

# RESEARCH PAPERS IN MANAGEMENT STUDIES



## **CONSIDERATIONS OF QUALITY IN BRITISH TELEVISION PRODUCTION: A BAYESIAN STATISTICAL ANALYSIS**

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# **Considerations of quality in British television production: A Bayesian statistical analysis**

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## **Abstract**

This paper examines the responses of 450 British male and female television production workers about their perceptions about the changes in the quality of television programmes. The British television industry was heavily restructured in the 1980s and 1990s with many production workers having their contracts changed from unlimited staff posts to freelance or self employed contracts. The paper is able to explore whether individuals' perceptions of changes in quality were related to their own labour market experiences and the signals for quality workmanship that operate in the labour market, described in the theoretical literature related to efficiency wages. The paper used Bayesian statistics to explore these relationships and found confirmation for the expectation that below and above market wages rates, as well as other indicators of quality labour and personal quality experiences were related to the perceptions about the components of quality of programmes.

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## **1. Introduction**

Good quality is a characteristic which everyone desires and agrees is a virtue whether this be television programmes, educational provision from schools and teachers, new products, or second hand cars. The problem is that quality is difficult to measure and judging quality sometimes rests on asymmetric information. The quality of British television programmes became an issue following the radical changes in regulation, structure and working conditions which have taken place in the industry from the early 1980s to mid 1990s. Pressures to cut costs in programme making took place alongside the industry changes. Many commentators have queried whether competitive pressures in the form of lower budgets for programmes and the bidding down of hourly wage rates have reduced the quality of programmes (Murrioni and Irvine, 1997). An alternative view is that competition can lead to more efficient use of resources and that quality need not suffer if increases in efficiency result, especially alongside productivity-enhancing technological changes. For example, forcing employers to break up (over) manning and job demarcation agreements could increase efficiency and quality remain constant but at lower prices. Licenses to broadcast given to commercial companies following government tenders have had quality safeguard clauses as part of the contract. However, since these are difficult to measure they are also difficult to write into contracts. Clearly, there is a wider range of concerns about quality where the BBC is concerned because of its role as a public service broadcaster. In this paper we consider programme makers' views about the changes in quality that have resulted over the 1990s and see how this is related to their experiences. This examination of quality in the television industry gains more importance from the fact that this is only one of a number of industries where changes in the structure of the industry have led to changes in the nature of contracts and working conditions.

The production worker's view of quality is available in a new panel data set and is an interesting dimension in the quality debates.<sup>i</sup> The production worker has his/her own perspective, one which has been claimed by some to be driven more by peer review than by consumer opinion (Murrioni and Irvine, 1997). It is the production worker who has the potential to affect the quality of the programme, although the budget is an important constraint on the level of quality achievable. It is only the production team who know what sort of short cuts have been taken, integrity or accuracy sacrificed and effort put in. By focussing on the production worker's perspective, information-based economics concepts are relevant to generate hypotheses and offer interpretations of the empirical data.

The plan of this paper is as follows: Section 2 below charts the changes that have occurred in the television industry since 1980. Section 3 considers the theories and measurement issues relating to a consideration of quality in general and in television. The data are summarised in Section 4 and in an Appendix. Sections 5 to 7 report on the analyses of the data collected from production workers on quality in television. The conclusions are presented in Section 8.

## **2. Changes in the television industry**

The television industry before the 1980s was structured with a vertically integrated public service broadcaster, the BBC, alongside a few integrated and heavily regulated private sector broadcasters (the regional ITV franchises). As a result of a series of regulatory changes, the position in the 1990s is one in which the private sector broadcasters compete first to get the licence, (subject to looser regulation), then to attain maximum ratings, and with the BBC itself reorganised with internal markets. Part of their programming is produced and supplied

from many small private and a few large independent production companies competing with each other to supply the broadcasters (Price Waterhouse PACT, 1995). The new Channel 4, in 1982, given a brief to commission or 'publish' programmes but not to make them itself, was the first stimulus to the new independent production sector. This was followed closely by the creation of a market in external suppliers in 1986 as the BBC and ITV were given the target of introducing a 25% quota of independent productions. In 1996 the BBC was reorganised from vertically divided directorates for television, radio etc. to horizontally divided BBC Broadcast, BBC Resources and BBC Production sections. The aim of the Production section is to seek commissions from Broadcast to produce programmes, in competition with other independent companies. However, since 1997, it has been agreed that 60 per cent of annual Broadcast expenditure would be guaranteed to go to in-house Production.

Prior to the 1980s, the majority of television workers were in salaried long-term jobs employed by broadcasters. In the 1990s estimates suggest that 60 per cent are freelance. There have been enormous pressures to cut production costs. Independent companies have not been able to afford more than a skeleton staff with specific short-term contracts when their commissions were so uncertain and on extremely tight budgets. However, the broadcasters have followed suit in giving large proportions of their workforce freelance contracts. The pressures on budgets have grown increasingly through the tendering for licences and franchises, and the advent of Channel 5 as a low budget channel. This environment has generated the need to try and monitor and police programme quality. The BBC and Independent Television Commission (ITC) are trying to develop quality measures (Towler, 1997).

### **3. Considerations of quality**

The ITC has mainly been concerned with quality measurement in the process of issuing licences to independent broadcasters. The license contract normally includes a written statement of the range of programmes to be broadcast and the time and priority. This involves setting down minimum hours for Channels 3, 4 and 5 of drama, factual programmes, news, education, religion, arts and children's programmes. In addition to this programming range, the ITC also regulates about advertising, sponsorship and technical services. The regulation is backed up by a variety of penalties for the failure to comply. These types of quality conditions are not a part of satellite licences. The ITC largely interprets quality as *range* and this is a measurable item and easier to contract. Failures to keep to contractual allocations are known to occur. These are the responsibility of the broadcasting company or licence holder.

There have been a number of discussions by media specialists and policy making institutes about the quality of television and how it should be judged. A few of these discussions and measures overlap with economic discussions of the concept of quality; others do not. Mulgan (1990) is the most extensive discussion describing seven dimensions of quality; producer quality and professionalism; consumer quality and the market; television's aesthetic; television as ritual and communion; television and the person (or citizen); the television ecology; and diversity. Murrioni and Irvine (1997) offered another summary list.<sup>ii</sup> Others have extended the dimensions to include ethical quality (Mephram, 1990) and provided integrated assessments (Born, 1998). None of these discussions have tried to measure or document quality changes under any of the various headings. Paterson (1993) claimed that quality would decline as a consequence of the decline in vertical integration since this would destroy successful production teams which promote creativity. Also, uncertainty about future

employment was predicted to lead to distraction, other agendas and a decline in the commitment of the workforce. Others have noted that market competition in comparison with bureaucracy, can endanger a sense of trust and common purpose in a workforce; opportunistic behaviour was predicted to grow as a consequence (Burke and Goddard, 1990). The consideration of quality in programming in this paper overlaps with Mulgan's producer quality and professionalism. But also, Burke and Goddard's work on the framework that underpins quality is also relevant.

