Tail risk and its mitigation for DPCR5

Note prepared for ENW

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1 Introduction

Recent volatility in capital markets and ongoing macroeconomic weaknesses have contributed to uncertainty as to the level of costs that DNOs will incur in the forthcoming regulatory control period. As Ofgem has noted, the scale of possible variation between outturn costs and those assumed in setting price controls, has always existed:

> but ha[s] been brought into sharp focus by recent changes in key input costs, such as the volatility in copper prices and the sharp increases in the cost of raising finance in the wake of the credit crunch. There have been other significant outturn variations affecting DNOs' net costs …[1]

Ofgem's initial proposals for DPCR5 stated that a significant part of the regulator's work between the publication of these proposals and the final proposals will involve assessing mechanisms to address this uncertainty, especially in relation to the costs of raising new capital to fund network investment.[2] This note is a contribution to Ofgem's work in this area.

It is noted that Ofgem's intention to investigate uncertainty mechanisms will be distinct from, but complementary to, analysis of the appropriate cost of capital for DNOs:

> We expect to focus much of our work … considering the mechanisms for managing uncertainty, in deciding on the most appropriate cost of capital for the DPCR5 period and in agreeing what scope there should be for shareholders to earn in excess of or below our assumed equity returns.[3]

In other words, Ofgem will consider in the round:

– the cost of capital that should be assumed in calculating allowed revenue;

[1] Ofgem (2008), 'Electricity Distribution Price Control Review Policy Paper', Ref 159/08, December, p. 15.
[2] Ofgem (2009), 'Electricity Distribution Price Control Review Initial Proposals', Ref 92/09, August 3rd, p. 6.
[3] Ofgem (2009), 'Electricity Distribution Price Control Review Initial Proposals', Ref 92/09, August 3rd, p. 6.

- the opportunities for outperformance against this ‘base WACC’;
- the risks of underperformance due to circumstances which are outside companies’ control, and which have not been taken care of by uncertainty mechanisms in the price control itself.

This consideration will be in the context of Ofgem’s comment that ‘volatility…is markedly higher than when the last price control was set’.[4]

A variety of regulatory mechanisms are available to deal with the type of uncertainty under consideration. PriceWaterhouseCoopers’ (PwC) report[5] for Ofgem on managing fluctuations in *the cost of debt* considered a number of relevant approaches, and recognised that regulators could derive significant benefits from a substantial effects clause, especially given certain problematic features of the other possible mechanisms. A substantial effects clause could reduce companies’ exposure to unanticipated costs shocks. It would also address uncertainty of a type (notably, ‘tail risk’) not considered in the final settlement for DPCR4, but which has nevertheless become more important as a consequence of recent increases in macroeconomic and capital market volatility. The invocation of the clause would be subject to a materiality condition, and would only relate to circumstances that could not have been avoided by prudent management action; in other words, it would not reward or ‘subsidise’ inefficient management.

Introducing such a clause should not reduce the assumed cost of capital relative to DPCR4, since the types of risk that would be addressed by the substantial effects clause were not seen as relevant at the time of DPCR4.

The remainder of this note explores this argument in more detail. It is structured as follows:

- section 2 considers some of the indicators that illustrate the change in risks since the DPCR4 price control was determined;
- section 3 considers how Ofgem might best mitigate the identified risks, building on PwC’s work;
- section 4 concludes by looking at the case for the inclusion of a substantial effects clause in DNOs’ licences.

2 Basis for investor perceptions of risk now and at DPCR4

This section reviews indicators that reveal how investor perceptions of tail risk might reasonably have increased in the period leading up to the DPCR5 final proposals, *relative* to the period leading up to the DPCR4 final proposals. A number of indicators could be used in this exercise, and the survey presented here is by no means exhaustive.

Investors take into account the regulatory framework for setting allowed revenue when evaluating investment prospects. Ofgem sets DNOs’ allowed revenue so as to allow an efficient DNO to recover a real rate of return on the regulated asset base (RAB), which is itself indexed to the RPI. Investors in DNOs are therefore confronted with two risks that are especially relevant in the present context.

- The DNO bears the risk that the assumed cost of capital may be below its actual cost of capital.

[4] Ofgem (2008), ‘Electricity Distribution Price Control Review Policy Paper’, Ref 159/08, December, p. 15.
[5] PriceWaterhouseCoopers (2009), ‘Managing Cost of Debt Fluctuations’, July.

– The DNO bears the risk of differences between variation in input prices (eg, construction prices) and variation in the RPI.[6]

The following summarises how recent developments in capital market costs and input prices demonstrate how investors' perception of the importance of tail risk will have increased relative to the period before the DPCR4 final proposals. The summary analysis presented below builds on, and is complementary to, sections 2 ('Setting the scene') and 5.1 ('Additional evidence on recent credit market conditions') of the PwC report.

2.1 Capital market risk

This section considers the volatility of interest rates, using gilt yields as a proxy. The analysis reveals a sharp recent increase in the volatility of gilt yields. Volatility in interest rates can be measured either by looking at how much daily changes in interest rates have increased, or by taking the standard deviation of this value to measure the change in the dispersion of first differences from some mean value. Both measures are employed below to analyse the changes in interest rate volatility since DPCR4.

– Figure 2.1 shows that daily changes in short-run interest rates before 2007 were significantly lower than the subsequent daily changes in either real or nominal medium- and long-run interest rates.

