

# **VOLUME RISK I: FORECAST ERRORS – FOR THE UK INLAND MAILS BUSINESS OF CONSIGNIA**

## **Paper 5 of a series of papers prepared by Consignia in June 2002 for Postcomm’s review of the price control for 2003**

### **Summary**

This paper considers the implications for the price control of outturn volume deviating from forecast volume for a non-liberalised postal sector or liberalised postal sector where all mails businesses are under the same universal service obligation. A separate paper<sup>1</sup> considers the volume risk in a liberalized postal sector where entrants have different obligations to Consignia and can enter niche (“cream-skimming”) markets with low marginal costs for Consignia and high profits for entrants.

The allowed revenue for the control of a regulated company is assessed on the basis of a single, and usually central, forecast of volume. Regulators have become increasingly aware of the financial risks to the regulated companies that arise from outturn volume deviating from the forecast volume (i.e. forecasting error). The recent price control review for National Air Traffic Services (NATS) did not take full account of such considerations. A summary of the case of NATS is included in Appendix A.

The paper concludes that the optimal approach of altering the structure of the control to address forecasting error should be applied in the case of Consignia. It also concludes that the optimal structure is a “hybrid” control where a portion of allowed revenue is fixed and independent of volume, and the remaining portion of allowed revenue is volume dependent.

Consignia considers that a pure price control structure and an error correction mechanism could be applied as an alternative to the optimal hybrid structure for changes in outturn volume about the forecast volume used in setting the control. This could be equivalent to the optimal hybrid structure by having the error correction mechanism change the allowed revenue in a manner that reflects the differences between the revenue curve for the pure price control and the revenue curve for the optimal hybrid control. However, the revenue adjustments through the error correction mechanism could be significant. Hence Consignia considers that the volume risk is best addressed through the structure of the control rather than as an add-on to a pure price control.

In conclusion, Consignia considers the most appropriate way of addressing the financial risk associated with forecasting errors of volume is through the structure of the price control and, in particular, through the application of a hybrid price control structure rather than a pure price or revenue control.

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<sup>1</sup> See “*Volume Risk II: cream skimming entry – for the UK inland mails business of Consignia*”, Consignia, June 2002

## 1. Introduction

This paper sets out the economic basis of the financial risk associated with forecast errors of volume *without* cream-skimming entry.

Section 2 explains why the optimal approach for addressing this risk is through the structure of the price control. It also discusses some examples where regulators have applied this approach.

Section 3 discusses alternative options for addressing this risk and briefly indicates why some regulators have applied some of these alternative options rather than the optimal approach.

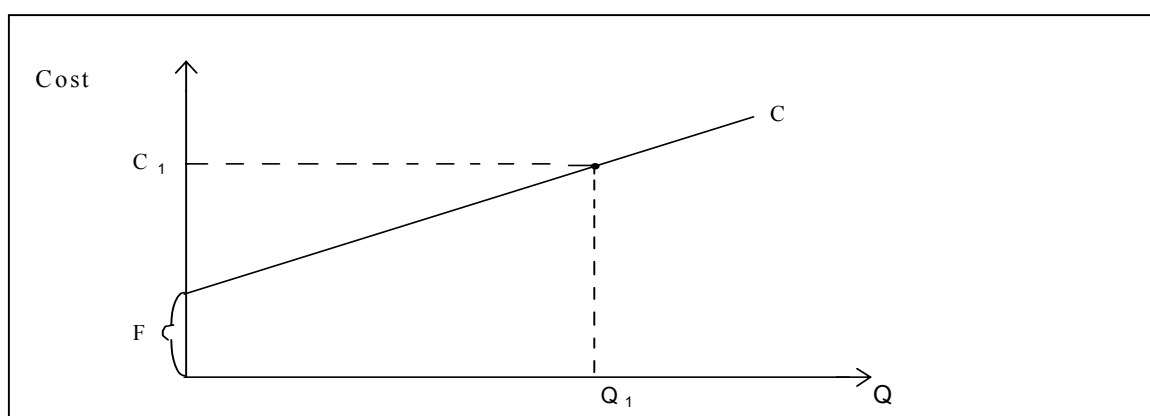
Section 4 discusses the need to change other areas of the price control, namely the cost of capital, if the optimal structure for the control is not applied. It also indicates the optimal structure without cream-skimming entry.