There is an obvious overlap in one of the conceptions of quality with standard economic theory. The notion of consumer being king, part of standard consumer preference theory, is implicit in the consumer's view of quality and its measurement by ratings for particular programmes. This feature of the quality debate is not taken up in this paper since our data are about television producers' rather than consumers' beliefs about quality. There have been only a few attempts to consider the relevance of concepts from information or institutional economics to issues of quality in television, but these could provide fruitful lines of enquiry, especially for considering the production worker's beliefs about quality. Broadly there are three sets of issues which have implications for beliefs about the quality of television programmes. Firstly there is the standard relationship where price reflects quality. Secondly, there are incentive issues within workplaces and in contracting about employment that can affect the quality of work carried out. Thirdly, there are selection processes in the labour market related to the quality of workers who are prepared to change jobs. We discuss these three sets of issues below, although our empirical work only takes up the first two of them.<sup>iii</sup>

The price one has to pay has conventionally been the signal of the relative quality of a good or service. That is, irrespective of market forces which can bid up the price, or monopolistic power which can add an element of economic rent, the relative prices of goods and services which are similar in content but different in quality would be expected to be signalled by their relative prices. It is certainly true that television programmes vary in their costs of production and that some programmes are intended to be low cost and low quality productions and recognised as such by comparison with other higher cost and higher quality products. The production of specifically low budget programmes became a feature of British television in the 1990s alongside the proliferation of new Channels including Channel 5 and satellite channels. But it is also the case that costs can be lowered for the same quality of product, through technological advance for example. Clearly there have been technological advances in television production from on-line and non-linear editing and DVC portable digital video cameras. These have undoubtedly allowed productivity to increase although comments from our survey respondents suggested that the lack of training made new technology less of a quality improvement than might otherwise be possible. Also, alongside technological change, regulations about the minimum acceptable quality of broadcast output were dropped in 1997. The analysis by Lutz et al (1998) of the relationship between quality standards and minimum quality regulations implies that the removal of minimum quality standards may well be associated with a decline in quality in both high and low quality producers.

When the producer or seller of a good knows more about the quality than the buyer or consumer, this produces the circumstances in which opportunistic behaviour can occur and moral hazard. In such circumstances, one party can benefit in an exchange because the other party does not have the same information. As noted earlier, the two organisational and market relationships in which commissions to produce programmes occur have different implications for quality. In the case of the larger broadcasters, a proportion of the commissions will go to internal production groups within the same company related now by internal markets rather

than formal vertical integration as in the past. Quality conditions are likely to be implied in such contracts. Independent production companies or production teams are the other external markets where commissions to produce programmes are contracted because of regulations (25% of broadcast programming). In this setting quality conditions can in principle be written into these external contracts. In practice, since there are few measures of quality, it is difficult to contract for the quality of a particular programme. However, there is clearly potential for television workers to reduce the quality. The recent uncovering in the British press of fake documentary interviews is probably the most blatant example of opportunistic quality reduction. Other ways of reducing quality include, short-cuts in the editing, using inexperienced or untrained workers who are cheaper to employ; less rigorous standards of research; and giving an unbalanced account of material because of wanting to spend less time on the production. Comments that television workers in our survey wrote on their questionnaires expressed all of these points, as described more fully in Dex and Sheppard (1999).

It might be expected that adverse selection would occur, driving out good quality (Akerloff, 1970). However, well-informed sellers (television production workers) are not trading with completely ill-informed buyers (commissioners) in British television production. There is repeat contracting, a relatively small industry with many overlapping networks and relationships and highly observable output albeit after the contract ends rather than before. Shapiro (1983) pointed to the need for reputation to be built up in an environment where quality was not observable prior to purchase (in this case, the commission). Freelance television workers in particular need to build good reputations to maintain a steady flow of work and to build trust which can reduce the transaction costs of repeat contracting. The relatively small industry and its concentration in a few locations in Britain mean that gossip and 'news' about an individual's quality of work and reputation can spread easily. Television workers, therefore, provide a less extreme case of the point Greenwald (1986) makes about workers in professional sports; that individual productivity becomes public knowledge. There is also high and widespread visibility of the output television programmes. The media's own narcissistic interest in itself adds further to the high visibility profile but this only allows quality to be judged after purchase.

Whilst adverse selection of the kind described by Akerloff does not characterise television production, some incentives to adverse selection in the labour market may well characterise the television worker's labour market. These could occur through the efficiency wage mechanisms outlined by Stiglitz (1987); not only do prices reflect quality, quality can be influenced by the price. Stiglitz (1987) reviewed the range of ways in which this reverse relationship can occur and some of its implications. Here beliefs about quality, about what it is that is being traded, can depend rationally on price. Good quality workers can be discouraged from entering the market in two circumstances; where employers have imprecise information concerning the labour endowment of particular workers and where a worker's acceptance wage is an increasing function of his/her productivity. The mechanism as outlined by Weiss (1980) works through employers seeking to retain their best workers and offering them better conditions and matching their external wage offers to avoid turnover. Employers will recognise that the pool of available labour at any one time is likely to be below average quality. Employees will recognise that quitting a job in order to enter the job market will signal that they are below average quality workers. This too will have a dampening effect on turnover. Also, employees who are prepared to work for lower wages in order to get a job will signal lower quality work and not get hired (Weiss, 1980).<sup>iv</sup> The market will not completely break down for a number of reasons. Greenwald (1986) pointed out that workers

are multidimensional and those who are ‘poor’ for one firm may be ‘good’ for another. In the television market the freelance environment promoted by the regulatory structure ensures a measure of re-contracting and turnover. However, we might expect to see a shift and reliance on head hunting and informal networks instead of advertising as a way of recruiting.<sup>v</sup> Also, workers with periods of unemployment or multiple job changing are predicted to get lower wages than those who have been continuously employed because of the information signal about worker quality that unemployment (and implied turnover) generates.<sup>vi</sup> As one freelance television researcher wrote on her questionnaire:

*‘Applied for every long (ie. one year) contract that I see in the BBC. Worried now they think I’ll go for anything but I do need stability’.*

Greenwald elaborated further on the implications of selection in the labour market which were predicted to vary by firm size. Large firms have greater risk spreading and lower costs of capital than small firms. On this basis, large firms will outbid small firms in the entry-level market and have the first choice of workers, small firms having to rely on the second-hand market to a greater extent. This would imply firstly, inferior wages in the smaller firms, the independent sector in television, as compared with larger broadcasters; secondly, the predominant direction of movement will be from large to smaller firms; and thirdly, a differential recruitment pattern between large and small firms. Smaller firms will be more likely to rely on informal methods of recruitment to compensate for the quality problem.<sup>vii</sup>

As well as the selection effects arising from the price influencing quality there are also incentive effects. Low wages can give workers the incentive to shirk and reduce their effort whereas wages above the relevant reference group, efficiency wages, can, in principle, increase morale and effort, reduce turnover and provide an incentive not to shirk (Greenwald, 1986). Stiglitz (1987) formulated a model of individual effort where the determinants were the individual’s wage, wage levels in the reference group, monitoring intensity and error terms or unobservable factors. We might expect therefore that workers who are paid or offered what they perceive as below market rates for the job will be likely to reduce the quality of the product, or think of exiting from the industry. The effects may vary according to whether there are one-off or continuing contracts. Monitoring of individual effort in a teamworking environment of television production is difficult. Certainly team workers will know about colleagues’ quality of work. As one television researcher working for an independent company wrote on her questionnaire:

*‘Don’t seem to have the same quality as years ago. Working with people who don’t give a shit anymore’.*

However, there are incentives for voluntary self regulation. The emphasis on reputation would be predicted to lead workers to want to protect themselves from poor standards of other team members.

This paper examines the relationships between workers’ beliefs about quality and this set of issues for a group of British television workers.

#### **4. The data**

The data were collected from 450 production workers, men and women, and a range of jobs or skills, by sending them nine postal questionnaires at six monthly intervals over a period of

5 years 1994-1998. Attrition occurred over the life of the panel and there was a disproportionate loss of young people in their twenties from the sample (Dex and Sheppard, 1998). This was noted by the research team at the time of collecting the data as more questionnaires were returned by the Post Office from this group with 'not known at this address' written on. This younger group were clearly a more mobile population. This may or may not be linked to quitting working in the television industry through the difficulties of finding work. A further refresher sample of 50 young (20-30 year old) television workers were added to the sample at wave 6. The analysis reports on the combined sample of these two groups; where there were differences between them, the results are noted.

