



Dundee Discussion Papers in Economics



SOME IMPLICATIONS OF CAPPING THE INFLATION INDEXATION OF USS PENSIONS

Bill Russell

Department of
Economic Studies,
University of
Dundee,
Dundee.
DD1 4HN

Working Paper
No. 261
November 2011
ISSN: 1473-236X

SOME IMPLICATIONS OF CAPPING THE INFLATION INDEXATION OF USS PENSIONS*

Bill Russell[#]

14 November 2011

ABSTRACT

On 1 October 2011 the Universities Superannuation Scheme (USS) substantially reduced the pension entitlements of its members. The most onerous of the changes is the cap placed on the indexation of pensions where in the event of high inflation the cap will quickly lower the real value of the pension. This paper quantifies the impact of the inflation cap and high inflation on the real value of the member's pension and the concomitant impact on the USS and universities.

Keywords: pensions, superannuation, USS.

JEL Classification: G00, G23.

* #Economic Studies, University of Dundee, Dundee DD1 4HN, United Kingdom. Phone: +44 (0)1382 385165 (work), +44 1382 384691 (fax), email brussell@brolga.net. I particularly thank Alison Fox and Dennis Petrie for their helpful insights and comments. The paper and data are available at www.BillRussell.info.

1. Introduction

On 1 October 2011 new rules governing the Universities Superannuation Scheme (USS) pension entitlements were enacted.¹ The changes are wide ranging including how the final salary is calculated, the contributions of members, and the capping of the indexation of pensions and deferred benefits with respect to increases in the consumer price index (CPI).² The changes mostly disadvantage the member but the inflation indexation cap on pensions is particularly onerous. The inflation cap is non-linear with the pension fully indexed to CPI inflation up to 5 per cent per annum. Between 5 and 15 per cent inflation pensions are indexed by 5 per cent plus half of the difference between the rate of inflation and 5 per cent inflation. Above 15 per cent annual inflation pensions are indexed by 10 per cent irrespective of the actual rate of inflation. The inflation cap is applied to all pensions that accrue after 1 October 2011 and to all deferred benefits of ex-members of the USS.³

The USS argues in their recent review of the pension scheme that the inflation cap is necessary so as to address the ‘inflationary risk’ of the asset portfolio of the pension scheme.⁴ The USS is therefore arguing that it is difficult to maintain the real value of the portfolio when inflation is high. It is not clear that this argument can be sustained empirically over the long or short time horizons. For example, the three panels of Graph 1 and Table 1 show the real return on an annual basis between 1980 and 2010 for three broad asset classes of any pension portfolio; namely very short term government debt (three month Treasury Bills), long term government debt (10 year Government Bonds) and equities (FTSE index).⁵ Note that the

¹ A summary of the changes to pension entitlements can be found at www.uss.co.uk. All USS documents referred to in this paper can be found at www.billrussell.info. The USS is open to employers of the higher education sector. In keeping with the name of the pension scheme we use the term ‘universities’ to encompass all the higher education institutions covered by the USS.

² In keeping with the USS terminology, members are academics whose pensions are underwritten by the USS.

³ After 1 October 2011 there are two tiers of members in the USS. The first tier includes the existing employees of the universities whose pensions on retirement are based on their final salary. The second tier is the new entrants employed after 1 October 2011 whose pensions are based on career average salaries. The inflation cap is applied to the re-valuing of the new entrants salaries. Due to the complicated nature of the how the inflation cap affects new entrants they are excluded from the modelling that follows. See Appendix 1 for details.

⁴ For example see USS (2010a).

⁵ See Appendix 2 for details of the data.

mean real returns for all three assets are positive suggesting that over the longer time horizon the nominal return for all three assets compensate for the rate of inflation.⁶ Note also that the share market while having the highest mean real return over the past thirty years has also the highest standard deviation in real returns. It is also the case that there is little systematic short-run negative correlation between inflation and both the real returns on Treasury Bills and the share market. This is demonstrated by the correlation coefficients reported in Table 1 between the annual percentage change in the real value of these assets and CPI inflation are -0.22 and -0.08 for Treasury Bills and the share market respectively with both coefficients insignificantly different from zero. In contrast the correlation coefficient between the real return on 10 year bonds and inflation is -0.41 which is significantly less than zero suggesting that higher inflation is associated with a lower real return on long term bonds in the short run.⁷

In general a company pension scheme such as the USS aims to balance the impact of inflation on its member's pensions with the impact that inflation has on the cost to employers of providing those same pensions. If the pension scheme fully indexes the member's pension to the rate of inflation then the risks surrounding the future rate of inflation are transferred from the member to the pension liabilities of the scheme. At the same time, the scheme will invest the portfolio of assets that fund the pension liabilities so as to compensate for inflation and in so doing reduce, or possibly eliminate, the risks of inflation to the employer. Therefore a well-functioning pension scheme conforms to a general rule of risk management that risks should be borne by those most able to handle the risk. Members have almost no facility after retiring to mitigate the inflation risk to their real income as they cannot re-enter the workforce or lock in the real value of their pensions either prior to or after retiring. In contrast the pension scheme is relatively good at handling the risks of high inflation by investing its financial assets in such a way that accounts for the rate of inflation.

⁶ The FTSE index does not include the reinvestment of company dividends suggesting the total real return from share price appreciation and dividends is somewhat higher and may be above 6 per cent after allowing for the taxation of dividends.

⁷ The real return on 10 year bonds is calculated using current CPI inflation which is likely to be a poor measure of expected inflation over the 10 year maturity of the asset.

By capping the indexation of pensions, the USS breaks the general rule of risk management outlined above by shifting the risks of future inflation onto members who are unable to mitigate these risks to their pension.⁸

This paper considers the impact of the introduction of the inflation cap on all three stakeholders in the pension process. We demonstrate how high inflation (defined in line with the inflation cap to be in excess of 5 per cent per annum) reduces the real value of pensions to members, the financial benefits to the USS and the financial benefits and costs to the universities. The next section explains why inflation is likely to be high in the future. Section 3 quantifies the impact of high inflation on the real value of the USS pension to members. It is calculated that for inflation equivalent to that in the 1970s the real value of a member's pension would decline by around a third over a period of ten years. Section 4 estimates the benefits to universities of the inflation cap for a range of inflation scenarios. Again for inflation equivalent to that in the 1970s it is estimated that universities will benefit by around £5 billion over ten years at 2010 prices. Section 5 considers two affects of the inflation cap on Universities. First it is argued that some, or all, of the surplus built up by the USS with high inflation will find its way to universities as they have the dominant voting rights in the USS. However, the second effect is that forward looking academics who believe inflation will be high sometime in the future will recognise the concomitant fall in their expected real remuneration and this will reduce their labour 'effort'.⁹ The problem for universities is that the former financial benefit is uncertain and depends on the future timing and size of inflation along with whether the USS transfers any inflation induced surplus back to universities. The latter is likely to be immediate and on-going. Consequently, while the inflation cap is definitely not in the interest of members it is not clear that the cap is in the interest of universities in the short or long runs. Section 6 concludes.

⁸ Unless otherwise stated the use of the term 'pensioners' includes ex-members with deferred benefits which are also subject to the inflation cap.