## 2. Hybrid controls

### 2.1 Rationale for hybrid controls

In most regulated industries a portion of total costs are fixed, independent of volume. Fixed costs are present when the long-run marginal or average incremental costs are less than unity, thereby implying the presence of some economies of scale. The total cost curve  $C$ , which includes an allowed profit ( $\pi_1$ ), is shown in Figure 1 with fixed costs  $F$  and a slope equal to the long-run marginal cost. The total cost at forecast volume  $Q_1$  is  $C_1$  and comprises fixed costs,  $F$ , and variable costs,  $C_1 - F$ , incurred in satisfying this volume.

Figure 1: The cost curve with forecast volume  $Q_1$



Alternative structures for the control are represented in the revenue curves in Figures 2a, 2b and 2c as follows:

- *Figure 2a*: revenue curve  $R_1$  represents a pure price control, where revenue increases in proportion to volume and there is no fixed component of revenue;
- *Figure 2b*: revenue curve  $R_2$  represents a pure revenue control, where revenue is fixed and independent of volume;
- *Figure 2c*: revenue curve  $R_3$  represents a hybrid control, where a portion of revenue is fixed that is equal to  $F$  and the remaining portion depends of volume such that  $R_3$  is the same as the cost curve  $C$ .
- *Figure 2d*: revenue curve  $R_4$  represents a hybrid control where the portion of fixed revenue is marginally less than the portion of fixed costs.

In each figure, the forecast volume is  $Q_1$  and at this volume the revenue and cost curves pass through the same point  $A$ , such that the regulated company earns the allowed profit  $\pi_1$ . However, if outturn volume is above the forecast volume  $Q_1$  then:

- In Figure 2a, with a pure price control, outturn revenue is above costs and the profit is above  $\pi_1$ ;
- In Figure 2b, with a pure revenue control, outturn revenue is below costs and the profit is below  $\pi_1$ ;
- In Figure 2c, with the hybrid control that has a portion of fixed revenue that matches fixed costs, outturn costs are equal to revenue and the profit remains at  $\pi_1$ ;
- In Figure 2d, with a hybrid control that has a portion of fixed revenue is marginally less than the portion of fixed costs, outturn revenue marginally exceeds costs and the profit is marginally above  $\pi_1$ .

Figure 2a: A pure price control structure where revenue increases in proportion to volume and there is no fixed component of revenue

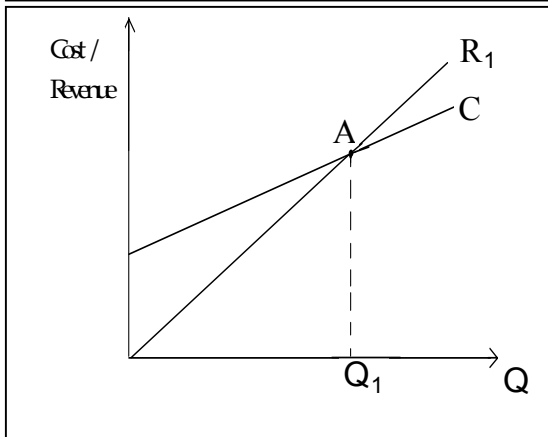


Figure 2b: A pure revenue control structure, where revenue is fixed and independent of volume

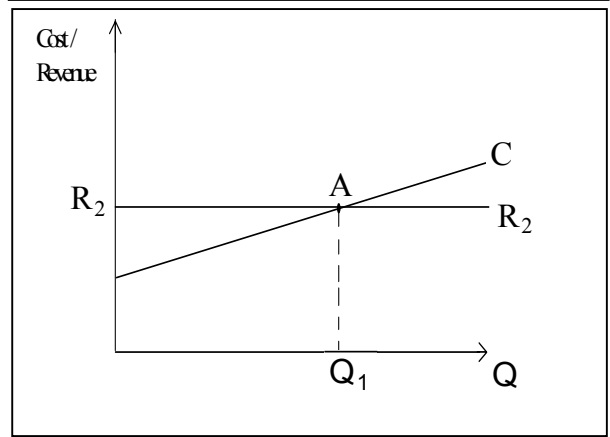


Figure 2c: A hybrid control, where a portion of revenue is fixed that is equal to F and the remaining portion depends of volume such that  $R_3$  is the same as the total cost curve C