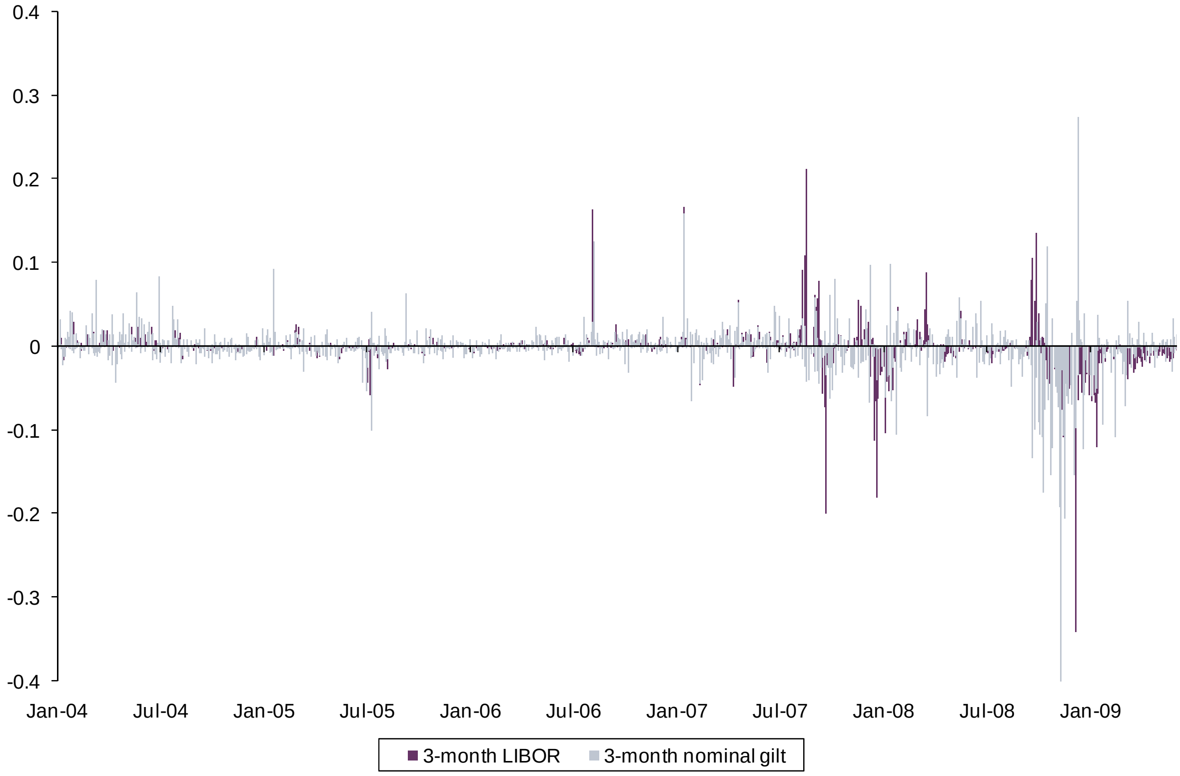
– Figures 2.2 and 2.3 show that the daily changes in medium- and long-run interest rates have substantially increased since 2007.

– Figure 2.4, which measures volatility (ie, the dispersion from the mean over one month of data for Figures 2.2–2.3), shows that volatility on medium- and long-run real interest rates has increased fourfold compared with five years ago, and has gone as high as sixfold, as it did earlier this year.

– For medium- and long-run nominal interest rates, volatility is now double its value compared with June 2004, and at its highest, was some four times above its June 2004 value.

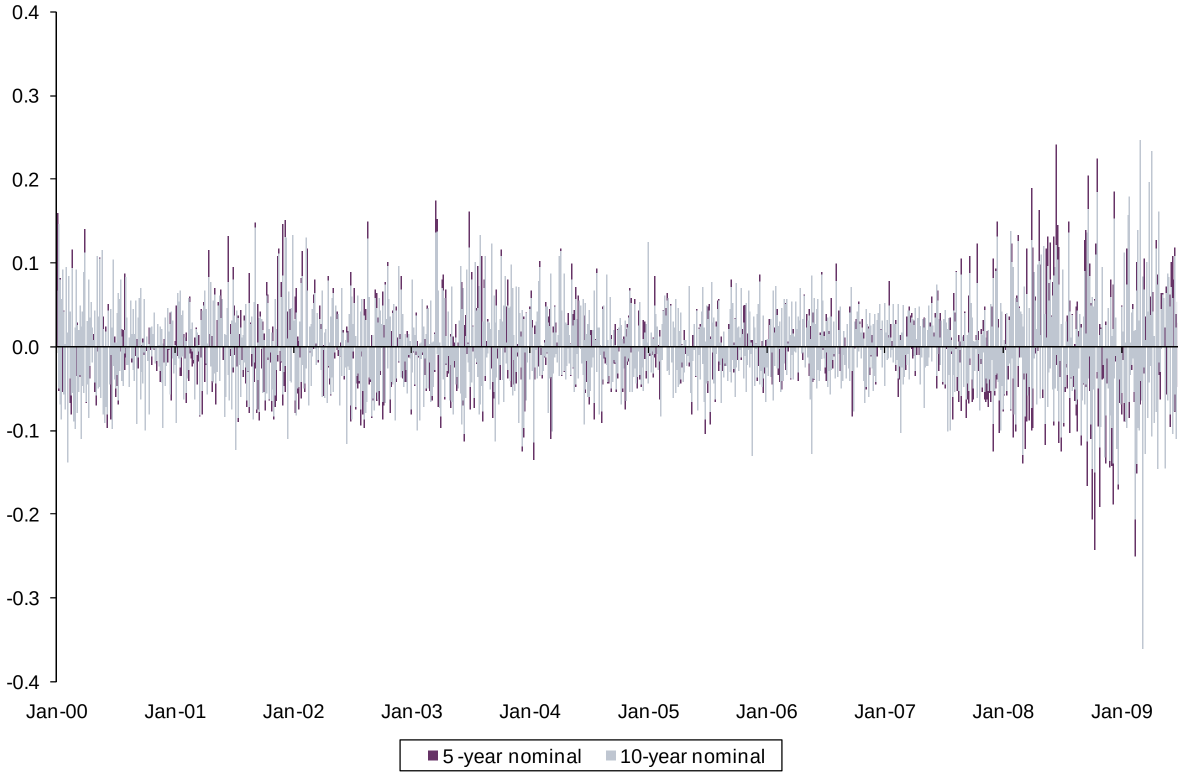
[6] The use of RPI measures changes in shareholder purchasing power.