These TV workers were asked at one cross-section wave only about their perceptions of changes in the quality of television programmes, alongside many other issues and about their personal characteristics and circumstances. The main questions on quality were asked at Diary 8 (May 1998) where data for 294 television workers in the main sample and 22 from the young people's sample gave their views on these issues; in total 316 were in the sample at the last wave. Respondents were asked eight questions in total about quality and ethics in programme making. These covered their views about changes in quality, in general and per pound spent, the areas of production which had seen quality reductions, and their experience of change in production quality and standards in programme making. There are also questions in earlier waves about the experience of low budget programme making (Diary wave 5), and hourly rates either above or below industry norms (Diary wave 6). More details about the data are provided in the Appendix 1.

## **5. Beliefs about the quality of programmes**

Television workers in this survey were asked what they thought had happened to the quality of television programmes, on the whole, over the last four years. Seventeen per cent of the sample thought the quality was unchanged, 12 per cent thought that it had improved either a little or a lot. The majority (67 per cent) thought that quality had got a little or a lot worse.

A further set of questions was asked about standards in programme making. Over one half the sample (54%) thought that ethical standards had declined and 46 per cent thought accuracy standards had declined. The proportions that thought that technical and creative standards had declined were lower, 38 and 36 per cent respectively and a sizeable group thought that technical standards (27%) and creative standards (24%) had increased. This was in contrast to standards of ethics and accuracy where very few thought there had been an increase in standards.

As indicated earlier, there has been a tendency for low-budget programmes to increase. Since price is often a signal of quality it is possible that television workers were indicating in their responses on quality changes that the budgets for programmes had declined. Certainly some of their written comments did make these direct links between the level of quality and the price (or programme budget).<sup>viii</sup> But other responses suggested that quality had also been declining independently of and in addition to the budget decline.

Having lower budgets does not automatically mean lower quality, especially if increases in efficiency are possible or productivity-enhancing technological change has occurred. The production workers were asked whether they thought the quality of programmes per pound spent had changed, 11 per cent thought it had stayed the same, 22 per cent thought it had increased and 33 per cent thought it had decreased. A much larger group (34%) thought that



they could not answer this question. These tended to be the younger cohort in their twenties who had less experience with which to judge whether things had changed.

However, as Stiglitz (1987) and others have pointed out, not only do prices reflect quality, beliefs about quality can be influenced by the price. In television production, there are at least two prices of interest; the price of the programme, its budget, and the price of the labour used to make it. Some of these workers had experience of low budget programmes. Twenty-eight per cent of the sample had worked on low budget programmes (less than £5000 per hour) by wave 5. We might expect this group to be more likely to believe that quality had gone down in television. Some workers had experience of having to accept below market rates for the job in order to find sufficient work (30%). Again, we might expect workers with such experiences to be more likely to view the quality of the product as having fallen. In contrast, there were also those who had received above market rates for the job, possibly as an efficiency wage (29%). These workers might be more likely to think that quality had risen.

In the case of standards of ethics and accuracy, some workers were implying that lower value was being placed on these qualities. Again those who had witnessed or experienced pressures to devalue these standards would be expected to be more likely to think that ethical and accuracy quality had declined. Of those working on factual programming (52%) claimed they had witnessed or experienced pressure to sacrifice accuracy for entertainment, controversy or excitement. Fifty-four per cent of the group who worked on factual programming also claimed to have experienced or witnessed pressure to treat programme contributors badly. Twenty three per cent felt they had a programme idea stolen. We would expect this to influence their views about the quality of ethical standards

## **6. Modelling beliefs about quality of television programmes**

A number of approaches were considered for modelling these six beliefs about the quality of television production. In the end we have treated them as independent measures, estimated in separate models. We rejected a MIMIC (multiple indicator, multiple cause) approach.<sup>ix</sup> Whilst our indicators do have similarities with the unobservable and latent variable representation that MIMIC models set out to handle, we consider that there are subtle but significant differences. Our data provide observable beliefs about quality and it is these we are setting out to model, in the first instance, rather than an unobservable latent quality concept.<sup>x</sup> We also consider that these 6 variables are measuring different and, to some extent, independent changes. There is no reason why ethical, technical, and creative standards should necessarily change together. However, it is more likely that standards of accuracy and ethical standards would be linked and the data confirmed this to be the case.<sup>xi</sup>

We estimated models of six dependent variables which were, in all but one case, coded to a 5-point scale (-2 through +2). Positive values indicated a belief that quality or standards had increased and negative changes indicated the opposite, zero signifying no change.

*Compared with 4 years ago (since 1994) would you say that the quality of television programmes on the whole is:* (codes 'a lot better', 'a little better', 'the same', 'a little worse', 'a lot worse' or 'Don't know').

Another general question followed this.

*..in your experience, do you think that the quality per pound spent has increased/stayed the same/decreased?*

These two general questions were broken down into a number of possible constituents in subsequent questions.

*In your view, have standards in programme making changed over the past 4 years (since 1994), and if so, how have they changed? (Codes ‘much lower’ through to ‘much higher’).*

Four types of standards were mentioned; *Standards of accuracy; Technical standards; Ethical standards; Creative standards.*

The form of the model was the same in each of the responses to these 5 questions :

$$Q_i = \beta X_i + e_i \tag{1}$$

where  $Q_i$  is a measure of what individual  $i$  believes to be the changes in the quality of television;  $X_i$  are a set of characteristics of individuals  $i$ ,  $\beta$  are a set of parameters and  $e$  is an error term whose specification is discussed below.

Since the dependent variables were all ordinal scales, ordered probit and ordered logit were considered to be appropriate estimation techniques with the ordered logit formulation being chosen since it is easier to estimate and interpret while having overall similarity with probit estimations (Zavoina and McElvey, 1975) in which case  $e$  has a standard logistic distribution, and we observe not  $Q$  but  $y$  where:

The observed counterpart to  $Q$  is  $y$ . Then

$$y = \begin{cases} 0 & \text{if } Q = \tau_0 \\ 1 & \text{if } \tau_0 < Q = \tau_1 \\ 2 & \text{if } \tau_1 < Q = \tau_2 \\ \dots \\ J & \text{if } Q > \tau_{J-1} \end{cases} \tag{2}$$

and where the  $\tau_j$  are unknown and to be estimated. A Bayesian approach to statistical inference was chosen (Carlin and Louis, 1996).<sup>xiii</sup> Bayesian inference allows for the combination of prior knowledge with new data in a probabilistically correct manner. There is the additional advantage that missing values can be represented by uninformative priors reflecting the uncertainty of these values.

A set of independent variables were derived from the data in order to capture some of the theoretical interests described above (Appendix Table A1 contains the definitions and means). Some of the variables were obtained from responses at earlier waves of data, therefore avoiding problems of endogeneity (for example attitudes). However, in some cases, using data from earlier waves is likely to have introduced a small amount of measurement error.<sup>xiii</sup> Status and conditions of work coincident with the reporting of beliefs about quality were used since it was the immediate circumstances that were hypothesised to have affected the beliefs about quality; for example, by being out of work at the time. Adopting a Bayesian approach allowed us to incorporate a set of hypotheses into the selection of prior means and standard deviations for the model. Broad non-informative priors were used on the  $\tau_j$  s. Priors on the  $\beta$ s were Gaussian with means and standard deviations as follows.<sup>xiv</sup>

Prior to collecting and analysing the data we believed that having had to accept below market (wage) rates for the job or work below one's self-perceived skill level (as ascertained at earlier waves) would lead to a belief that quality in television production had fallen. Having been able to secure above market (wage) rates, or having had formal training over the past six months were expected to lead to beliefs that quality had risen. Similarly, having a higher annual income (measured on an 11-point scale of income bands going up in £5 thousand steps and reported at wave 8) was expected to be associated with a belief that quality had improved.<sup>xv</sup> Having had to work on low budget programmes but not by choice was also expected to lead to a belief that quality had fallen, as was the personal experience of being pressured to compromise accuracy standards in factual programming or having witnessed colleagues being subjected to the same pressure.