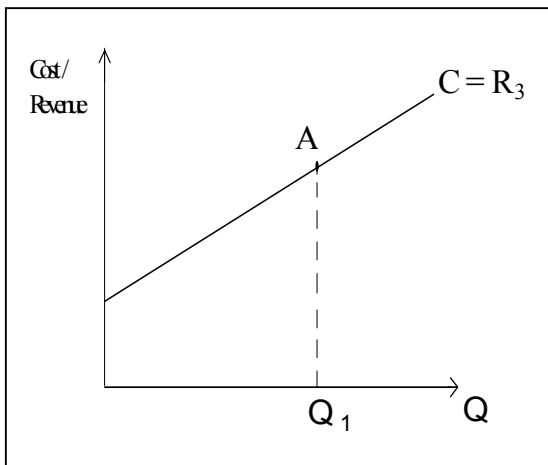
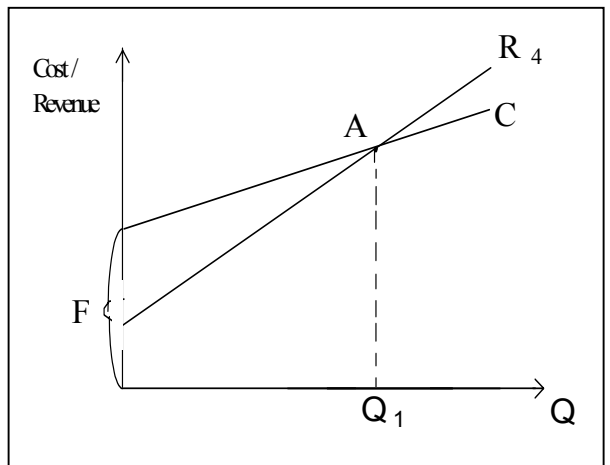


Figure 2d: A hybrid control that has a portion of fixed revenue is marginally less than the portion of fixed costs, outturn revenue is marginally below costs and the profit is marginally below  $\pi_1$



Conversely, if outturn volume is below the forecast volume  $Q_1$  then:

- In Figure 2a, with a pure price control, outturn revenue is below costs and the profit is below  $\pi_1$ ;

- In Figure 2b, with a pure revenue control, outturn revenue is above costs and the profit is above  $\pi_1$ ;
- In Figure 2c, with the hybrid control, outturn costs are equal to revenue and the profit remains at  $\pi_1$ ;
- In Figure 2d, with a hybrid control that has a portion of fixed revenue marginally less than the portion of fixed costs, outturn revenue is marginally below costs and the profit is marginally below  $\pi_1$ .

In conclusion: the hybrid control provides a means of reducing the variability of profit about  $\pi_1$  and thereby reducing the financial risk. However, the complete removal of financial risk of forecasting error also removes any incentives to increase volume to improve profit, as shown in Figure 2c. Consequently, the optimal structure for the control is similar to that represented by Figure 2d, where the portion of fixed revenue is marginally less than the portion of fixed costs. In this case, the financial risk of volume forecast error and volume incentives are appropriately balanced.

## 2.2 *Application of hybrid controls*

In practice, there are several cases where the regulator of a regulated industry has moved from the application of a pure, or near pure, structure of control to a hybrid control:

- the regulator in the electricity industries used to set a pure price control for the distribution businesses. Since 1995, the regulator has set a hybrid price control with 50 per cent of allowed revenue fixed, independent of volume;
- the regulator of Transco used to set a pure price control. Following the Monopolies and Mergers Commission's report in 1997<sup>2</sup>, the regulator set a hybrid price control with 50 per cent of allowed revenue fixed, independent of volume;
- the regulator of Railtrack used to set a near pure revenue control with 90 per cent of allowed revenue fixed, independent of volume. In 2000, the regulator set a hybrid price control with 75 per cent of allowed revenue fixed, independent of volume.

For electricity and gas, the selection of a hybrid control where 50 per cent of revenue depends on volume provided the regulated businesses with some incentives for volume growth, but less incentive for volume growth than that of a pure price control. In the case of Railtrack, the theory outlined above and presented in Figure 2c was applied to derive the appropriate portion of revenue that was volume dependent, with a volume incentive then separately factored into the control as a form of error correction mechanism.