Figure 2.1 Nominal short-run interest rates daily changes



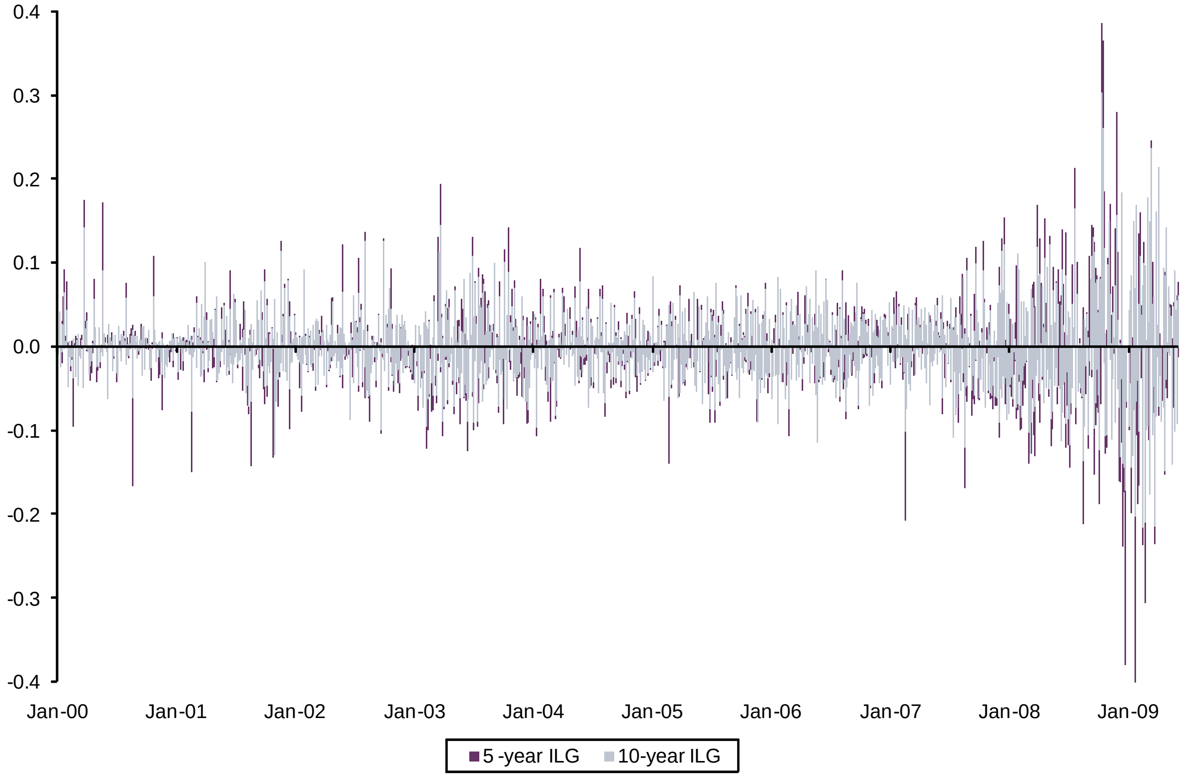
Source: Bank of England, Oxera analysis.

Figure 2.2 Nominal medium- and long-run interest rates daily changes



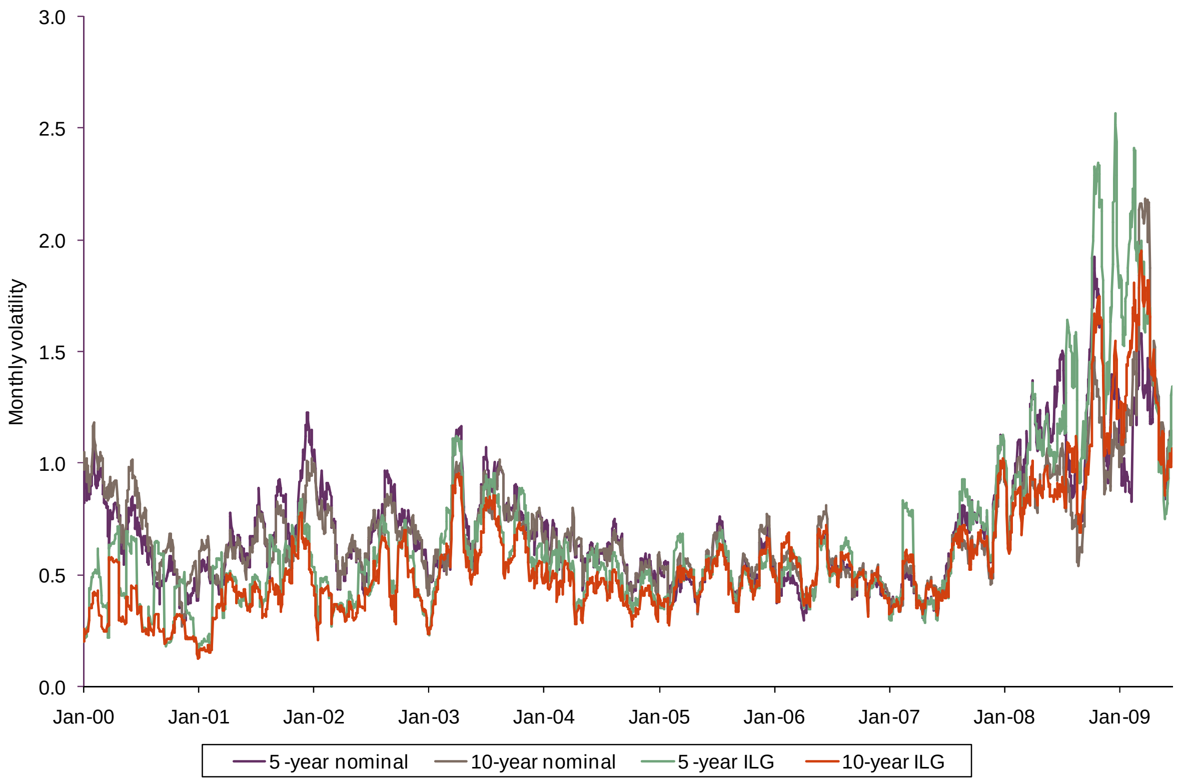
Source: Bank of England, Oxera analysis.