⁹ 'Effort' can be thought of in two dimensions. The first is the quantity of labour applied to activities desirable to the universities. The second is the quality of that labour. This argument can be thought of as an application of efficiency wage theory. See for example the early 'classic' work of McDonald and Solow (1981), Akerlof (1982), Shapiro and Stiglitz (1984) and Akerlof and Yellen (1986, 1990).

2. Why inflation is likely to be high at some time in the future

The United Kingdom inflation performance over the past twenty years has been relatively good compared to the inflation outcomes during the two world wars, the 1970s and the 1980s. However, the argument that inflation will continue to remain low (i.e. less than 5 per cent) over the indefinite future is difficult to sustain for the following reasons.

- (i) The Monetary Policy Committee (MPC) of the Bank of England has indicated by its unwillingness to tighten monetary policy that the Government mandated inflation target of 2 per cent per annum plus or minus 1 percentage point is not of primary importance. This is demonstrated by the MPC persistently accommodating inflation for 21 consecutive months (at the time of writing) above the upper target boundary of 3 per cent inflation per annum including September 2011 when annual CPI inflation was 5.2 per cent. The last change in the Official Bank Rate by the MPC was from 1.0 to 0.5 per cent on 5 March 2009.¹⁰ The MPC has therefore refused to tighten monetary policy for 31 months in the face of increasing inflationary pressures including 21 consecutive months above the upper bound of the target range for inflation.

Furthermore, Sir Mervyn King (Governor of the Bank of England) states on 23 March 2009 in his first open letter to the Chancellor following the original breaching of the 3 per cent upper boundary of the inflation target that:

‘As a result of these factors [commodity prices and low demand], and notwithstanding the inflation outturn for February, it is likely that over the next year CPI inflation will move below target, although the profile of inflation could be volatile, reflecting the reversal of the temporary change in VAT on CPI inflation.’

And again in his most recent open letter to the Chancellor on 15 August 2011 that:

¹⁰ The official rate of 0.5 is the lowest ‘bank rate’ set by the Bank of England since the foundation of the bank in 1694.

‘[I]t is likely that inflation will rise to around 5% in the coming months
Inflation should then fall back through 2012’

The Governor in every open letter to the Chancellor explaining why inflation is above its target has incorrectly forecasted that inflation will return to within the target range with no change in monetary policy. In other words the Governor (and the monetary policy committee) is entirely sanguine about the prospects for inflation and is simply waiting for ‘non-monetary policy’ factors to reduce inflation. That is, inflation is not the objective of monetary policy. Instead it is the responsibility of ‘factors’ that are outside the control of the Bank of England.

- (ii) The high debt levels presently experienced by the United Kingdom and other developed economies along with the inability or lack of desire to run persistent budget surpluses through higher taxation and/or lower government spending suggests that developed economies can only reduce the real value of outstanding government debt through higher inflation. Consequently, governments in general would welcome higher inflation and it appears that the United Kingdom central bank is willing to accommodate the higher inflation with loose monetary policy (see i above).¹¹

- (iii) Wars are traditionally associated with high inflation. Even small regional wars can lead to extended periods of high inflation. For example the 1974 Egypt Israeli War is an important precursor to the Organisation of Petroleum Exporting Countries oil price rises and subsequent high inflation of the 1970s and early 1980s. Furthermore, the Bank of England Act (1999) explicitly allows the Treasury to instruct the Bank of England when ‘in the public interest and in extreme economic circumstances’ to ignore the inflation cap.¹² Consequently, to argue that inflation will remain below 5 per cent over the indefinite future is simultaneously arguing that there will be no wars that increase inflation. Any understanding of history would suggest that on a statistical basis this is unlikely.

¹¹ This assertion is considered in more detail in Appendix 3.

¹² See Bank of England Act 1998, Chapter 11, Section 19 (1).

In any case, whether or not CPI inflation is going to be above 5 per cent per annum in the future is largely irrelevant. What is relevant is that the universities expect inflation to be above 5 per cent sometime in the future. If this was not the case then the universities would not have included the inflation cap in the proposed changes to the USS which were subsequently enacted as it would be redundant. Furthermore, no observer of economic history would argue that the probability that inflation will rise above 5 per cent over the indefinite future is zero. Consequently, quantifying the size of the impact of a range of high inflation scenarios is relevant to understanding the impact of the inflation cap on members, the USS and on the universities.

3. The impact of inflation on the real value of the USS pension to members

This section considers the impact of the inflation cap on the real value of the pension to members. As explained in the introduction the inflation cap is a non-linear rule and so the impact on the real value of the pension is not straightforward.

The impact of inflation on the real value of pensions, τ_t , due to the inflation cap can be calculated as:

$$\tau_t = \frac{1+x_t}{1+y_t} \tag{1}$$

where y_t is the percentage change in the consumer price index since the base period divided by 100 and x_t is the percentage change in pensions subject to the inflation cap since the base period. The inflation cap is applied to pensions on a sequential annual basis and the calculation in equation (1) must be applied on a similar basis.

Graph 2 shows the real value of a pension in three high inflation environments.¹³ The pension begins in year zero at a value of 1 and each line shows the real value of the pension, τ_t , as a

¹³ The real value is of any pension that is either taken or deferred but not a future pension of a member who is still employed by the university. The latter is roughly indexed to inflation by wages increasing in line with inflation up until retirement.

proportion of its starting real value for years zero to ten.¹⁴ The numbers coinciding with the last observation on each line is the real value of the pension after ten years.¹⁵

The red line shows the real value of the pension over a period of ten years if inflation is equivalent to that experienced during the 1970s in the United Kingdom. In this case we see the real value of the pension declining by around a third over a period of 10 years. That is, a £10,000 pension today would be worth £6,700 after experiencing ten years of inflation equivalent in magnitude and profile to that in the 1970s. The green and blue lines are the real values of the pension if inflation is 20 and 30 per cent per annum for 10 years respectively where we see the real value of the pension declining by 60 and 80 per cent.

4. The impact of high inflation on the USS

High inflation affects the USS in two ways. The first is the inflation cap reduces the real value of the pension liabilities of the USS when inflation is high. The second is the inflation cap transfers the risks associated with future high inflation from the USS to the members which in turn encourages the USS to become more conservative in its investment strategy for its portfolio of financial assets. We will deal with each affect below.

4.1 Modelling the impact of high inflation on the USS

To develop a full microeconomic model of the cost of funding USS pensions would require extensive corporate data known only to the USS. Furthermore, much of a more detailed model would be irrelevant for our purpose of quantifying the financial benefit to the USS of the inflation cap when inflation is high. We therefore use a straightforward aggregate discrete time model to calculate the impact of high inflation on the USS.

We begin by considering the impact of inflation on the pension liabilities of the USS. We assume that all demographic characteristics of members and pensioners are fixed over time

¹⁴ See also the notes to Graph 2.