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<sup>2</sup> 'BG plc – A Report under the Gas Act 1986 on the Restriction of Prices for Gas Transportation and Storage Services', MMC, 1997, The Stationary Office, London, paragraph 2.59.

### 3. Alternative approaches

#### 3.1 *Error correction mechanism*

In the electricity industry, the regulator has recently applied a pure revenue control for the National Grid Company to reflect a generally stable environment of costs and volume, but with an error correction mechanism for a specific area (new generation connections) where volume growth is less predictable. The error correction mechanism defines changes to the allowed revenue for changes in volumes of new generation connections.

Consignia considers that a pure price control structure and an error correction mechanism could be applied as an alternative to the optimal hybrid structure for changes in outturn volume about the forecast volume used in setting the control. This could be equivalent to the hybrid structure by having the error correction mechanism change the allowed revenue in a manner that reflects the differences between the revenue curve for the pure price control (e.g.  $R_1$  in Figure 2a) and the revenue curve for the hybrid control ( $R_4$  in Figure 2d). However, the revenue adjustments through the error correction mechanism could be significant. Hence Consignia considers that the volume risk is best addressed through the structure of the control rather than as an add-on to a pure price control.

#### 3.2 *Interim price controls*

In the water industry, the regulator has applied a pure price control to reflect a generally stable environment of costs and volume, but with an option of a mid-periodic review in specified exceptional circumstances. The regulated industry can seek an interim review if the difference between actual and forecast volume has a pre-defined and material effect on turnover. In contrast, in the telecommunications industry, the regulator concluded that interim reviews of the price control increased uncertainty and reduced the incentives for innovation and efficiency for the regulated industry.

Consignia considers that, with the onset of liberalisation and the ease of entry into the postal market, the potential for error in forecasting volumes is significant. Consignia considers that it may be necessary to have an option for an interim review in specified exceptional circumstances, but that the price control should be set in a manner that:

- (a) is consistent with reasonable expectations of entry over the duration of the control derived from forecasts of Consignia's Entry Pricing Model;
- (b) reduces the probability of the need for an interim review by appropriate adjustment to the structure and allowed revenue<sup>3</sup>.

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<sup>3</sup> See "*Volume risk II: cream-skimming entry – for the UK inland mails business of Consignia*", Consignia, June 2002.

### 3.3 *Cost of capital*

In the telecommunication industry, the regulator has applied a pure price control with no error correction mechanism and no option for an interim periodic review, but has allowed a higher level of cost of capital than any other regulated industry.

Consignia considers that a higher cost of capital for BT relative to other regulated industries would be consistent with a view that the cost of capital took into account volume risk. However, Consignia considers that an adjustment to cost of capital, for the reasons described above, would be an indirect, and potentially distortionary, means of addressing volume risk. Further, the regulator, Oftel, did not link the issues of volume risk and structure to the cost of capital. Consignia considers that the higher cost of capital for BT relative to other regulated industries relates to other factors including the high proportion of operating costs to Regulatory Asset Base (RAB) or allowed profit and that a higher cost of capital would be a poor, second best approach for addressing volume risk<sup>4</sup>.

### 3.4 *No adjustment*

In the telecommunication industry, the regulator, Oftel, has applied a pure price control with no error correction mechanism and no option for an interim periodic review. Oftel considered volume risk in its review in 1997. Oftel's assessment of volume risk was related mainly to actual volume exceeding forecast volume i.e. a tendency to under-forecast volume growth in the presence of a rapidly growing market which lead to profits in excess of allowed profits for BT. Oftel concluded that there was no need to make any adjustment for volume risk associated with unanticipated volume growth.

Consignia considers that the postal sector is not subject to the rapid growth of the telecommunication sector and that, with potential loss of volume from liberalisation and electronic substitution, volume risk is mainly related to actual volume being below forecast volume in the postal sector.

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<sup>4</sup> See "*Allowed profit I: cost of capital - for the UK inland mails business of Consignia*", Consignia, June 2002.