Figure 2.3 Real medium- and long-run interest rates daily changes



Source: Bank of England, Oxera analysis.

Figure 2.4 Interest rate volatility



Source: Bank of England, Oxera analysis.

2.2 Price volatility

This section considers evidence on changes in volatility of prices. The following items are analysed:

– consumer price inflation;
– contractor costs;
– copper prices;
– input costs more generally.

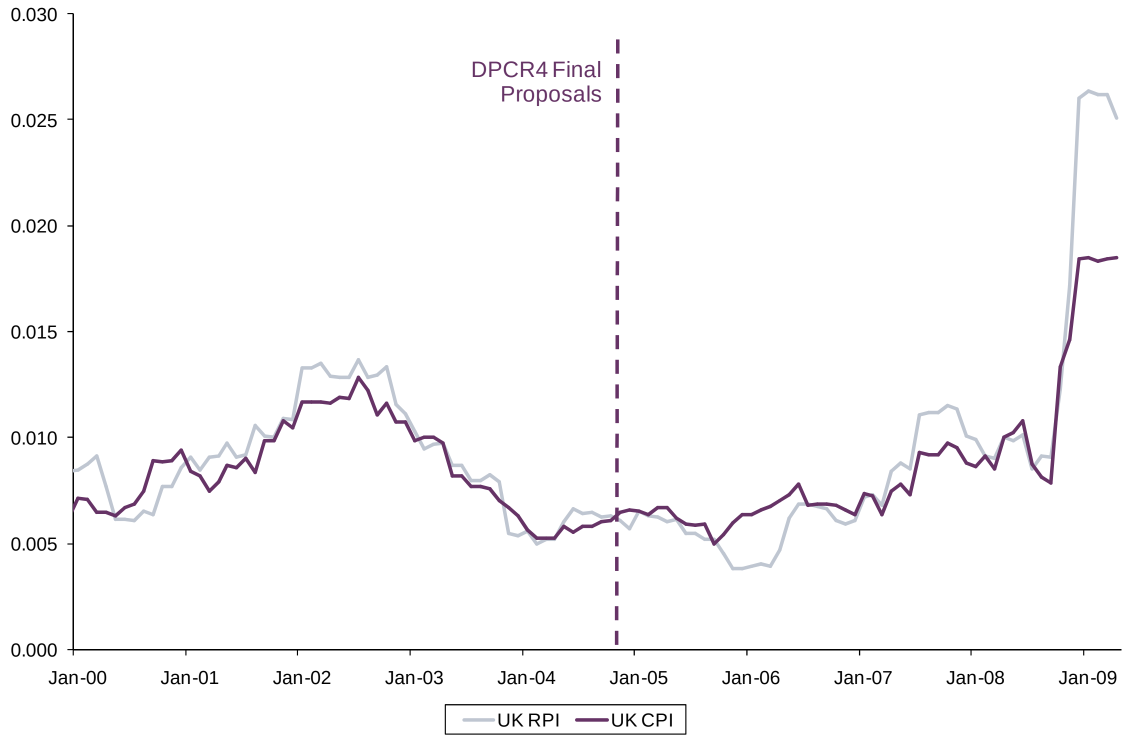
2.2.1 Consumer price inflation

DNOs are compensated through indexation of the RAB and a real cost of capital for general consumer price inflation. Despite this, inflation can be a complicating factor in the assessment of real cost levels (one of the standard public policy arguments for moderate inflation being that it facilitates economically desirable changes in relative prices), and may contribute to uncertainty about cost outturn levels. This is in addition to the occurrence of negative changes in RPI which can be expected to have a negative impact on DNO finances (reduced nominal revenue in the face of downward inflexibility in at least some nominal costs), and which would not have been seen as a significant risk in December 2004. Increases in the volatility of inflation also indicate more general macroeconomic trends, which themselves will increase uncertainty about cost outturns over DPCR5. The following considers recent inflation volatility, and prospects for future volatility.

2.2.2 Recent inflation volatility

There have been significant market developments for UK inflation recently. For example, in the past year or so, RPI inflation in the UK has reached both a 17-year high and a 48-year low. Inflation has also become more volatile than in the past. This fact is highlighted in Figure 2.5, which shows a step-change in the volatility of CPI and RPI inflation at the beginning of 2009. Volatility is calculated as the annual standard deviation of the month-to-month differences in RPI and CPI.