¹⁵ In 2006 women and men are expected to live a further 19.9 and 17.2 years respectively after the age of 65 and so considering the impact of inflation over a period of 10 years is conservative. See Figure 3.3 Period life expectancy and healthy life expectancy at 65: by sex, Pension Trends, Office of National Statistics downloaded from the ONS web site on 29 August 2011.

and that these characteristics and the discount rate are independent of the rate of inflation. The demographic characteristics include the numbers of members and pensioners, the final salaries and the life expectancy of each pensioner, their partners and dependents. This means that as we move through time the distribution and number of pensioners do not change along with the associated life expectancy and other characteristics of the pensioners. This is an important pedagogical assumption so that we can abstract from the model the demographic changes that may influence the pension liabilities of the USS. The model therefore focuses only on the effects of high inflation on the pension liabilities of the USS. In a sense this assumption allows us to identify a base-line model of pensions before we incorporate the effects of high inflation. We also only model the impact of high inflation on the pensions of existing members of the USS as of 1 October 2011 and not the pensions of new entrant academics employed by universities after that date (see Appendix 1).

The pension liabilities of the USS can be separated into two broad categories. The first is the liabilities of members who are still employed by universities and not drawing (or deferring) their pensions. These liabilities are roughly indexed to inflation if salaries move approximately in line with prices. The second category is the liabilities of pensions that are being drawn or deferred and are therefore subject to the inflation cap. It is the second category that we are interested in when quantifying the impact of high inflation on the finances of the USS.

The value of the pension liabilities of the USS that are subject to the inflation cap, L_0 , (i.e. the second category in the paragraph above) is defined as the discounted present value of the stream of all USS pensions and benefits that are paid or deferred in the base period when they are fully indexed for inflation. We also define the real value of a member's pension in the base period as $\tau_0 = 1$. The real value of the inflation capped pension liabilities of the USS in period t expressed in the base period's prices can then be written as:

$$\pounds L_t = \pounds L_0 * \tau_t \tag{2}$$

Equation (2) states that if there is no change in the real value of members' pensions then the pension liabilities of the USS in period t is the same as in the base period because of the assumption that there is no change in the demographics, discount rate or characteristics of pensioners over time. Furthermore, if the real value of each USS pension declines by 10 per

cent in period t relative to the base period then $\tau_t = 0.9$ and the present value of all future pension liabilities of the USS will also fall by 10 per cent relative to the base period.¹⁶

The financial impact on the USS from high inflation comes from two sources. The first is the impact on the real value of the pension liabilities set out above. The second is the impact on the value of the financial assets held by the USS to service the pension liability. We therefore can write the total benefit from these two sources, $\pounds B_t$, as:

$$\pounds B = \pounds L_0 - L_t + z_t = \pounds L_0 * (1 - \tau_t) + z_t \quad (3)$$

where z_t is the impact that high inflation has on the net assets of the USS since the base period. Given that Graph 1 and Table 1 indicate that (a) the real return from short and long-term government debt and the share market are strongly positive over the past thirty years, and (b) there is no significant short run correlation between the real returns of short-term government debt and the share market, we assume that high inflation has no systematic impact on the real net asset position of the USS and so $z_t = 0$. In other words, we assume that the USS manages their financial assets in line with market returns over the past thirty years. This implies:

$$\pounds B_t = \pounds L_0 - L_t = \pounds L_0 * (1 - \tau_t) \quad (4)$$

The difficulty that we face when calculating equation (4) is estimating the USS pension liabilities that are subject to the inflation cap in the base period, L_0 , without access to the intimate corporate information mentioned above. These liabilities are the pensions already drawn by retired members and the deferred pensions of ex-members of the USS. The remaining pension liabilities are of members still employed by the universities and fully indexed due to the link between price and wage inflation.

We therefore estimate the size of the inflation cap liabilities subject to three further assumptions. One, we assume the net assets of the USS match the ‘true’ pension liabilities of the USS in the base period. In recent years the USS published actuarial studies that report the

¹⁶ This is because all the components of the present value calculation will be multiplied by 0.9 and the present value is also multiplied by 0.9 as we have assumed above that the discount rate is fixed.

net asset position of the USS has ranged between 77 per cent in 2007 and 103 per cent in 2008 of the estimated USS pension liabilities. The latest reported estimate published in USS (2010) is that the net assets position of the USS on 31 March 2010 was 91 per cent of the USS pension liabilities. The ‘matching’ assumption that we employ is therefore conservative.¹⁷

Two, we assume that the pension liabilities of employed non-retired members are fully indexed for inflation while, in line with the policy to inflation cap USS pensions, all pensions that are presently paid, or deferred, are subject to the inflation cap. The actual implementation of the inflation cap policy by the USS is ‘grandfathered’ and applies to pensions of existing members that accrue after 1 October 2011. Members’ pension’s accruing after 1 October will be subject to the inflation cap while their pension that accrued before 1 October will be fully indexed. And three, we assume that the proportion of the total pension liabilities that are inflation capped is equivalent to the proportion of pensioners (both retired and deferred) in the total membership of the USS.¹⁸

On the basis of these three assumptions we can estimate the pension liabilities of the USS that are inflation capped in the base period as:

$$L_0 = A_0 * \alpha_0 * (1 - \beta_t) \quad (5)$$

where A_0 is the net asset position of the USS in the base period, α_0 is the proportion of the total membership of the USS that are either receiving pensions or have their pensions deferred and β_t is the proportion of pensions that are fully indexed to inflation due to the ‘grandfathering’ of the policy to inflation cap pensions. Our focus here is the benefit to the USS of the inflation cap independent of the decision to grandfather the change in the rule.¹⁹ We therefore assume that all pensions that are being paid or deferred at the time of the high

¹⁷ See the Statement of Assets on page 54 of USS (2010). The assumption is conservative in the sense that if we assume the pension liabilities are larger than net assets of the USS then the benefits to the universities due to the inflation cap will be larger than that calculated below.

¹⁸ Deferred pensions are included as they are also subject to the inflation cap after 1 October 2011.

¹⁹ For example, ignoring the deferred benefits of ex-members, the benefit of the inflation cap to the universities is zero on 1 October no matter how high inflation is because the proportion of the pension liability that is subject to the cap is zero. This is not because the inflation cap policy is not beneficial to universities but because the policy change is ‘grandfathered’. The policy is not grandfathered with respect to the deferred benefits of ex-members and so high inflation in October 2011 will bring consequential benefits to the USS.

inflation are capped and $\beta_t = 0$. This will eventually be the case when the grandfathering of the rule change is no longer relevant.²⁰ With $\beta_t = 0$ we can use equation (5) to substitute for L_0 in equation (4) to arrive at the benefit to the USS of a reduction in the real value of USS pensions due to the inflation cap as:²¹

$$\pounds B_t = \pounds(A_0 * \alpha_0) * (1 - \tau_t) \quad (6)$$

The advantage of this approach to measuring the financial benefit to the USS is that we can consider the inflation cap over any time frame. For example, if we want to quantify the benefit to the USS one year after the base period then $t = 1$ in equation (6). Similarly, if we want to quantify the benefit over a longer time horizon such as ten years from a given base year then we simply set $t = 10$ in the same equation.

Note that this methodology does not calculate the present value to the USS of implementing the inflation cap as at 1 October 2011. This is because the calculation depends on the timing of the future high inflation. Instead this methodology calculates the real value of the high inflation measured in base period prices in the years that the actual inflation occurs.

