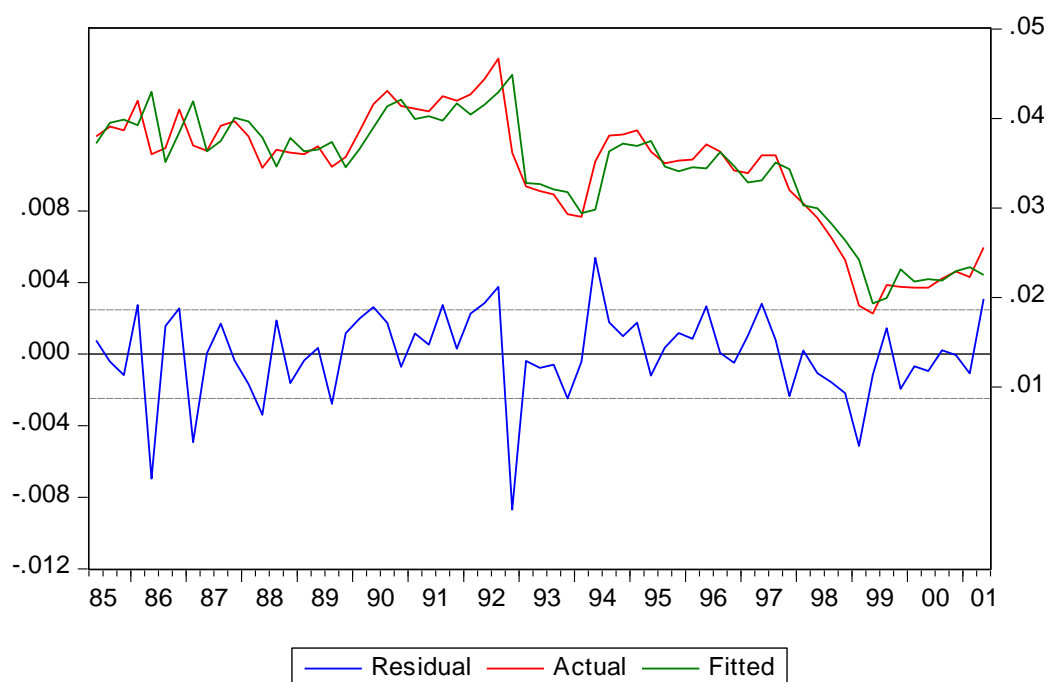
Appendix: Break test

1.50 The gilt yield series discussed in paragraphs 1.20 can be modelled as an ARMA (1,1) process (with a declining trend, named "T").

Table 1: ARMA (1,1) estimation results

Dependent Variable: YIELD				
Method: Least Squares				
Sample (adjusted): 1985Q2 2001Q2				
Included observations: 65 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.044461	0.003579	12.42281	0.0000
T	-0.000292	8.72E-05	-3.351631	0.0014
AR(1)	0.746950	0.092764	8.052165	0.0000
MA(1)	0.336549	0.139958	2.404639	0.0192
R-squared	0.876829	Mean dependent var		0.034311
Adjusted R-squared	0.870772	S.D. dependent var		0.006892
S.E. of regression	0.002478	Akaike info criterion		-9.103483
Sum squared resid	0.000374	Schwarz criterion		-8.969675
Log likelihood	299.8632	Hannan-Quinn criter.		-9.050687
F-statistic	144.7495	Durbin-Watson stat		2.049301
Prob(F-statistic)	0.000000			
Inverted AR Roots	.75			
Inverted MA Roots	-.34			

Figure 4: Fitted and residuals of values for the ARMA (1,1) series process



The graph above indicates there 1992Q3 as a candidate date for a break in the series and indeed a Chow test confirms this suspicion.

Table 2: Chow test on ARMA(1,1)

Chow Breakpoint Test: 1992Q3

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1985Q2 2001Q2

F-statistic	8.680055	Prob. F(4,57)	0.0000
Log likelihood ratio	30.91995	Prob. Chi-Square(4)	0.0000
Wald Statistic	39.88169	Prob. Chi-Square(4)	0.0000

- 1.51 We have repeated the Chow test after integrating the gilt series (i.e. taking its first difference) and modelling it as an ARIMA (1,1).

Table 3: ARIMA (1,1) estimation results

Dependent Variable: **D(YIELD)**

Method: Least Squares

Sample (adjusted): 1985Q3 2001Q2

Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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C	-0.000189	0.000357	-0.530306	0.5978
AR(1)	-0.643664	0.186167	-3.457446	0.0010
MA(1)	0.844661	0.119575	7.063841	0.0000
R-squared	0.076295	Mean dependent var		-0.000194
Adjusted R-squared	0.046010	S.D. dependent var		0.002607
S.E. of regression	0.002547	Akaike info criterion		-9.062452
Sum squared resid	0.000396	Schwarz criterion		-8.961254
Log likelihood	292.9985	Hannan-Quinn criter.		-9.022585
F-statistic	2.519216	Durbin-Watson stat		2.038245
Prob(F-statistic)	0.088871			
Inverted AR Roots	-.64			
Inverted MA Roots	-.84			

- 1.52 Again, the Chow test confirms the presence of a structural break in the series in at 1992Q3.

Table 4: Chow test on ARIMA(1,1)

Chow Breakpoint Test: 1992Q3			
Null Hypothesis: No breaks at specified breakpoints			
Equation Sample: 1985Q3 2001Q2			
F-statistic	7.814110	Prob. F(3,58)	0.0002
Log likelihood ratio	21.72494	Prob. Chi-Square(3)	0.0001
Wald Statistic	53.73791	Prob. Chi-Square(3)	0.0000