Figure 2.5 CPI and RPI volatility

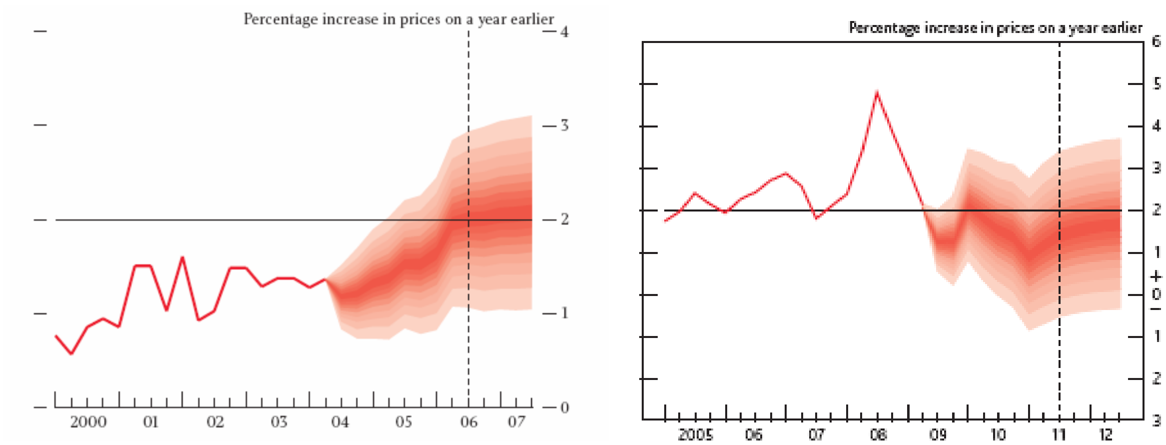


Source: Datastream, Oxera analysis.

2.2.3 Inflation forecasts

In its latest ‘Inflation Report’, the Bank of England states that the extent to which recent developments in policy and the wider macroeconomy—such as sterling depreciation and ‘quantitative easing’—may affect outturn inflation is ‘highly uncertain’. It is possible to consider the implications of this statement for the types of risk faced by investors in DNOs by comparing the latest forecast with a forecast from earlier years. The two charts below contemplate this situation. On the right-hand side is the chart from the latest Inflation Report, August 2009, while on the left-hand side the chart from August 2004 is presented. The five-year time difference has been chosen to reflect the length of the price control.

Figure 2.6 Bank of England inflation forecasting



Note: The fan chart depicts the probability of various outcomes for CPI inflation in the future. If economic circumstances identical to today’s were to prevail on 100 occasions, the MPC’s best collective judgement is that inflation in any particular quarter would lie within the darkest central band on only ten of those occasions. The fan chart is constructed so that outturns of inflation are also expected to lie within each pair of the lighter red areas on ten occasions. In any particular quarter of the forecast period, inflation is therefore expected to lie somewhere within the fan on 90 out of 100 occasions. The bands widen as the time horizon is extended, indicating the increasing uncertainty about outcomes. The figure on the right for August 2009 is based on interest rates that move in line with market expectations and £175 billion in asset purchases. The figure on the left for August 2004 is again based on expectations that interest rates will move in line with market expectations.
Source: Bank of England (2004), ‘Inflation Report’, August; Bank of England (2009), ‘Inflation Report’ August.

In comparing the two charts, the following features are notable.

– First, the Bank of England’s observation that the way in which some of the key drivers of inflation will affect outturns is ‘highly uncertain’ can be seen by comparing the width of the ‘fan’ at any point within the forecast period. At one year into the forecast period in the August 2004 chart, the fan forecasts inflation to accuracy of about 1%; the comparable value for the August 2009 chart is approximately 3.5%.

– Second, the estimates in the August 2004 fan are more closely concentrated around the central estimate; this can be seen by comparing the width of the brighter red sections in the centre of the fan. On the left-hand side, the central three bands by the end of the forecast period (Q1 2006) cover a range of approximately 0.5%, this compares with a range of over 1.0% in the right-hand chart.

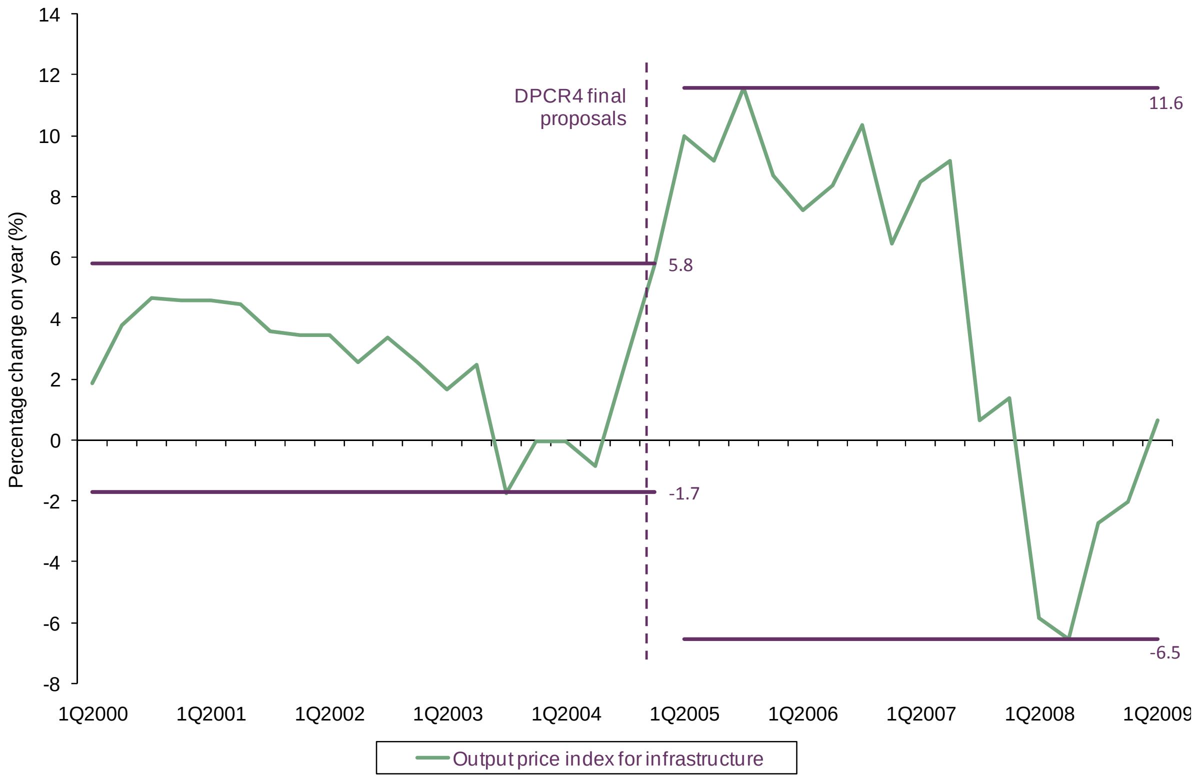
Overall, recent experience and the future outlook for inflation point to a significant degree of volatility and uncertainty.