## 4 Application for Consignia

### 4.1 *Evaluating the level of risk*

OXERA Consulting Ltd (OXERA) has undertaken a simulation exercise to assess the potential impact of volume risk on the beta value of the Weighted Average Cost of Capital (WACC). According to the results of the simulation, the beta value would need to be increased by something in the region of 0.4 for a pure price control if the cost-reflective hybrid control is not applied when the portion of fixed costs is 0.4. Given a number of assumptions about the calculation of the WACC estimation<sup>5</sup>, an increase of 0.4 in the beta value increases the WACC by about 2.0 percentage points. The allowed revenue for the pure price control would need to increase by about £0.08 bn per annum relative to that for a cost-reflective hybrid control. For a pure price control, when compared to a hybrid control with the fixed portion of revenue at 0.3, the corresponding increase would be £0.06 bn per annum. A note on the simulation undertaken by OXERA is included in Appendix B.

### 4.2. *Application of the optimal hybrid price control without cream-skimming*

Consignia considers that about 40 per cent of its costs are fixed within the control period. The overall long-run marginal cost in the mail service is estimated to be 0.6<sup>6</sup>. This estimate was made separate from, but is also broadly consistent with, the long-run historic change in costs relative to change in volumes<sup>7</sup>.

Consignia considers, with no cream-skimming entry, the optimal hybrid structure should include some incentive for volume growth to exceed the volume forecast used in setting the control. It considers that, with no cream-skimming entry, this could be achieved by reducing the portion of total revenue that is fixed and independent of volume from 0.4 to 0.3. The change in revenue for a change in volume is then 0.7 without cream-skimming entry.

### 4.3 *Conclusions*

Consignia considers that the optimal means of addressing the risk of forecast error of volume, with the fixed costs as a portion of total costs at 0.4 and no cream-skimming, is through a hybrid control structure.

A pure price control, with the portion of fixed costs at 0.4 and no cream-skimming entry, would increase the beta value by about 0.4 relative to a cost-reflective hybrid control. The allowed revenue for the pure price control would need to increase by about £0.08 bn per annum relative to that for a cost-reflective hybrid control.

Consignia considers that, with no cream-skimming entry, the optimal hybrid structure should include some incentive for volume growth to exceed the volume forecast used in setting the control. It considers that, with no cream-skimming entry, this could be achieved by reducing the portion of total revenue that is fixed and independent of volume

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<sup>5</sup> See “*Allowed profit I: cost of capital - for the UK inland mails business of Consignia*”, Consignia, June 2002.

<sup>6</sup> “*Report of the Steering Group on the Long run Marginal Cost of the inland letter service*”, The Post Office, October 1986

<sup>7</sup> See “*The performance of the UK inland mails business of Consignia*” Consignia, June 2002.

from 0.4 to 0.3. The change in revenue for a change in volume is then 0.7 without cream-skimming entry. For a pure price control, when compared to a hybrid control with the fixed portion of revenue at 0.3, the corresponding increase would be £0.06 bn per annum.

Consignia considers that a pure price control structure and an error correction mechanism could be applied as an alternative to the optimal hybrid structure for changes in outturn volume about the forecast volume used in setting the control. This could be equivalent to the optimal hybrid structure by having the error correction mechanism change the allowed revenue in a manner that reflects the differences between the revenue curve for the pure price control and the revenue curve for the optimal hybrid control. However, the revenue adjustments through the error correction mechanism could be significant. Hence Consignia considers that the volume risk is best addressed through the structure of the control rather than as an add-on to a pure price control.

In addition, Consignia considers that the control may need to include an option of an interim review in specified exceptional circumstances. In such a case, Consignia consider that the control should be set in a manner that:

- (a) is consistent with reasonable expectations of entry over the duration of the control derived from forecasts of Consignia's Entry Pricing Model; and
- (b) reduces the probability of the need for an interim review by appropriate adjustment to the structure and allowed revenue<sup>8</sup>.

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<sup>8</sup> See also "*Volume risk II: cream-skimming entry – for the UK inland mails business of Consignia*", Consignia, June 2002.