4.2 *Estimates of the benefits to the USS of the inflation cap*

Tables 2 and 3 provide summary statistics of the USS for the year to 31 March 2010 from the latest published annual accounts of the USS. We choose 31 March as the base period $t = 0$ for our calculations. In the base period the net assets of the USS, A_0 , were valued at £30,197.9 million and the proportion of the USS membership who are either pensioners or ex-members with deferred benefits, α_0 , was 50.61 per cent (see Table 2). Consequently, the inflation capped pension liabilities in the base period, L_0 , as calculated in equation (5) are estimated to be £15,283.2 million.

²⁰ Assuming all the pensions are capped is equivalent to considering the impact on pensions that accrue after 1 October 2011. It allows us to use the values for pension liabilities and contributions to quantify the effect on the ‘new’ pensions of existing members.

²¹ Note that if we were interested in the actual time profile of the benefit to the USS of high inflation then we need to also model the time profile of β_t .

Table 4 provides estimates of the benefits to the USS from the inflation cap of pensions. The estimates are calculated over two time horizons and for five inflation scenarios. The first two inflation scenarios demonstrate the non-linearity in the USS inflation cap applied to pensions. Row 1 reports the benefit to the USS of an increase in inflation by 1 percentage point from 5 to 6 per cent per annum. We see that the pension liabilities of the USS are reduced by slightly less than half of one percentage point which is equal to a benefit in one year to the USS of around £70 million at 2010 prices. Similarly, if inflation is six per cent for ten years then the inflation capped liabilities of the USS decline by around 4.6 per cent and the benefit to the USS over ten years is around £700 million measured in 2010 prices. Row 2 undertakes a similar analysis for an increase of 1 percentage point in annual inflation from 15 to 16 per cent per annum.²² The benefits to the USS amounts to around £125 million in the first year and £810 million over ten years in base period prices.

Rows 3 to 5 report three high inflation scenarios. The first scenario reported in row 3 is the benefit that would accrue to the USS if inflation is equivalent to that in the 1970s. In this case we would see an average annual fall in the inflation capped pension liabilities of around 3.8 per cent per year and an average annual benefit of around £580 million at 2010 prices. We see also that after ten years the inflation capped pension liabilities have declined by around a third which is equivalent to slightly less than £5 billion at base period prices. The last two high inflation scenarios are reported in rows 4 and 5 in Table 4. We see the benefits to the USS when inflation is 20 and 30 per cent per annum for ten years are very large and equivalent to around £8,900 and £12,400 million respectively in 2010 prices. This amounts to just less than 60 per cent and slightly more than 80 per cent of the inflation capped pension liabilities of the USS in the base period.

4.3 The impact on the management of the USS

The shifting of the inflation risk from the USS to the members through the inflation cap means that the pension liabilities of the USS will become less risky with respect to inflation. This allows the USS to become more conservative in its investment strategy by trading off a

²² This calculation is for an increase of 1 percentage point in inflation and not for an inflation rate of 16 per cent.

lower mean return on their asset portfolio for a lower variance in the return.²³ In other words, the USS will then aim for a mean return on their asset portfolio that is less than the return the market would deliver if the risks of inflation were managed by the USS. This response to the shifting of the risk from the USS to the members appears to already be underway. For example the USS announced its intentions in section 5.3 on page 36 of USS (2010) to shift its investment strategy towards ‘risk reducing assets’ which are described as government bonds and indexed linked gilts at the expense of a reduction in equities in the portfolio.

The shift to a more conservative investment strategy may have a large negative impact on the mean returns of the USS financial portfolio in the present economic environment. This is because the long-term bond yields are at historically low levels (2.43 per cent on 30 September 2011) implying negative real rate of return of around – 2.8 per cent. These low rates are due to the setting of monetary policy where the official interest rate is 0.5 per cent and the quantitative easing of the Bank of England increasing the demand and prices of long term government debt. One must conclude therefore that interest rates are unlikely to fall further and are likely to increase when monetary policy finally returns to a more ‘normal’ setting. Consequently, increasing the share of long-term government debt in the portfolio at this time increases the exposure of the USS to the risks of increasing interest rates and the subsequent reduction on the capital value of the long-term government debt.²⁴

Finally, any surpluses derived from high inflation and the inflation cap are likely in part to be appropriated by the management and directors of the USS. This would be in the form of higher salaries, benefits and bonuses as well as an expansion in the number of employees. This suggests the costs of administering the USS would rise relative to the level of costs if there was no inflation cap of pensions.

²³ See the discussion concerning the mean returns and variance in the introduction. The surpluses generated by the inflation cap and high inflation will make the USS look as though it is financially better managed than if there was no cap in place. This suggests the financial performance of the USS is a poor indicator of the inherent skills of the management. This is a simple example of the old adage that ‘easy money leads to soft management’.

²⁴ A doubling in the yield on long-term government debt from the present rate of 2.43 per cent (30 September 2011) to 4.86 per cent approximately halves the value of that debt. Note that a doubling in the yield is still equivalent to a negative real return of -0.34 per cent at current rates of inflation compared with the mean real 10 year bond rate of 3.22 over the past 30 years (see Table 1).

5. The impact of high inflation on universities

The impact on universities comes in two forms. The first is the transfer of any benefit to the USS from high inflation on to the universities. This depends on the voting structure of the USS. The second is the impact on the working behaviour of academics when they recognise that the change in pension entitlements has reduced the real value of their remuneration after 1 October 2011. We will deal with each in turn.

5.1 *Transfer of benefits to universities*

On their web site the USS describes itself as a centralised final salary scheme that is open only to employers in the higher education sector. In turn the USS is run by a board consisting of 12 directors comprising on 18 August 2011 of, (i) seven directors (including the Chairman) who are either appointed by Universities UK (UUK) or have close connections to the management of universities in the past or in the present, (ii) three directors who are appointed by the Universities and College Union (UCU), and (iii) two ‘non-aligned’ directors. The latter appear to have no particular connection to the membership of the USS and are more likely ‘aligned’ with the views of the universities.²⁵ Given that the USS is open to university employers only and the majority of the directors are either appointed by, or connected to, the management of universities, we can expect the decision making process to favour the views of universities and not the members of the USS.

It is also the case that the contrary view that representatives of members control the decision making of the USS is difficult to sustain. This would imply that members also control the rate at which universities contribute to the USS. Academics would then be able to unilaterally

²⁵ As of 18 August 2011 the 12 directors are Sir Martin Harris (Chairman, appointed by UUK); Professor John Bull CBE (Director and Deputy Chairman, co-opted – formally the Vice-Chancellor of the University of Plymouth from 1989 until his retirement in 2002); Professor Glynis Breakwell (Director, appointed by UUK); Michael Butcher (Director, co-opted - member of the audit committee at Loughborough University); Joseph Devlin (Director, appointed by UCU); Professor David Eastwood (Director, appointed by UUK); Mr Steve Egan (Director, appointed by HEFC - is vice chair of the IMHE which is the higher education program of the OECD); Mr Dave Guppy (Director, appointed by UCU); Ms. Virginia Holmes (Director, co-opted - formerly chief executive of AXA Investment Managers in the United Kingdom and managing director of Barclays Bank Trust Company); Mr Howard Jacobs, (Director, co-opted – formally worked for the solicitors, Slaughter and May who state on their web site that they ‘advise on a wide range of pension matters, acting both for corporate sponsors . . . and for trustees’); Mr David McDonnell (Director, appointed by UUK); Mr Bill Trythall (Director, pensioner appointed by UCU).

control their remuneration through their control of the pension contributions of universities and the resulting pension entitlements. Given the USS was set up at the behest of the universities it is unlikely they would make such a fundamental mistake as to set up a pension scheme that allows academics to control their own remuneration. Finally, the conclusion that the decision making process of the USS is dominated by representatives of the universities is consistent with the overwhelming nature of the recent changes to pension entitlements which are detrimental to members. This is evidenced by the changes enacted on 1 October 2011 were first proposed by the universities and strongly opposed by the member's representatives on the Board of Directors.²⁶ With universities dominating the decision making process of the USS, any financial benefits that follow from the implementation of the inflation cap can be expected to flow back to universities and not to members of the USS.