2.2.4 Contractor costs

To measure the change in contractor costs, the BERR output price index for new construction works (infrastructure) has been used. This is shown in Figure 2.7, together with lines indicating its maximum and minimum values in the five-year period before the DPCR4 final proposals, and the time since. The graph clearly shows the increase in variation through the DPCR4 period, compared with the recent evidence available when the DPCR4 price control was set.

The output price indices for construction work are derived from tender price indices for public and private sector works, and are used as a deflator to convert the output of all construction work from current to constant prices. As such, the output price index measures the actual price level of all construction work being carried out in any given quarter.

Figure 2.7 BERR output price index

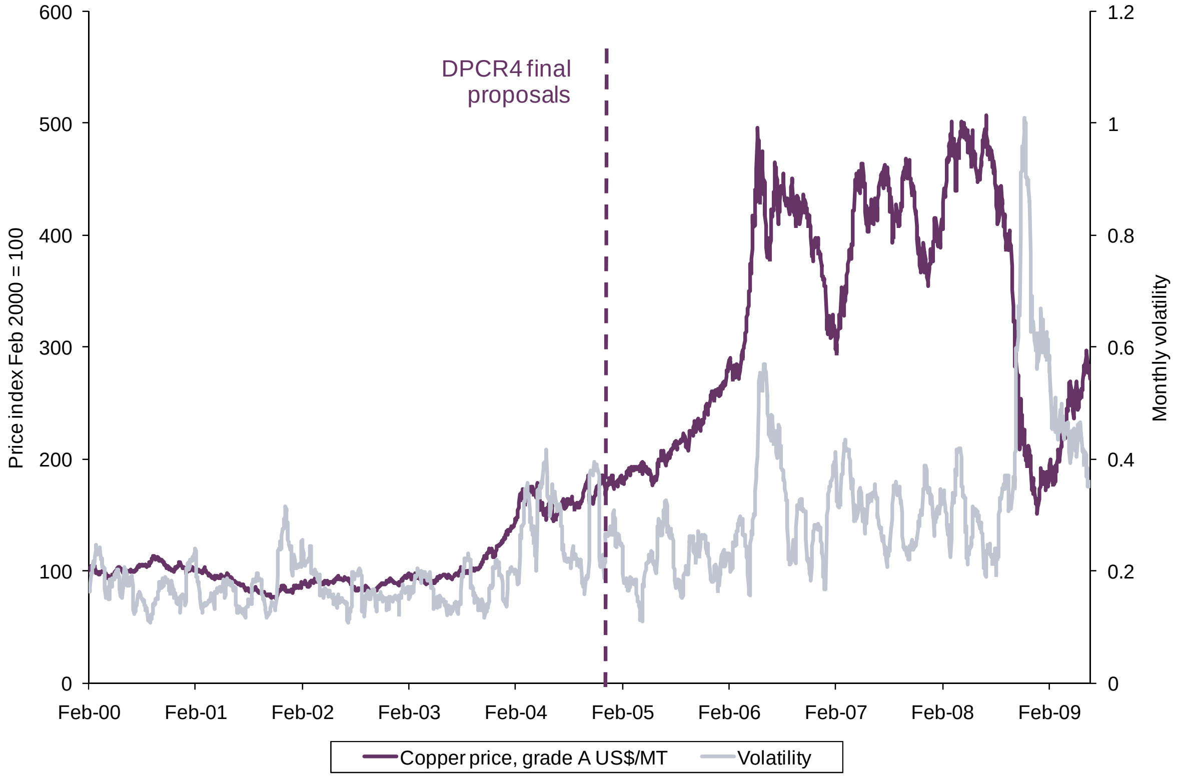


Source: BICS, Oxera analysis.

2.2.5 Copper prices

Ofgem's policy statement in relation to the DPCR5 price control noted recent volatility in copper prices. Figure 2.8 gives the historical time series on the price of copper together with the annualised day-to-day volatility. It is evident that volatility has increased in the period leading up to DPCR5 relative to the period leading up to the DPCR4 final proposals.