The association of quality with creativity and the aesthetic of television programme making noted by Mulgan (1990) was captured by respondents' responses to a question at wave 6 asking them to rank, on a 5-point scale the importance they attached to creativity. Here we hypothesised that greater importance attached to creativity was likely to lead to a belief that quality had declined. Also, attaching importance to 'trust between colleagues' or having had one's ideas stolen (from waves 8 and 5 questions respectively) were expected to be associated with a decline in ethical standards in particular. In a similar way attaching more importance to 'competitiveness' within the quasi markets operating in television production was expected to lead to a view that quality had improved. This view was assumed to be indicating a favourable view in general about the changing structure of the television industry.

There were some small variations between the set of independent variables entered into each model. Where there was no prior reasoning to associate an independent variable with the particular dependent variable it was not included in the model estimation. So, for example, pressures to compromise accuracy, or the importance attached to trust between colleagues were not thought to be potential explanations of changes in technical standards.

A range of other independent variables, entered mainly as dichotomous zero/one values, were also included in the models; these captured personal characteristics of the workers (gender, age); type of job; type contractual status (freelance or owner compared with staff); type of organisation (broadcaster compared with independent company); conditions of work (long hours or zero hours of work compared with other weekly hours in the survey week); and labour market location (London compared with out of London). The prior means chosen for the coefficients of independent variables are described below. The same initial values of prior means and standard deviations were used in each model since the dependent variables were all similar and there was no a priori reason to vary them (Table 2). The posteriors were sampled using MCMC (Markov Chain Monte Carlo) methods and autocorrelation of the samples was checked to give some assurance of convergence.

Men were expected to see quality as having fallen more than women. Women have had some advances from the breakdown of old hierarchies and traditions in the television industry. Older workers were expected to feel progressively negative effects on quality with age for several reasons. Younger workers had no or little past experience to compare with the new environment. Also, change becomes more difficult with age and nostalgia about a past golden era can creep in. Those working freelance compared with those in more secure staff positions were expected to see quality as having declined, partly because of the insecurity of their new status. Similarly those working in a broadcaster who had previously been very secure and

were experiencing considerable uncertainty and upheaval from internal reorganisations in the 1990s were also expected to perceive that quality had declined. Working either long hours, or no hours at all were expected to be associated with beliefs of a decline in quality on the basis that their working conditions created personal pressures and problems. We did not have many specific expectations about particular job categories (means set to zero therefore) except for managers who were expected to believe that quality had increased since their job prospects could be argued to have improved through successive managerial reorganisations that were taking place. Working in London was hypothesised to be associated with a belief that quality had declined because of the greater network and grapevine capabilities of those working in London, combined with the expectation that bad news travels faster than good news.

Standard deviations were chosen initially to reflect the extent of our uncertainty about the framed beliefs. Where we had theoretical support for particular beliefs we have tended to select narrower standard deviations than where theoretical reasoning was not available. However, sensitivity analysis was undertaken by substantially widening all standard deviations to examine the effects on the posterior distributions of introducing far more uncertainty into the priors.

## **Results – posterior distributions in Base Models**

There are a number of possible outcomes from the Bayesian analysis. The posterior means and standard deviations could be largely unchanged as compared with the prior values; in this case no new information has been gained from the analysis. Additional confirmation for a hypothesis is gained where posterior standard deviations are substantially smaller than their prior values and the mean is approximately unchanged. Large changes of the mean compared with the posterior standard deviation would provide new information to change our understanding of the relationships.

In fact, there were relatively few surprises in the results. The vast majority of parameter results either confirmed and strengthened our initial hypotheses or did not provide any new information. The posterior distributions for the various models are displayed in Table 1.

### *Beliefs about quality*

In our first model, perceptions about quality in general were found to be associated with labour market experiences, confirming our expectations. Having experienced above (or below) market wage rates for the job was associated with believing quality had increased (or decreased). The sizes of the posterior means of these variables were both reduced compared with the priors but standard deviations were also reduced, confirming that zero values for the mean were excluded. Similarly having worked below one's perceived level of skill or having experienced or witnessed pressure to compromise accuracy were also confirmed as being associated with a belief that quality had declined. The posterior results suggest that, contrary to our original hypothesis, having a higher income had an effect on beliefs about quality that was much smaller than we had assumed and which might be zero. The sensitivity analyses, widening the prior standard deviations for these (and separately for other variables), reinforced the conclusion that the prior means were too large in most cases and that the effects of interest were all smaller than previously believed, with the exception of having had training.

Other variables which were confirmed as important were the age dummies. The hypothesis that increasing age, through decade bands, would lead to larger and larger probabilities that quality had declined was supported by the posterior means and standard deviations of the age dummies. In the 40s (and to a lesser extent in the 30s) age group, the prior expectations of a negative effect on quality that excluded zero was confirmed with the posterior mean remaining the same as the prior mean. However, the posterior mean for the 50s age group was higher than its prior, as well as higher than the younger age groups; it also excluded zero. These effects are likely to be due to a mixture of period effects from the changes in television affecting the 40s and 50s age groups more drastically, given that they have prior experience in an industry structured on different principles, combined with elements of nostalgia.

Producers were found to be more likely than other occupations to think that quality had declined despite completely neutral prior expectations. Producers may, with their overall view of the TV programme's production, have a different (and in this case worse) view about that production than those who focus on parts of the production process. Thinking that competitiveness in television production was good was found to have a posterior mean that excluded zero, compared to the prior where zero was included; while the posterior mean was the same as the prior, the standard deviation was four times smaller. This attitude was found to be associated, therefore, with the belief that quality had increased.

The results from the model examining the determinants of beliefs about quality per pound spent were similar in many ways to the more general question about quality (Table 1). There was strengthened support for the hypothesis that wage rates affect views of quality and that being in the 50s age group was likely to lead to perceiving quality as having declined. Two new relationships emerged more strongly in this model. Higher income had a posterior mean that excluded zero although of a much smaller size than the prior mean. This suggests that higher income was associated with thinking quality per pound spent was higher and that there were efficiency gains outweigh quality trade-offs to the introduction of low budget programming. Also, the posterior mean indicated that working for a broadcaster had a non-zero association with the belief that quality per pound had declined. Different occupational groups and different contractual statuses were not found to have distinguishable beliefs in this model.

The sensitivity analyses undertaken increased all the prior standard deviations 5 fold while keeping the earlier prior means unchanged. This introduced far more uncertainty into the hypotheses and made a prior mean that included zero the standard hypothesis for all variables. The main changes that resulted were that all of the posterior standard deviations were substantially lower than their prior values, but many of the means were also substantially reduced. Some of the relationships described in the text relating to links between labour market experiences and perceptions of quality did not exclude zero values after the prior standard deviations were all widened. Further examination of selected results changed the standard deviation of the one prior at a time to distinguish whether the changes in any one variable's mean and standard deviation were attributable to changes in its own prior, as proposed to changes in the prior values for some other variable. This more selective test showed that in most cases, the changes were due to the variable's own priors. However, the overall goodness of fit statistic,  $-\log P(\text{data}|\text{model})$ , was much increased in the modified model, compared with the base model, (Table 2). The base model is approximately  $e^{12}$  times more likely to be true, therefore, than the modified sensitivity test model. The same comparison in other models described below led to the same conclusion in favour of the base model in each case.