As the USS is a multiple company pension scheme it is not possible for the USS to directly transfer any surplus to the universities. However, one method for the transfer to occur would be for the pension contributions to the USS of members to remain fixed at 7.5 per cent of pensionable salary while the universities (in line with private sector practice) take a partial or full payment 'holiday' in their contributions. Assuming the pension contributions of members and universities are at their steady state values consistent with the pension liabilities of the USS in the base period we can express the benefits in terms of the universities pension contributions.

Table 4 reports the benefit to the USS in terms of the universities' pension contributions. In column 3 the annual surplus is reported as the percentage of actual university pension contributions in the year to 31 March 2010 (£862.6 million). Column 4 reports the surplus as the percentage of pensionable salary. We see that an increase in annual inflation from 5 to 6 per cent leads to a benefit equivalent to around 8.5 per cent of actual contributions and 1.3 per cent of pensionable salary. The latter implies that when inflation is 6 per cent then universities could reduce their annual pension contributions by 1.3 percentage points from 16 to 14.7 per cent of pensionable salaries so as to offset the surplus created by the inflation cap.

²⁶ For example see USS (2011b) which states that 'Following a meeting on 7 July 2010, the Joint Negotiating Committee (JNC) . . . decided to accept a package of proposals put forward by the employers. These proposals formed the recommendation from the JNC which were to be considered by the USS Trustee Board at ths (sic) meeting on 22 July 2010.'

Similarly for an increase in inflation from 15 to 16 per cent the benefit is equivalent to 14.5 per cent of actual contributions and 2.3 per cent of pensionable salaries.²⁷

For inflation equivalent to that in the 1970s columns 3 and 4 of row 3 reports the benefit is slightly less than 70 per cent of the universities contributions in the year to 31 March 2010 and around 11 per cent of pensionable salaries. Universities could therefore reduce their contributions from 16 per cent to 5 per cent of pensionable salaries due to the reduction in the real value of the pension liabilities brought about by the interaction of the high inflation and the inflation cap. The high inflation scenarios in rows 4 and 5 show the benefit to the USS is larger than the combined pension contributions of the members and universities.

Finally, we can use the model to search for the rate of inflation that leads the surplus to the USS to equal the universities' pension contributions of 16 per cent and the total contributions by the members and universities of 23.5 per cent of pensionable contributions. The answer to the former is around 16.6 per cent inflation and to the later it is slightly less than 20 per cent inflation.

6. Conclusion

On a superficial level the inflation cap appears to be in the interests of universities with the financial benefits when inflation is above 5 per cent substantial. However, once the costs are identified the full picture is more complicated. For example, not all the generated surplus is likely to accrue to the universities as some of the surplus will be appropriated by the management and directors of the USS leading to less efficient (in cost terms) management of the USS. It is also the case that academic employees of the universities are likely to change their behaviour if they expect, not unreasonably, that future inflation will be high. The inflation cap will then mean that the expected real value of their present remuneration has declined. If academics expect very high inflation sometime in the future then the present value of the pension may (in the limit) be approximately zero and the real value of their expected remuneration will decline by around 23.5 per cent (i.e. equal to the pension

²⁷ Note that this is the extra surplus generated from an increase in inflation from 15 to 16 per cent. The actual surplus with 16 per cent inflation is £790 million per annum which is equivalent to 92 per cent of actual contributions and 14.7 per cent of pensionable salary.

contributions of members and universities). Any large falls in the expected real remuneration of academics are likely to lead a reduction in the labour ‘effort’ of academics.

However the biggest complication for universities is that the timing of the benefits and costs do not coincide. The actual benefits to universities due to the inflation cap are uncertain and depend on the timing and magnitude of the high inflation as well as the share of the pension liabilities subject to the inflation cap. In contrast, the response of academics to the decline in the expected value of their remuneration is immediate and on-going irrespective of whether or not the benefits actually accrue to universities in the future. For example, consider the following scenario where it is rational (based on an understanding of past inflation) for universities and members in 2011 to expect inflation to be high sometime in the future. If expectations are not realised and inflation remains below 5 per cent then there is no financial benefit to the universities from the inflation cap. However, the labour supply response of academics based on expected inflation is immediate and on-going leading to higher costs and disruption. Furthermore, the shift to a more conservative investment strategy by the USS will mean that the return on the USS portfolio of financial assets will be lower implying the pension contributions of universities will be higher than if the inflation cap was not in place. Even if the expectations of high inflation are realised the benefits to the universities may be muted due to the grandfathering of the policy to inflation cap pensions.

The analysis above points to a number of policy issues. The inflation cap can be thought of as a mechanism by which universities through the USS can legally reduce their labour costs retrospectively. In the limit, very high inflation will see the real pension liabilities converge on zero and the universities appropriate not only all their past pension contributions but also the past pension contributions of members and any real increase in the real value of the asset portfolio built up from the contributions. This resulting decline in the pension provision to members runs contrary to the desire of successive governments to encourage pension provision in general.

The second issue is the ‘retrospective’ nature of the inflation cap. For example, ex-members with deferred benefits may well have acted earlier to either not join the USS, transfer their deferred benefits out of the USS, or not even accept employment at a university if they were aware that their deferred benefits worth (on a cost basis) up to 23.5 per cent of their

pensionable salary could be appropriated from them through the imposition at a later date of the inflation cap and high inflation.

Third, inflation capping of pensions is likely to encourage pension schemes to under-perform in terms of administrative costs of the scheme and returns on the asset portfolio.

Fourth, the reduction in the expected remuneration of academics due to the implementation of the inflation cap depends on each academics expectation of inflation and the awareness of the roles that inflation and the cap play in reducing the expected real value of their pension. Given inflation (as of September 2011) is already above 5 per cent, academics may quickly update their expectations and understanding of the process. Consequently, the fall in the expected real remuneration may be substantial leading to a similarly substantial reduction in 'effort' by employed academics and increased difficulty in hiring and retaining high quality academic staff.

Fifth, the monopoly status of the USS for the provision of pensions of university academics means that there is no available market mechanism to moderate the behaviour of the universities with respect to the provision of pensions. If academics were allowed to direct the universities' pension contribution to the pension provider of their choice then competitive pressures would mean that the inflation cap would most likely not be sustainable. Furthermore, this would allow academics to manage their own personal pension fund in such a way to offset any risks of future high inflation. At the very least the academic can do better at offsetting the risks of future high inflation using readily available financial products than carrying all the inflation risk associated with the indexation cap with a pension managed by the USS.