Figure 2.8 Copper prices and volatility



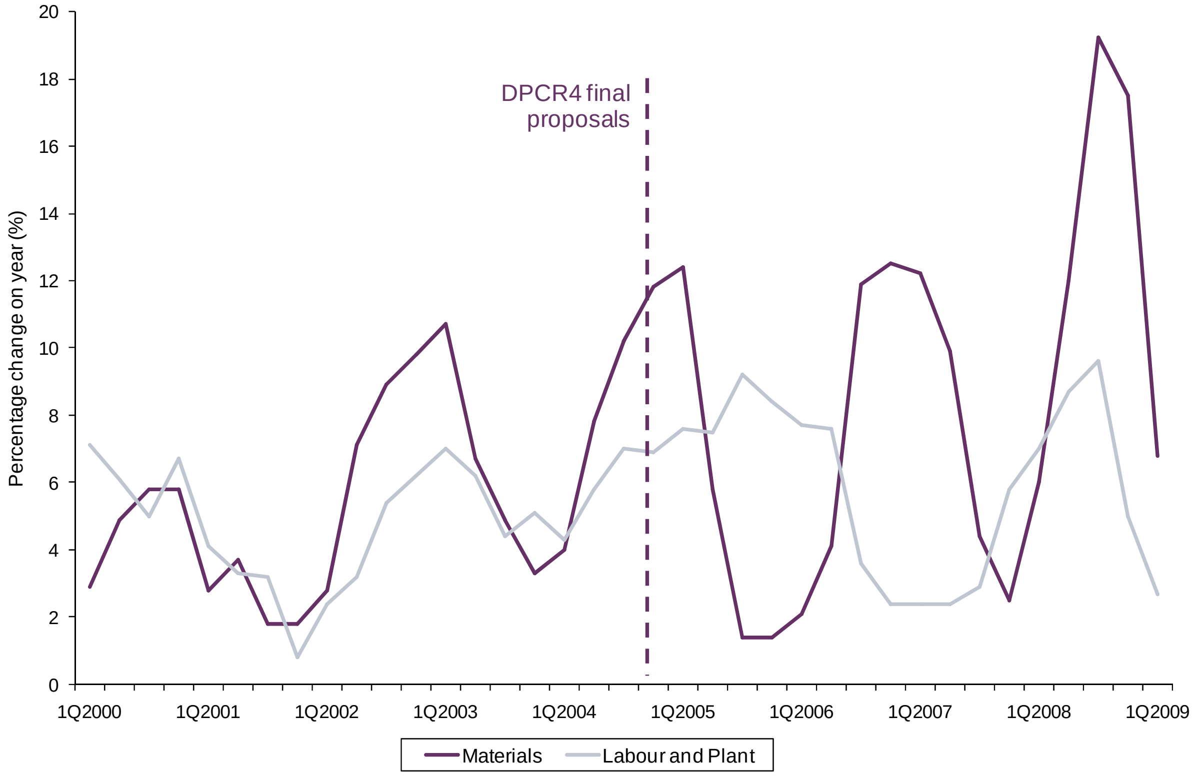
Note: The Bank of England notes that volatility in exchange rates may exacerbate volatilities in input prices for UK companies, as commodities traded in US $ are purchased in pounds sterling.
Source: Datastream, Oxera analysis.

2.2.6 Resource costs

To provide a wider picture on the changes in resource costs, the BERR FOCOS[7] indices of the changes in the cost of labour, materials and plant can be analysed, as summarised in Figure 2.9. Again, as with the series examined above, the increase in the amplitude of variation over the relevant period is clear.

[7] The resource cost index of infrastructure.

Figure 2.9 BERR FOCOS resource cost index for infrastructure



Source: BERR, Oxera analysis.

2.3 Conclusion

Evidence concerning recent volatility in key variables, indicating the risks faced by investors in DNOs, points to a key conclusion—investors are now much more likely to be sensitive to the possibility of low probability, high impact events relative to the period leading up to the publication of the DCPR4 final proposals. The following section considers the means by which this uncertainty could be addressed as part of the proposals for the forthcoming control period.

3 Dealing with uncertainty and the application of a substantial effects clause

How might Ofgem mitigate the consequences of the greater uncertainty and volatility that presently confronts DNO investors? The PwC report[8] for Ofgem assessed a number of approaches for managing the cost of *debt* uncertainty, and considered five options,[9] as follows:

– continue with the existing framework;
– continue with the existing framework, but with a ‘streamlined’ disapplication mechanism which would specify the circumstances under which a disapplication request would be appropriate, thereby making the operation of the request mechanism more transparent;

[8] PriceWaterhouseCoopers (2009), ‘Managing Cost of Debt Fluctuations’, July.

[9] PwC did not consider a debt pass-through approach (in which Ofgem would periodically review DNOs’ actual cost of debt and then set this as the allowed cost of debt ex post). Oxera considers, however, that such a mechanism is unlikely to fulfil Ofgem’s objectives and may well score relatively poorly against the criteria used in the PwC report.

– cost of debt headroom;
– a cost of debt trigger mechanism;
– a substantial effects clause.

These options were evaluated against a number of criteria.[10] PwC concluded that the two most appropriate options were a substantial effects clause, and a version of the existing framework (taking into account the disapplication clause).

We agree with several of PwC's conclusions, some of which are effectively specific to the issue that they were addressing (managing cost of debt fluctuations), and some of which also apply to a more general management of uncertainty through the price control mechanism. The problems with some of the more mechanistic solutions (indexation or trigger-induced indexation) have previously been discussed by Ofgem itself and by the Competition Commission, not least in relation to the price controls for the BAA London airports. The problem with simply allowing headroom against an ex ante estimate of costs is the sheer amount of headroom which would be needed to cope with any sort of replication of recent volatility.

We do see a point in pursuing the substantial effects or the streamlined licence disapplication options. This is because (a) they are general mechanisms which can deal with unknown unknowns as easily as known unknowns, and (b) they can easily be structured to deal with tail risks alone, rather than with more normal variations from central expectations, and thus deal with one of the main features of the DPCR5 review which is different from the situation prevailing at the time of the last DNO review.

The substantial effects clause is an established regulatory tool. It is an example of a 'generic' reopener, the role of which is to provide protection against unforeseen events that may occur after the conclusion of the price determination process. In the water sector, the interim determination mechanism (IDoK) may be triggered under defined circumstances that are specified in the licences of water undertakings.[11] There is also provision in the water sector for a substantial effects clause, which allows for a change in the agreed price limits if circumstances beyond the control of prudent management will have an impact on the licensee that exceeds some materiality threshold. Therefore, the difference between the IDoK and substantial effects clause mechanisms is that the former is specific, and the latter is general and can better capture the types of risk that Ofgem will need to address as part of the overall DPCR5 settlement, given recent changes in investor sentiment. The substantial effects clause would also afford Ofgem the discretion to apply the test more widely and in a broader range of circumstances than the IDoK.