**Table 2. Goodness of fit statistics associated with various models and the sensitivity analyses.**

**Estimates of  $-\log P(\text{data}|\text{model})$**

<b>Dependent variables.</b>	<b>Base model</b>	<b>Modified model. (All standard deviations increase 5-fold)</b>
<b>Beliefs about</b>		
Quality in general	393.34	405.49
Quality per pound	267.52	283.81
Ethical standards	344.61	360.93
Standards of accuracy	349.00	361.24
Creative standards	397.58	405.34
Technical standards	433.80	446.19

In this model of perceptions of quality in general, the results of the sensitivity analysis weakened some of the earlier conclusions but strengthened others. Associations between perceptions of quality and labour market experiences were all much weaker than hypothesised and were not clearly excluding zero associations. The belief that quality had declined was stronger as age increased. Also increased in size were the posterior means of producer and manager occupations. However, this needs to be placed along side the strong preference for the base model indicated in the goodness of fit statistics.

*Beliefs about ethical standards*

Beliefs about changes in ethical standards were also found to be associated with labour market experiences in the same way as beliefs about quality in general (Table 1). The posterior mean values for these effects were all reduced compared to their prior means, and posterior standard deviations were all lower than the priors. The posterior mean for the variable representing individuals' experiences of having had to compromise accuracy was larger than its counterpart in the model of quality in general. This suggests this element of personal experience had a more pronounced effect on perceptions about ethical standards than about quality in general. The same is true for standards of accuracy reported below. Higher income was associated with believing ethical standards had improved, but the effect was again much smaller in magnitude than had previously been thought, although it did exclude zero. In addition, having had one's ideas stolen was included in this model. This aspect of personal experience was also confirmed as being associated with a perception that ethical standard had declined, although with a smaller mean than the hypothesised prior.

The greater the importance attached to competitiveness in television, the less likely the perception that ethical standards had decreased. There is a suggestion, here, that views about the workings of the labour market in general were affecting perceptions about ethical standards, although not so much perceptions about quality in general. As was the case for quality in general, increasing age was confirmed as being associated with the belief that ethical standards were declining.

New information was obtained about the status of freelance, working for a broadcaster and having long hours of work. The uncertainty was reduced and the effect smaller than had been expected. In other respects, no new information was gained about the effects of gender, location or type of job on perceptions about ethical standards.

As indicated in the earlier model, widening the prior standard deviations selectively did introduce some differences into the interpretation of the results. The importance, in terms of size of coefficients, of the variables capturing labour market and ethical experiences declined in the posterior results compared to the prior means. In particular, earning above average rates, having the experience of compromising standards of accuracy, or having one's ideas stolen did not have posterior means that excluded zero in this sensitivity exercise. Having experienced below market rates did still exhibit a negative posterior mean that excluded zero. However, with wider prior standard deviations, being a producer had a stronger posterior and negative mean which excluded zero, as did being a manager, although with a sign indicating a belief that ethical standards had increased. These additional associations should be noted therefore along side the clear preference given to the base model by the goodness of fit statistics (Table 2).

#### *Beliefs about standards of accuracy*

The conclusions from our analysis of beliefs about accuracy were largely similar to those for ethical standards with respect to the effects of labour market experiences and increasing age; both were associated with beliefs that standards of accuracy had fallen (Table 1). Similarly no new information was gained about the effects of other personal characteristics and conditions of work.

The results for the model on accuracy differed from those from ethical standards in only two relatively minor respects. Confirmation of an association, excluding zero, between having ones ideas stolen and beliefs about accuracy, present in the model of ethical standards, was not present in this model about standards of accuracy. Nor did higher income levels appear to be associated with beliefs about accuracy, as they had been with beliefs about ethical standards.

Widening the prior standard deviations had the same effects on the coefficients in the standards of accuracy model as it did on the model focussing on ethical standards. Labour market effects on standards were weakened as a result, with the exception of having experienced below market wage rates. However the results for producer, manager and other types of job were not affected by the changes in priors. However, as in earlier models, a clear preference was indicated for the base model by the goodness of fit statistics (Table 2).

#### *Beliefs about creative standards*

One difference from earlier models seen in the model of beliefs about creative standards was the confirmation of an association between being freelance and perceiving standards of creativity to have fallen, compared with being a staff worker (Table 1). The pressures of the freelance contract working life may bite most into creativity. In other respects there were many overlaps with the results from earlier models.

As indicated in earlier models, widening the prior standard deviations selectively again introduced some differences into the interpretation of the results. The importance, in terms of size of coefficients, of the variables capturing labour market and ethical experiences declined

in the posterior results compared to the prior means. However, with wider prior standard deviations, being a producer had a stronger posterior and negative mean which almost excluded zero. Also having one's ideas stolen was associated with a positive belief that creative standards had increased. These additional associations should be noted therefore although along side the clear preference indicated for the base model by the goodness of fit statistics (Table 2). The association noted with stolen ideas is interesting. Individuals may be thinking that creative standards are being maintained by their own good ideas, despite their owners not being paid for them.

### *Beliefs about technical standards*

The main differences, compared with earlier models, in the model about changes in technical standards related to working for a broadcaster and working in London (Table 1). Working for a broadcaster or in London, were both associated with a belief that technical standards had declined. The posterior means were both more negative than from their prior values with substantial reductions in the posterior over the prior standard deviations. It is possible that technical standards have changed the most in London broadcasting through the competition of low budget programming being more acute in London.

In other respects, the results from the model of beliefs about technical standards were similar to other models although with some minor differences.

Widening the prior standard deviations selectively again introduced some differences into the interpretation of the results but the changes had less effect overall in this model on changes in technical standards than in the other aspects of quality. The clear preference for the base model was again indicated by the goodness of fit statistics (Table 2).

## **7. The problem of attrition**

It is possible that those who returned their survey questionnaires at the final wave were more likely to be those who believed television production had declined in quality. Some of the individuals with missing questionnaires may even have left television because of their disenchantment with its quality. Given we had information from earlier waves, about the characteristics of the those who were no longer in the sample at the final wave, it was possible to estimate a selection model of those who did respond at the final wave, and also a model of the effects of this selection on beliefs about quality. Selection was included in each of the quality models considered above.

The selection mechanism can be described as follows<sup>xvi</sup>:

$$W_i^* = \beta x_i + U_i$$

Where  $W_i$  indicates whether an individual returned a completed questionnaire at the final wave, taking the value one if so, and zero otherwise. The  $x_i$  are a set of characteristics associated with individual  $i$  at the first wave of the panel survey and have associated parameters  $\beta$ ;  $U_i$  are errors. Since logit is used for the estimation, the  $U_i$  are assumed to have a standard logistic distribution.

$$W_i = 1 \text{ if } W_i^* > 0 \text{ and zero otherwise}$$



$Y_i$  from equation (2) is observed if and only if  $W_i = 1$ .

Equation (2) is modified to read:

$$Q_i = \beta x_i + e_i + ? U_i$$

We have used Bayesian inference to estimate this selection model.<sup>xvii</sup> The prior means and standard deviations chosen for the small set of  $x$  variables used in the selection equation are displayed in Appendix Table A2 along with the posterior means and standard deviations from the selection variables in each model. The priors chosen tended to reflect a large measure of uncertainty about our expectations with two exceptions. We had stronger reasons from the data collection information for expecting the youngest age group, used as the reference group, to have higher attrition from the sample than other age groups. We also expected that male respondents would be less likely than female respondents to send back their questionnaires, a feature commonly found in other surveys. The model allows for the posterior means and standard deviations of the selection variables to vary in each model so that a set of posterior results is presented for each model, with selection added. However, in practice there were relatively small variations in the posterior results, and the conclusions apply to all models.