Finally, if the motivation of the universities for the inflation cap is purely financial with little or no regard for pensioners then the message to existing university employees is bleak. This is because the recent changes enacted on 1 October 2011 can easily be extended to all members by (a) removing the grandfathering of the inflation cap, (b) inflation capping all pensions, and (c) the unilateral and retrospective shifting of all pensions to a 'career average' basis. All three policies are within the remit of the USS controlled by the universities and if financial gain is the only objective then these policies are likely to be enacted in the future.

In contrast, the universities may be truly concerned about the risks of high future inflation on their asset portfolio and that the impact of the inflation cap on the real value of members' pensions is an undesirable (to the universities) consequence of the policy. In this case the universities are pursuing a 'myopic' management style in that they are blind to the full consequences of their actions because they are so focused on the single objective of avoiding the perceived risks from inflation. If this is the case then universities would happily end the USS monopoly on academic pensions and pay their pension contributions directly to academics or to a pension provider of the academic's choice. This would allow academics to manage their own pensions and for no additional financial outlay the universities can avoid (i) the risks of high future inflation to their asset portfolio (as there are no pension liabilities to service); the additional labour supply costs associated with the fall in the expected remuneration of the academics; and (iii) the higher cost of pension provision due to the USS becoming a more conservative manager of their asset portfolio. At the same time the universities will be demonstrating that their motivation is not purely financial by voluntarily rejecting any future financial benefits that follow from the 'undesirable consequences' of the policy to inflation cap pensions.

7. References

Akerlof, G.A. (1982). Labor Contracts as Partial Gift Exchange, *Quarterly Journal of Economics*, vol. 97, pp. 543-69.

Akerlof, G.A. and J.L. Yellen (1986). *Efficiency Wage Models of the Labor Market*, Cambridge University Press, Cambridge.

Akerlof, G.A. and J.L. Yellen (1990). The fair Wage-Effort Hypothesis and Unemployment, *Quarterly Journal of Economics*, vol. 105, pp. 255-83.

McDonald, I.M. and R.M. Solow (1981). Wage Bargaining and Employment, *American Economic Review*, vol. 71, pp. 896-908.

Shapiro, C. and J.E. Stiglitz (1984). Equilibrium Unemployment as a Worker Discipline Device, *American Economic Review*, vol. 74, pp. 433-44

USS (2010a). Consultation on proposals for changes to USS, October, Universities Superannuation Scheme, London.

USS (2010b). Report & Accounts for the year ended 31 March 2010, Universities Superannuation Scheme, London.

USS (2011). Important information for USS members, Universities Superannuation Scheme, London.

USS (2011b). Scheme Review, downloaded from the Universities Superannuation Scheme web site (www.uss.co.uk/HowUssIsRun/Schemereview/Pages/default.aspx) on 18 October 2011, London.

APPENDIX 1: THE IMPACT OF THE INFLATION CAP ON ‘NEW ENTRANTS’ INTO ACADEMIA

The empirical analysis set out above for deferred pensions of ex-members and pensions of members substantially understates the financial benefits to the USS of the inflation cap. This is because from the 1 October 2011 the USS will run a ‘two-tier’ pension system. The first tier includes the existing members who remain on a final salary pension *albeit* with the pension that accrues after 1 October subject to the inflation cap. The analysis of the paper considers the impact of high inflation on the pensions of the first tier of the USS.

The second tier contains the ‘new entrants’ who are employed by universities after 1 October 2011. For the new entrants they will have their final salary for pension purposes calculated as the sum of $1/80^{\text{th}}$ of the salary in each pensionable year. This $1/80^{\text{th}}$ of their salary will then be indexed in line with the same inflation cap between the year that it occurs and when the new entrant retires. This may be a period of forty or more years. Consequently, any inflation above 5 per cent while the new entrant is employed for the university will lower the real value of their final salary even before they retire and, in turn, lower the real value of their pension. With very high inflation the pension liability of the USS in regards to the new entrants may be all but fully extinguished prior to retirement. The new entrants will then find themselves in the unenviable situation that their pension is of no value when they retire and the universities through the USS have appropriated all past pension contributions from members and universities along with the real growth in the value of the contributions. Even for moderate inflation the real value of the pension may well be less than the real value of the members’ contributions even given the universities pension contributions and the tax advantages conferred by the government. In this case it may well be optimal for the new entrant not to join the USS and manage their own ‘inflation-proof’ pension themselves. At the very least, once the grandfathering of the two tier pension system expires and all members of the USS are employed after 1 October 2011 then the benefits to the universities of the inflation cap will be in the order of twice that quantified above for the tier one members of the USS.

The benefits accruing to the USS of inflation capping the final salary of the new entrants is not modelled here as it complicates the modelling and discussion considerably as the time profile of future inflation becomes important. For example, the closer high inflation occurs to the retirement age the greater the impact on the real value of the final salary and the real value of the pension of the new entrant. However, the basic analysis outlined here is entirely relevant when describing the benefits to universities from inflation capping the final salary calculation for new entrants.

APPENDIX 2 DATA APPENDIX

The data for the United Kingdom are annual unless stated otherwise. The mnemonic of the series relates to the database that the data was downloaded from. Data are available to download from www.BillRussell.info.

United Kingdom Data		
<i>Variable</i>	<i>Mnemonic</i>	<i>Details</i>
Inflation	ONS CDKO	Inflation is measured as the percentage change in the consumer price index (CPI). The CPI series is described by the ONS as the 'long term indicator of prices of consumer goods and services' and based in January 1974 = 100.
Three month Treasury bill rate	IFS 60C..ZF	91 day Treasury bill rate calculated as the average of the daily rates.
Government 10 year bond yield	IFS 61A..ZF	Theoretical gross redemption 10 year bond yields calculated as the average of the daily rates. Prior to 1984 it is the 5 year bond yield.
Government 20 year bond yield	IFS 61...ZF	Theoretical gross redemption 20 year bond yields calculated as the average of the daily rates.
Share Prices	IFS 62...ZF	The FTSE All-Share Index, base April 10, 1962, is a market capitalization weighted index representing the performance of all eligible companies listed on the London Stock Exchange's main market.

Notes: ONS: The data were downloaded on 29 August 2011 from the Office of National Statistics web site. IFS: The data are from the International Monetary Fund, International Financial Statistics (Edition: September 2011) and downloaded on 23 September 2011 from ESDS International, University of Manchester. DOI: 10.5257/imf/ifs/2011-09.

Real return on Treasury bills and Government Bonds calculated as the yield less inflation in the concurrent year. Real share market return calculated as the percentage change in the real share market index where the latter is calculated as the share market index divided by the CPI.