## APPENDIX A

### A COMMENT ON THE NATIONAL AIR TRAFFIC SERVICES

In its advice to the DETR<sup>9</sup> in August 2000, the Civil Aviation Authority (CAA) recommended that for UK En Route Services—its main licensed business—National Air Traffic Services (NATS) should have a price cap of RPI – 5 applied to its prices, at the time of £46.23/chargeable service unit (CSU). A CSU was calculated according to a formula that takes account of the weight of the aircraft and the distance flown i.e. it is just a unit of volume. The DETR relaxed the CSU to encourage bidders in the purchasing process but retained the structure of the charge.

In its financial modelling, the CAA assumed a traffic/cost elasticity of 0.25. This would suggest that 75 per cent of NATS's costs are fixed. However, the structure of the control was that of a pure price control.

Following September 11th, NATS has experienced a significant downturn in volumes. As an indication of this, CAA's low-case forecast for 2001/02 was for CSU growth of +5.2 per cent; by contrast NATS current base-case forecast for the same period is –3.8 per cent. It is estimated that NATS will face a revenue loss of between £230m and £300m if volumes drop from the base case used in CAA's assumptions to NATS's present base-case scenario.

Given the analysis presented in the main part of the paper<sup>10</sup>, it is not at all surprising that the volume downturn will have a significant impact on NATS's profitability within a pure price control structure. NATS has made an application to change the price control<sup>11</sup>. NATS considers that without an interim review:

- it would have to reduce costs in such a way as to reduce services and airspace capacity;
- it would be unable to pursue investments that are necessary to enhance capacity and improve quality; and
- it would not have a reasonable opportunity to finance its activities adequately.

Press reports already suggested that the banks backing NATS were threatening to place the company into Administration. On Wednesday February 20th, the *Financial Times* reported that a £60m bridging loan had been given to NATS, split 50:50 between the banks and the government to deal with the short-term problems.

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<sup>9</sup> Department of the Environment, Transport and Regions

<sup>10</sup> See “*Volume Risk I: forecasting errors – for the UK inland mails business of Consignia*”, Consignia, June 2002.

<sup>11</sup> ‘*Application to Reopen the Eurocontrol Charge Control*’, National Air Traffic Services Ltd, 2002.

## APPENDIX B

### A NOTE ON THE ANALYSIS UNDERTAKEN BY OXERA FOR EVALUATION OF FORECASTING ERROR RISK WITHOUT CREAM-SKIMMING ENTRY

#### Introduction

According to the assumptions underpinning the capital asset pricing model (CAPM), it is only those risks that are correlated with overall market risk that should be of concern to investors. These risks, which are primarily the sensitivity of demand to the macroeconomic business cycle, are ones that investors cannot normally diversify away or avoid within a well-balanced portfolio of assets. However, those factors which influence demand but which operate at a firm- or industry-specific level, can normally be avoided through diversification and do not form part of CAPM analysis.

CAPM analysis is used to assess the beta value. The beta value measures the correlation between returns to Consignia's investors and movements in the market as a whole and thereby the level of risk that investors cannot avoid with a well-balanced portfolio. For Consignia, Consignia's forecasting model of volume growth estimates an elasticity of 1 with respect to economic growth<sup>12</sup> and confirms that the income elasticity has some correlation with market risk. The remaining variables in Consignia's forecasting model, such as prices and service standards, are either under Consignia's control, or operate solely in the postal sector and, hence, will not automatically be correlated with market risk.

For unanticipated and permanent changes in GDP, an increase in GDP growth will increase company earnings and, through the volume:economic growth elasticity, increase postal volume. For a non-cost-reflective structure of control, the increase in volume alters both revenues and profits. Unanticipated and permanent changes in GDP also affect the level of the FTSE All-share Index, as investors revise their expectations of future growth potential. The correlation between these two effects is an estimate of the increase in the beta value and an indication of the 'risk premium' that would need to be added to the cost of capital as a result of moving away from the cost reflective structure of a hybrid control that matches revenue to costs.

OXERA's analysis considers the impact of an unanticipated and permanent change in GDP on Consignia's volumes and profits and on the FTSE All-share Index, to enable the changes in the beta value to be assessed for alternative structures of the control - including a cost-reflective structure of a hybrid control where revenue to costs are matched.

#### GDP changes and Consignia's value

OXERA's analysis assumes the long-run marginal cost for Consignia is 0.6 with the fixed costs as a portion of total costs at 0.4. It is assumed that there is no risk premium for forecast error when the structure of the control of revenue matches this cost structure i.e. the hybrid control assumes with the fixed revenue as a portion of total revenue is 0.4 at the forecast level of volume.