### **Selection variable results**

Whilst there are some minor variations according to the particular model being estimated, for most of the variables included the conclusion is that no new information is gained from the posterior results with a few exceptions. Expecting that women would be more likely to return their questionnaires is not supported. In the case of working for a broadcaster at the start of the panel survey, instead of a prior mean close to zero, the posterior mean favoured a positive value that excluded zero. In the case of age the expectation in the priors that there would be a greater likelihood of workers in their 40s and 50s at the time replying to the questionnaire was strengthened in the posterior results.

The results suggested therefore, that the attrition was skewed with broadcasters and older workers being more likely to continue to respond to the postal survey than those working in independent production companies or younger workers respectively. As noted above, the disproportionate loss of younger workers from the survey had been recognised by the research team at the time of data collection.

### **Results from including selection in the Base Models**

The results of the original variable set after selection has been incorporated are displayed in Appendix Table A3 for the base model priors and standard deviations. We pick out here only the main findings. The  $\nu$  values indicate the extent to which the unmodelled variation about respondents in the selection model has an effect in the main model. The  $\nu$  values were all positive and greater than one with standard deviations that indicated a measure of certainty about the sign, with the exception of the model of ethical standards where the negative  $\nu$  value was uncertain. With the exception of ethical standards, therefore, those who returned their questionnaires at the final wave 8 were also more likely to be those who thought quality had increased, *ceteris paribus*. Sensitivity tests varying the prior values of  $\nu$  and re-estimating did not alter the conclusions described above or below.<sup>xviii</sup>

There were effects on some posterior coefficients from including selection in the models. Quality in general, and quality per pound spent both exhibited similar effects. The sizes of the posterior coefficients on wages rates below and above the going rates, on the pressure to compromise and on attitudes to competitiveness in television production were all closer to the prior values after selection, having moved further away in the Base model without selection. They also more firmly excluded zero in the selection models. The models of ethical standards and standards of accuracy exhibited similar effects on the same variables. In addition, having had one's ideas stolen also had a posterior coefficient slightly larger in size than its prior. One further change in the model of technical standards was a similar move towards the prior mean for working in London.

In general, therefore, incorporating selection into the models gave less refutation to a set of prior values on some of the key labour market experience variables considered in theory and in the literature.<sup>xix</sup>

## **8. Conclusions**

In our examination of quality in television production from the production worker's perspective, a number of conclusions can be drawn. There was no doubt that workers, overall, felt that quality in television production had been declining. Some of the changes occurring in the industry were consistent with workers trying to protect their reputation as quality workers and their signalling capacity. This is important in an environment where they were being forced to work in low price programmes.

We examined beliefs about a number of different concepts of quality. While there was some variation across the different concepts, there was mainly considerable uniformity in the results. Production workers' beliefs about quality often appeared to be influenced by their own wage rates, relative to some norm, and by whether they were working at their appropriate level of skill. The idea that price not only reflects quality but that quality is also determined by price is supported by the views expressed by television production workers, although at levels below those we originally believed. In addition, direct experiences of pressure to compromise accuracy and having one's ideas stolen were also important influences.

Although when asked this question directly many could not answer, the model results drawing on their actual experience suggested that television workers seemed able to judge that working on low budget programmes did not mean that quality per pound spent could not be maintained.

The age effects noted might also indicate that experience, mixed possibly with nostalgia for a past golden era, also play their part, especially for the oldest groups. Attitudes that appreciated the effects of competitiveness in the television industry were likely to ameliorate the tendency to think that quality had declined. Although our attitude measure predated the expression of beliefs about quality, it is still possible that, rather than a cause of beliefs about quality, these attitudes are more of a symptom of another common cause. If the evidence is correct, that producers were more likely than other groups to think that quality had declined, this is a worrying result for television production. This group are more likely to have an overview of the whole production process than other workers.

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## **Appendix 1. The data**

The data consist of an initial Questionnaire (Q1) in May 1994 followed by repeated Day's Diary plus Questionnaires (D1, D2, ..., D7) sent by post and filled in every 6 months starting on 15th November 1994. The respondents were aged between 21 and 65 in 1994; 56 per cent were men and 44 per cent women. They were from all sectors of the television industry and all points in the creative production cycle. They included researchers, production assistants, producers, directors, designers, editors, cameramen and independent company owners.

The data consist of discursive diary information in which individuals wrote about their day, quantitative responses to a set of pre-coded questions, plus some open-ended questions. At the outset 436 individuals were in the survey. Over time there has been attrition from the sample but it has not been all loss. There are many cases of individuals failing to reply at one Diary date, but then filling in a subsequent Diary. The numbers of completed diaries at each wave from the main sample are outlined in Sheppard and Dex (1998). At the last Diary (eight), 294 individuals from the main sample completed the questionnaire (67% of those in the sample at the beginning). Only 22 of the young people's sample of 50 responded at the final diary (44 per cent of the original sample). More details about the survey and preliminary findings are available in two reports of interim findings, (British Film Institute, 1995, 1997). A separate analysis of attrition based on the characteristics of the sample at the Initial Questionnaire has been carried out (Sheppard and Dex, 1998). There was a disproportionate loss of young (20-30) year olds from the sample over time but it has remained representative of its original state in other respects.

**Table 1. Results of Bayesian analysis on Base Models of the determinants of changes in the quality of television production.**

Variable	All models		Beliefs about quality		Beliefs about quality per £		Beliefs about ethical stands	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD
Below rate	-1.0	0.3	-0.539	0.228	-0.413	0.219	-0.651	0.208
Low skill	-0.4	0.2	-0.336	0.177	-0.274	0.179	-0.365	0.181
Above rate	1.0	0.3	0.607	0.183	0.593	0.215	0.540	0.206
Training	0.2	0.2	0.251	0.166	0.303	0.164	0.298	0.161
Income	0.5	0.3	0.072	0.050	0.113	0.057	0.105	0.048
Low budget	-0.6	0.4	-0.076	0.304	0.082	0.261	-0.120	0.268
Compromise	-1.0	0.3	-0.436	0.201	-0.598	0.226	-0.743	0.194
<b>Importance of</b>								
Creativity	-0.2	0.4	-0.063	0.055	0.056	0.070	-0.064	0.060
Trust	-0.2	0.4					-0.119	0.137
Competitiveness	0.2	0.4	0.190	0.102	0.057	0.111	0.211	0.105
Stolen ideas	-1.0	0.3					-0.500	0.204
<b>Characteristics</b>								
Gender /male	-0.1	0.5	-0.072	0.222	0.045	0.246	-0.259	0.219
Age 30s	-0.2	0.1	-0.167	0.093	-0.218	0.094	-0.201	0.088
Age 40s	-0.4	0.2	-0.397	0.153	-0.233	0.171	-0.279	0.156
Age 50s	-0.6	0.2	-0.781	0.161	-0.604	0.174	-0.665	0.170
Freelance	-0.4	0.2	-0.236	0.151	-0.358	0.163	-0.108	0.166
Owner indie	0.0	0.2	-0.030	0.178	0.101	0.165	-0.224	0.196
Broadcasting	-0.4	0.4	-0.193	0.220	-0.614	0.263	-0.196	0.245
Long hours	-0.4	0.4	-0.194	0.220	-0.251	0.245	-0.252	0.220
No hours	-0.2	0.3	0.064	0.214	0.028	0.235	-0.011	0.228
London	-0.3	0.5	0.014	0.206	-0.064	0.245	-0.228	0.229
Producer	0	0.4	-0.531	0.252	-0.170	0.218	-0.043	0.222
support	-0.2	0.4	-0.008	0.280	-0.211	0.296	-0.046	0.297