The substantial effects mechanism is readily transposable to the context of electricity distribution in general, and to DPCR5 in particular. A licence condition could be drafted such that the price control would be reopened if a prudently managed and efficiently financed DNO faced an event that exceeded a materiality threshold. The specification of the materiality threshold would clearly need to be consistent with other uncertainty mechanisms which will be embedded in the DPCR5 price control, and it would need to take on board the view which has been expressed in the past by Ofwat, that the thresholds in the current water licences do not restrict the application of the clause to sufficiently material events.[12] For example, an appropriate threshold might be that the net present value of expected losses

[10] Consumer benefit (does the mechanism benefit the consumer (risk versus prices)?), incentivisation (does the mechanism preserve the DNOs' incentives?), complexity (simple and user-friendly approach?), transparency (clear when/how the regulator is likely to intervene?), targeted approach (does the mechanism apply when an intervention is needed?), proportionality (is the intervention proportionate to the issue?), and consistency (does the mechanism align with the broader regulatory framework and its previous application?).

[11] Typically, Licence Condition B, Para. 14, and sub-paragraphs thereof.

[12] Ofwat (2004), 'MD189, Proposed Licence Modifications Consultation', March.

incurred by the licensee over a ten-year period exceeds 20% of licensee turnover.[13] DNOs would be required to demonstrate that the impact could not have been avoided through prudent management.

Having said all of the above, it is to be considered whether a substantial effects clause should be applied in the way that it has recently been applied by the Competition Commission in the case of Sutton and East Surrey Water plc (SES).[14] The view of the Competition Commission has been to reject SES's claim, mainly on the basis that, although the alleged substantial effects met the specified materiality criterion, SES's ability to finance its activities had not been compromised. This approach would seem not only to elide the issues of materiality and financeability, but would also prejudice the symmetry which PwC thinks (justifiably, in Oxera's consideration) should be part of a substantial effects clause for DNOs. If such a clause were to allow Ofgem to reduce allowed revenue in the event of a material windfall benefit to a DNO, then the symmetrical outcome would be an increase in revenue in the event of an unexpected material adverse effect. To require also a financeability test in the latter case would be to create a regime which was stacked against the company.

A substantial effects clause of the proposed type would help mitigate uncertainty surrounding the impact of low probability, high impact events. It would not require adjustments to the cost of capital relative to DPCR4 since the types of risk at issue were not taken into account at the time of that review (justifiably, in the light of information available at the time).

However, it is important not to dismiss the main alternative identified by PwC—streamlined licence disapplication—without due consideration. DNOs' licences contain provision for requests to be made to Ofgem for regulated revenue caps to be removed. As PwC notes in Appendix 5.2 of its report, there is little clarity as to the circumstances in which the clause may be invoked,[15] and the clause is not associated with any materiality threshold. The licence disapplication process is also lengthy, and Ofgem may refer a disapplication request to the Competition Commission. These disadvantages are not shared by the substantial effects clause, as the PwC report notes:

> […] the substantial effect clause which is similar in spirit to the disapplication clauses but would offer a greater degree of transparency to the DNOs than the existing framework in its current form[16]

A streamlined disapplication process would address some of the identified disadvantages, but nevertheless would still not capture all of the advantages of the substantial effects clause. A disapplication process would still require a tightly defined set of circumstances to be identified before it could be invoked, and would appear to be more likely to face administrative delays in its implementation than would the substantial effects clause.

The substantial effects clause, therefore, offers the advantages of a generic reopener that can be deployed rapidly to adjust regulatory settlements to confront the realisation of tail risk or unknown unknown-type events that are expected to have a material impact on DNOs for reasons beyond the control of prudent management.

[13] It is noted that the relevant limits in the case of water undertakings are 15 years and 20% respectively. See, for example, Para. 14.3 of the licence of Southern Water, available from http://www.ofwat.gov.uk/industrystructure/licences/lic_lic_srn.pdf.

[14] Competition Commission (2009), 'Sutton and East Surrey Water plc, Interim Price Determination', June.

[15] Ofgem's recent guidance document on responding to financial distress stated that it would be minded to apply the disapplication clause in the event that the following three conditions are met: the financial distress was caused by factors beyond the control of the network, re-opening of the settlement could reasonably be expected to relieve the financial distress in a timely manner, and consideration was given to the impact of reopening on consumers, network users and other parties. See Ofgem (2009), 'Arrangements for responding in the event that an energy network company experiences deteriorating financial health: Draft guidance document', Ref: 49/09, May.

[16] PriceWaterhouseCoopers (2009), 'Managing Cost of Debt Fluctuations', July, p. 16.

4 Conclusion

Events since 2004 have created a rational basis for heightened perception of tail risk, which did not exist at the time of the DPCR4 review. The lack of such perceptions at that time is illustrated by the absence of specific regulatory mechanisms to mitigate tail risk effects and by the lack of consideration given to them in estimating the cost of capital assumed in DPCR4, and was justified by the relative lack of volatility in key cost areas in the years prior to 2004.

The drafting of a substantial effects licence condition would not require a major effort from either Ofgem or DNOs, and would probably not obviously require separate consultation. It is an established regulatory mechanism, and in effect represents a subset of IDoK-type mechanisms that have been around for some time. These practical considerations are significant in light of the time remaining until final proposals are issued in December of this year.

Finally, it is important to note that the core mechanism to allow for risk in a price control is the cost of capital. If no identifiable mechanism is available to address the types of risk considered in this paper, it may be appropriate to increase the allowed cost of capital relative to what was assumed in DPCR4. However, types of risk considered in this paper were not addressed in the period leading up to the DPCR4 settlement. Thus, there is no case for the allowed cost of capital for DNOs to be *reduced* relative to DPCR4 in the DPCR5 final proposals in the event that measures like a substantial effects clause or a streamlined licence disapplication mechanism were to be included as part of the total DPCR5 package.