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<sup>12</sup> "Disaggregated Letter Traffic Demand in the UK", John Nankervis, Sophie Richard, Soterios Soteri, Frank Rodriguez, in 'Postal Services: Pricing, Productivity, Regulation and Strategy' edited by Michael Crew and Paul Kleindorfer, 2002, Kluwer Academic Publishers. .

OXERA's analysis calculates the change in risk premium for an unpredicted and permanent change in GDP with the fixed revenue as a portion of total revenue is 0.3 at the forecast level of volume as follows:

- for a 1% growth in GDP there is a 1% increase in mail volumes, assuming the volume:economic growth elasticity of 1;
- under OXERA's assumptions, a 1% increase in mail volume, increases costs by 0.6% and revenue by 0.7%;
- assuming costs of £5bn, the 1% increase in mail volume would result in an increase in profit of about £5m;
- the unpredicted and permanent change in GDP could happen at any time within the price control period which is assumed to be 5-years. If it happens at the start of the period, the present value of 5-years of additional annual profit of £5m discounted using a discount factor of about 10 per cent is about £20m. If it happens at the end of the period the value is zero. Hence, the average value for the period is £10m;
- the RAB value depends, amongst other factors on the coverage of the control. For example, a RAB-value of £3bn, the additional £10m in profit would increase the long-term return to Consignia's investors by 0.33 per cent and for a RAB-value of £5bn, the additional £10m in profit would increase the long-term return to Consignia's investors by 0.20 per cent. As the RAB value increases, the long-term return to Consignia's investors decreases.

## **GDP changes and FTSE All share index**

To assess the impact of GDP growth on the market value, the FTSE All-share index is regressed on successive lags of the growth rate in GDP for a data series comprising quarterly observations from Q1 1980 to the present in nominal terms.

This analysis indicates that only contemporaneous changes in GDP have a significant impact on the movement of the FTSE All-share Index. There is a strong statistical relationship between changes in FTSE All-share Index and GDP whereby a change of 1 per cent in GDP is consistent with a 2.3 per cent change in the value of the market.

## **Change in the beta value**

The above analysis concludes that:

- an unpredicted and permanent increase in GDP of 1 per cent increases the long-term return to Consignia's investors by 0.20 to 0.33 per cent (for a RAB value of between £5bn and £3bn respectively), if the hybrid price control assumes that fixed revenue as a portion of total revenue is 0.3 and the fixed revenue as a portion of total revenue is 0.4;
- an unpredicted and permanent increase in GDP of 1 per cent increases the FTSE All-share returns index by 2.3 per cent.

Consequently, the correlation between the return to Consignia’s investors and the FTSE All-share index is 0.09 to 0.14 (for a RAB value of between £5bn and £3bn respectively). The change from a cost-reflective structure for the control to a structure where the fixed revenue as a portion of total revenue is 0.3 would increase the beta value by 0.09 to 0.14 (for a RAB value of between £5bn and £3bn respectively).

This analysis is extended to consider the impact on the beta value for alternative control structures. The results are shown in Table A1 for the case with the fixed costs as a portion of total costs at 0.4 and no cream-skimming entry. For example, for a pure price control, the increase in the beta value is 0.35 to 0.58 (for a RAB value of between £5bn and £3bn respectively). This would increase the pre-tax Weighted Average Cost of Capital by about 1.6 to 2.7 percentage points (for a RAB value of between £5bn and £3bn respectively) and is valued at about £0.08 bn per annum. For a pure price control, when compared to a hybrid control with the fixed portion of revenue at 0.3, the corresponding increase would be £0.6 bn per annum

**Table A1: Impact of alternative structures for the control on Consignia’s beta value with the fixed costs as a portion of total costs at 0.4 and no cream-skimming.**

Structure of the control Ratio of fixed to variable	Change to the beta value		
	RAB = £5bn	RAB = £4bn	RAB = £3bn
40:60	0.00	0.00	0.00
30:70	0.09	0.11	0.14
20:80	0.17	0.22	0.29
10:90	0.26	0.33	0.43
0:100	0.35	0.43	0.58