Variable	All models		Beliefs about quality	Beliefs about quality per £			Beliefs about ethical stands	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD
Post production manager	0	0.4	-0.036	0.253	-0.286	0.321	-0.165	0.293
	0.2	0.4	-0.146	0.307	0.108	0.373	0.400	0.368
Number of observations			316		316		316	

**Table 1 continued. Results of Bayesian analysis on Base Models of the determinants of changes in the quality of television production.**

<b>Variable</b>	<b>All models</b>		<b>Beliefs about accuracy</b>		<b>Beliefs about creative standards</b>		<b>Beliefs about technical standards</b>	
	<b>Prior mean</b>	<b>Prior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>
Below rate	-1.0	0.3	-0.637	0.235	-0.520	0.229	-0.539	0.236
Low skill	-0.4	0.2	-0.454	0.174	-0.408	0.184	-0.481	0.188
Above rate	1.0	0.3	0.538	0.211	0.565	0.199	0.258	0.215
Training	0.2	0.2	0.383	0.190	0.091	0.172	0.139	0.165
Income	0.5	0.3	0.005	0.049	0.053	0.052	-0.030	0.051
Low budget	-0.6	0.4	-0.060	0.309	0.025	0.287	0.020	0.286
Compromise	-1.0	0.3	-0.695	0.210	-0.467	0.202	-0.431	0.183
<b>Importance of</b>								
Creativity	-0.2	0.4	-0.110	0.058	0.023	0.057	-0.013	0.056
Trust	-0.2	0.4	0.011	0.142				
Time	-0.2	0.4					-0.104	0.106
Competitiveness	0.2	0.4	0.225	0.102	0.251	0.096	0.309	0.098
Stolen ideas	-1.0	0.3	-0.333	0.210	-0.183	0.211		
<b>Characteristics</b>								
Gender /male	-0.1	0.5	-0.033	0.226	-0.353	0.228	-0.126	0.242
Age 30s	-0.2	0.1	-0.206	0.093	-0.192	0.089	-0.224	0.099
Age 40s	-0.4	0.2	-0.349	0.162	-0.407	0.158	-0.303	0.162
Age 50s	-0.6	0.2	-0.667	0.167	-0.522	0.158	-0.531	0.148
Freelance	-0.4	0.2	-0.285	0.160	-0.325	0.143	-0.251	0.156
Owner indie	0.0	0.2	-0.066	0.176	-0.069	0.191	-0.048	0.162
Broadcasting	-0.4	0.4	-0.246	0.249	0.006	0.238	-0.749	0.227
Long hours	-0.4	0.4	-0.188	0.232	-0.098	0.200	-0.185	0.208

<b>Variable</b>	<b>All models</b>		<b>Beliefs about accuracy</b>		<b>Beliefs about creative standards</b>		<b>Beliefs about technical standards</b>	
	<b>Prior mean</b>	<b>Prior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>
No hours	-0.2	0.3	-0.108	0.235	0.175	0.239	0.027	0.246
London	-0.3	0.5	-0.158	0.225	-0.139	0.224	-0.445	0.214
Producer	0	0.4	0.272	0.219	-0.256	0.215	0.011	0.212
support	-0.2	0.4	0.154	0.270	0.067	0.259	0.026	0.258
Post production	0	0.4	0.246	0.267	-0.033	0.278	-0.116	0.256
manager	0.2	0.4	0.176	0.323	-0.087	0.351	0.268	0.314
Number of observations			316		316		316	



**Appendix Table A1 Definitions and means of explanatory variables used in .**

<b>Variable name</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Definitions and source of data, Wave n.</b>
Below rate	0.300	0.394	Has experience of working at below the market wage rate, 0/1 Wave 6
Low skill	0.072	0.258	Has experience of 'having had to accept work below my skill level in order to secure regular employment', 0/1 Wave 7.
Above rate	0.290	0.370	Has experience of working at above the market wage rate, 0/1 Wave 6
Training	0.174	0.379	Has experienced formal training in the past 6 months, 0/1 Wave 8.
Income	6.455	2.624	Annual personal income band, 11-point scale, Wave 8
Low budget	0.190	0.392	Has experience of working on low budget programmes and ??, 0/1 Wave
Compromise	0.188	0.391	Whether experienced or witnessed pressure to compromise accuracy in factual programming., 0/1 Wave 8.
<b>Importance of</b>			
Creativity	3.130	2.189	Extent to which individual likes or dislikes this aspect of their job in television, 10-point scale, Wave 6.
Trust	4.439	0.739	How important is trust between colleagues for carrying out creative work in television. 5-point scale, Wave 8
Competitiveness	2.518	1.212	How important is competitiveness for carrying out creative work in television. 5-point scale, Wave 8
Stolen ideas	0.230	0.355	Thinks has had ideas stolen, 0/1 Wave 5

<b>Characteristics</b>			
Gender /male	0.553	0.497	Male =1 (Female=0)
Age 30s	0.266	0.442	Age 30-39 at Wave 8, 0/1.
Age 40s	0.327	0.469	Age 40-49 at Wave 8, 0/1
Age 50s	0.304	0.460	Age 40-59 at Wave 8, 0/1.
Freelance	0.310	0.462	Sees self as freelance worker at Wave 8, 0/1.
Owner independent	0.092	0.288	Owner of independent production company at Wave 8, 0/1
Broadcasting	0.190	0.392	Works for Broadcaster at Wave 8, 0/1
Long hours	0.215	0.411	Worked over 48 hours per week last week, Wave 8, 0/1.
No hours	0.089	0.285	Worked zero hours last week, Wave 8, 0/1
London	0.604	0.489	Works in London at Wave 8, 0/1
Producer	0.349	0.477	TV Producer at Wave 8, 0/1
support	0.148	0.355	Works in research or clerical Wave 8, 0/1
<b>Variable name</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Definitions and source of data, Wave n.</b>
Post production	0.109	0.312	Works in post production at Wave 8, 0/1
Manager	0.031	0.174	Works as manager at Wave 8, 0/1
Number of observations	316		
Broadcast 1	0.282	0.450	Worked for a broadcaster at wave 1, 0/1
Age 30-39 at 1	0.302	0.459	0/1, Wave 1
Age 40-49 at 1	0.306	0.461	0/1 Wave 1
Age 50-59 at 1	0.161	0.367	0/1 Wave 1
Degree	0.613	0.487	Highest qualification is degree 0/1 Wave 0
London 1	0.602	0.489	Worked in London at Wave 1, 0/1

Number of observations	447		

**Table A2. Results of Bayesian analysis on selection variables in models of the determinants of changes in the quality of television production. (Base model priors and standard deviations used in main models)**

Gamma Variables	All models		Beliefs about quality	Beliefs about quality per £			Beliefs about ethical stands	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD
ONE	0	5	0.583	0.099	0.085	0.091	0.487	0.091
Sex	-0.2	0.1	-0.083	0.086	-0.084	0.089	-0.093	0.088
Degree	0.05	0.1	0.038	0.092	0.040	0.082	0.082	0.087
Age at wave 1								
30-39	0.05	0.05	0.027	0.050	0.016	0.048	0.054	0.046
40-49	0.08	0.05	0.133	0.047	0.136	0.047	0.119	0.049
50-59	0.1	0.05	0.134	0.055	0.117	0.046	0.104	0.048
Widowed	0	0.2	-0.015	0.176	-0.042	0.160	-0.011	0.168
Lives London at Wave 1	-0.8	0.5	-0.131	0.181	-0.105	0.171	0.043	0.162
Broadcasting	0.05	0.1	0.177	0.091	0.190	0.086	0.185	0.085
N			447		447		447	