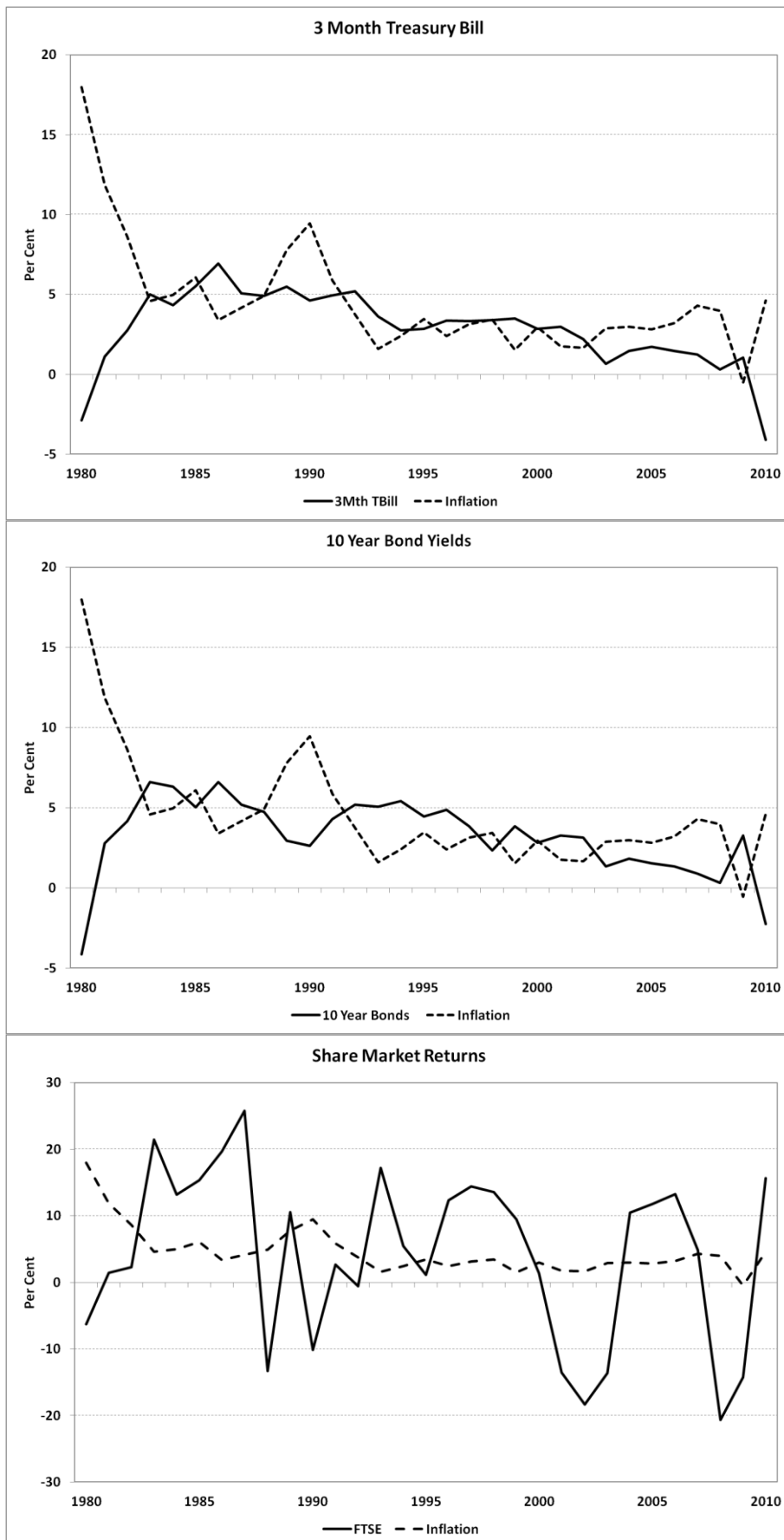
APPENDIX 3: FISCAL SURPLUSES VERSUS INFLATION TO REDUCE THE REAL VALUE OF GOVERNMENT DEBT

Recent political events in the United States leading up to the largely symbolic deadline for the default of government debt on 2 August 2011 have demonstrated that the Republican Party is willing to default on government debt for the purpose of political gain. The financial markets now accept that United States government debt (even at its present moderate historical levels) is no longer 'risk free' because of political risk. By implication, given the increased risk of holding United States government debt the risk of all government debt world-wide has increase. This provides governments the incentive to reduce the real value of government debt so as to reduce any increase in the cost of funding the debt due to the political risk. This can be achieved in three ways: run fiscal surpluses, sell government assets and higher inflation.

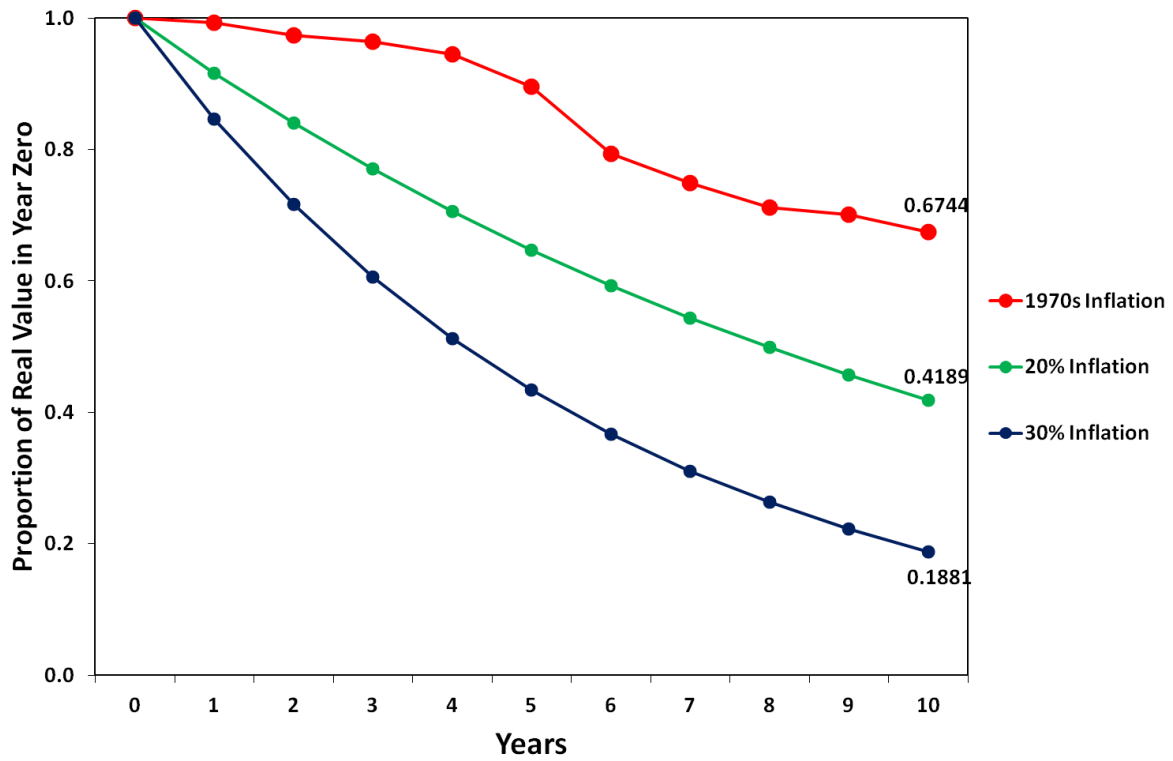
However, only one of the three ways to reduce government debt is credibly available to governments. The lesson from the Clinton/Bush 2000 presidential election (and to a lesser extent the Carter/Regan 1980 election) is that it is very unwise to run a persistent or structural fiscal surplus because the Republican Party (or in general any opposition) will embrace a policy to reduce taxation so as to be elected. The Clinton/Bush lesson appears not lost on Gordon Brown (United Kingdom Chancellor) who proceeded to shift the United Kingdom's fiscal position from a slight surplus to a large deficit in a period of strong economic growth. Presumably, this change in macroeconomic policy was not for economic reasons but to close off the opportunity for the Conservative Party to offer tax cuts at the next election.

There has developed, therefore, an asymmetry in how the political process deals with fiscal surpluses and deficits. A surplus is now 'bad' in a political sense because it allows the opposition to offer credible and economically responsible tax cuts to voters. In contrast, a deficit is 'good' because any policy of tax cuts is not credible as they are economically irresponsible. Consequently, for all the rhetoric of governments about the need to reduce the level of government debt the idea that this can be achieved through a prolonged fiscal surplus is not credible *and therefore if debt is to be reduced it can only be achieved by selling assets or higher inflation*. Given nearly all of the government monopolies of any value in the United Kingdom have already been sold by the Thatcher/Major/Blair/Brown governments it implies that the only opportunity for there to be a substantial reduction in government debt is to run a sustained period of loose monetary policy leading to high rates of inflation. Recent behaviour by the Monetary Policy Committee in the United Kingdom suggests that the Bank of England is willing to support the debt reduction programme by implementing such a high inflation policy.

Graph 1: United Kingdom Inflation and Real Asset Returns: Annual 1980-2010



Graph 2: The Impact of ‘High’ Inflation on the Real Value of a USS Pension



Notes: The real value of a USS pension is calculated as in equation (1) where $\tau_0 = 1$. For example, for year 1 of the 20 per cent inflation example in the graph above (i.e. the green line) then for $t = 1$ the rate of inflation is 20 per cent and the inflation cap means that pensions are indexed by 10 per cent so that $\tau_1 = 1 * \frac{(1+0.1)}{(1+0.2)} = 0.9167$ and for $t = 2$ then $\tau_2 = 0.9167 * \frac{(1+0.1)}{(1+0.2)} = 0.8403$.

**Table 1: Inflation and the Real Return on Financial Assets
Annual 1980 to 2010**

	<i>Inflation</i>	<i>3 Month Treasury Bill</i>	<i>10 Year Bond</i>	<i>Share Market</i>
Mean	4.58	2.83	3.22	4.28
Standard deviation	3.55	2.37	2.40	12.63
Correlation with inflation		- 0.2234 (- 1.23) [0.2271]	- 0.4144 (- 2.45) [0.0205]	- 0.0760 (- 0.41) [0.6845]

Notes: The Data Appendix provides details on how the real rates of return are calculated. Reported as () are t-statistics of the correlation coefficient between the real asset return and inflation. Reported as [] is the probability value that the correlation coefficient is zero. Mean and standard deviation reported as per cent per annum.

**Table 2: Membership and Contributions of the USS
31 March 2010**

	<i>Membership¹</i>	<i>Contributions (£ Million)²</i>	
Members	137,932	<i>Main Section</i>	
Pensioners		Employers	862.6
Members	46,268	Employers Salary Sacrifice	210.8
Spouses	8,728	Members Basic	124.5
Dependent Children	866	Members AVC	51.8
Total Pensioner Members	55,862	Total Main Section	1,249.7
Deferred Pensions	83,201	<u>Supplementary Section</u>	19.5
Ex-spouse Pensions	2,301	<u>Money Purchase AVC</u>	69.3
Total Membership	279,296	Total Contributions	1,338.5

Notes: Statistics as of 31 March 2010 and published in USS (2010). 1 See Summary of Movements page 52. 2 See Contributions page 58. The 'salary sacrifice ratio' is paid by the employers on behalf of members so as to take advantage of a tax benefit. In the year to 31 March 2010 the employer's basic contribution to the USS was increased from 14 to 16 per cent of the members pensionable salary on 1 October 2009. The member's contribution is 6.35 per cent of salary. The ratio of member's basic contributions to employer's basic contributions is approximately $\frac{6.35}{(14+16)/2} = 0.42$. This can be compared with the data in the table where the ratio can be calculated as $\frac{124.5+210.8}{862.6} = 0.39$. Members as a percentage of total membership and pensioners as a percentage of total membership are 49.39 and 50.61 per cent respectively.

Table 3: Benefits Payable by the USS (£ Million)
31 March 2010

	<i>Main Section</i>	<i>Supplementary Section</i>	<i>Money Purchase AVC</i>
Pensions	890.7	11.2	48.2
Lump Sum on or after Retirement	295.4	0.5	0.4
Lump Sum on Death in Service	7.7	2.2	(47.0)
Total	1,193.8	13.9	1.6
Total Benefits Payable £1,209.3			

Notes: The average pension per member is $\frac{950.1 \text{ million}}{55,862} = \text{£}16,335$ where the numerator is the total value of USS pensions and the denominator is the number of USS pensioners.

Table 4: The Impact of High Inflation and the Inflation Cap on the USS

<i>Inflation Scenario</i>	<i>Real Value of Pension Liabilities</i>		<i>Benefit to the USS</i>	
	1. Percentage Change in L^1	2. £ million ²	3. Percentage of Contributions ³	4. Percentage of Pensionable Salary ⁴
1. Increase in inflation of 1 percentage point from 5 to 6 per cent per annum				
Annual	- 0.47	72.09	8.36	1.34
Cumulative total after 10 years	- 4.62	705.79		
2. Increase of inflation by 1 percentage point from 15 to 16 per cent per annum				
Annual	- 0.82	126.02	14.61	2.34
Cumulative total after 10 years	- 7.95	812.68		
3. Inflation equivalent to that in the 1970s				
Annual average	- 3.81	582.53	67.53	10.81
Cumulative total after 10 years	- 32.56	4,976.01		
4. Ten years of 20 per cent inflation				
Annual	- 8.33	1,273.60	147.65	23.62
Cumulative total after 10 years	- 58.11	8,880.98		
5. Ten years of 30 per cent inflation				
Annual	- 15.38	2,351.25	272.58	43.61
Cumulative total after 10 years	- 81.19	12,407.70		

Notes to Table 4

¹ Except for the 1970s inflation experience, the annual percentage change in the real inflation capped pension liabilities L and the cumulative impact on L over ten years are reported. For the 1970s inflation experience the annual change is the average percentage change in L over the ten years of the 1970s and the actual change in L over the 1970s.

² The benefit to universities reported as £ million is calculated as the percentage change in L (either annual or the cumulative total) multiplied by the nominal value of the inflation capped USS pension liabilities as at 31 March 2010 such that $L_0 = £ 30,197.9 * 50.61\% = £15,283.16$ million.

³ The benefit to universities expressed as a percentage of contributions is calculated as the £ million value of the benefit reported in ² as a percentage of the actual contributions of universities in the year to 31 March 2010 which was £862.6 million (see Table 1).

⁴ The benefit to universities expressed as a percentage of pensionable salary is the percentage in ³ (expressed as a proportion) multiplied by the rate that universities contribute to the USS which was 16 per cent of pensionable salaries on 31 March 2010.