**Table A2 continued. Results of Bayesian analysis on selection variables in models of the determinants of changes in the quality of television production. (Base model priors and standard deviations used in main models)**

<b>Gamma Variables</b>	<b>All models</b>		<b>Beliefs about accuracy</b>		<b>Beliefs about creativity</b>		<b>Beliefs about technical stands</b>	
	<b>Prior mean</b>	<b>Prior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>	<b>Posterior mean</b>	<b>Posterior SD</b>
ONE	0	5	0.479	0.095	0.504	0.098	0.483	0.097
Sex	-0.2	0.1	-0.091	0.094	-0.090	0.084	-0.067	0.092
Degree	0.05	0.1	0.037	0.088	0.041	0.088	0.035	0.081
Age at wave 1								
30-39	0.05	0.05	0.037	0.046	0.026	0.050	0.036	0.048
40-49	0.08	0.05	0.122	0.046	0.129	0.047	0.122	0.048
50-59	0.1	0.05	0.113	0.047	0.127	0.052	0.112	0.049
Widowed	0	0.2	-0.121	0.172	0.057	0.162	-0.031	0.184
Lives London at Wave 1	-0.8	0.5	-0.032	0.166	-0.094	0.163	-0.023	0.167
Broadcasting	0.05	0.1	0.156	0.093	0.170	0.088	0.190	0.087
N			447		447		447	

**Table A3. Results of Bayesian analysis on models of the determinants of changes in the quality of television production after allowing for selection effects of attrition. (Base model priors and standard deviations used.)**

Variable	All models		Beliefs about quality		Beliefs about quality per £		Beliefs about ethical stands	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD
Below rate	-1.0	0.3	-0.718	0.247	-0.751	0.287	-0.868	0.272
Low skill	-0.4	0.2	-0.363	0.187	-0.359	0.196	-0.415	0.175
Above rate	1.0	0.3	0.734	0.259	0.793	0.250	0.838	0.241
Training	0.2	0.2	0.261	0.191	0.307	0.196	0.289	0.180
Income	0.5	0.3	0.115	0.078	0.236	0.118	0.136	0.085
Low budget	-0.6	0.4	-0.203	0.312	-0.187	0.316	-0.353	0.320
Compromise	-1.0	0.3	-0.608	0.234	-0.908	0.249	-1.010	0.271
<b>Importance of</b>								
Creativity	-0.2	0.4	-0.095	0.077	0.098	0.123	-0.134	0.106
Trust	-0.2	0.4					-0.268	0.231
Competitiveness	0.2	0.4	0.232	0.129	0.179	0.184	0.261	0.158
Stolen ideas	-1.0	0.3					-0.768	0.245
<b>Characteristics</b>								
Gender /male	-0.1	0.5	-0.179	0.317	-0.057	0.378	-0.305	0.366
Age 30s	-0.2	0.1	-0.162	0.095	-0.207	0.109	-0.197	0.088
Age 40s	-0.4	0.2	-0.416	0.168	-0.318	0.206	-0.321	0.191
Age 50s	-0.6	0.2	-0.796	0.190	-0.641	0.197	-0.676	0.203
Freelance	-0.4	0.2	-0.289	0.162	-0.409	0.200	-0.213	0.168
IndependentCo owner	0.0	0.2	-0.040	0.205	0.078	0.178	-0.141	0.216
Broadcasting	-0.4	0.4	-0.163	0.266	-0.574	0.329	-0.140	0.309
Long hours	-0.4	0.4	-0.294	0.283	-0.467	0.292	-0.350	0.302
No hours	-0.2	0.3	-0.001	0.274	-0.098	0.292	-0.058	0.268
London	-0.3	0.5	-0.091	0.279	-0.197	0.378	-0.298	0.348

Variable	All models		Beliefs about quality		Beliefs about quality per £		Beliefs about ethical stands	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	
Producer	0	0.4	-0.562	0.295	-0.160	0.356	-0.022	0.298
support	-0.2	0.4	-0.073	0.296	-0.245	0.359	-0.009	0.317
Post production	0	0.4	-0.076	0.306	-0.253	0.337	-0.294	0.368
manager	0.2	0.4	-0.035	0.371	0.196	0.377	0.399	0.326
Number of observations			316		316		316	
nu	0	5	1.439	0.634	2.681	0.687	-1.854	1.167

**Table A3 continued. Results of Bayesian analysis on models of the determinants of changes in the quality of television production.**

Variable	All models		Beliefs about accuracy		Beliefs about creative standards		Beliefs about technical standards	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD
Below rate	-1.0	0.3	-0.841	0.271	-0.753	0.267	-0.834	0.260
Low skill	-0.4	0.2	-0.456	0.188	-0.471	0.190	-0.454	0.202
Above rate	1.0	0.3	0.669	0.241	0.751	0.253	0.490	0.261
Training	0.2	0.2	0.353	0.200	0.178	0.184	0.146	0.191
Income	0.5	0.3	0.038	0.072	0.131	0.077	-0.023	0.088
Low budget	-0.6	0.4	-0.343	0.356	-0.277	0.313	-0.225	0.309
Compromise	-1.0	0.3	-0.881	0.252	-0.704	0.239	-0.715	0.236
<b>Importance of</b>								
Creativity	-0.2	0.4	-0.178	0.091	-0.053	0.083	-0.061	0.095
Trust	-0.2	0.4	-0.016	0.180				
Time	-0.2	0.4					-0.210	0.178
Competitiveness	0.2	0.4	0.316	0.149	0.299	0.147	0.367	0.148
Stolen ideas	-1.0	0.3	-0.537	0.285	-0.432	0.252		
<b>Characteristics</b>								
Gender /male	-0.1	0.5	-0.160	0.306	-0.540	0.327	-0.301	0.343
Age 30s	-0.2	0.1	-0.207	0.090	-0.194	0.105	-0.201	0.103
Age 40s	-0.4	0.2	-0.365	0.175	-0.411	0.164	-0.287	0.186
Age 50s	-0.6	0.2	-0.676	0.172	-0.603	0.171	-0.605	0.196
Freelance	-0.4	0.2	-0.311	0.185	-0.401	0.164	-0.327	0.175
IndependentCo owner	0.0	0.2	-0.081	0.171	-0.054	0.204	0.039	0.201
Broadcasting	-0.4	0.4	-0.145	0.258	-0.011	0.325	-0.724	0.283
Long hours	-0.4	0.4	-0.315	0.277	-0.094	0.294	-0.280	0.304
No hours	-0.2	0.3	-0.217	0.243	0.034	0.267	-0.045	0.262



Variable	All models		Beliefs about accuracy		Beliefs about creative standards		Beliefs about technical standards	
	Prior mean	Prior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD	Posterior mean	Posterior SD
London	-0.3	0.5	-0.258	0.307	-0.361	0.317	-0.605	0.324
Producer	0	0.4	0.242	0.250	-0.350	0.277	0.003	0.296
support	-0.2	0.4	0.035	0.299	0.103	0.345	-0.117	0.362
Post production	0	0.4	0.192	0.339	-0.019	0.310	-0.205	0.326
manager	0.2	0.4	0.199	0.367	0.034	0.363	0.396	0.387
Number of observations			316		316		316	
Nu	0	5	1.607	0.581	1.981	0.402	2.185	0.921

## Notes

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- <sup>i</sup> There is problem of terminology here. Economists would normally expect the production worker to be described as the producer or seller of a good. In television, 'producer' has a specific meaning which would create ambiguity if used here. The more cumbersome term, production worker is used to avoid confusion.
- <sup>ii</sup> Murrioni and Irvine's four categories are the consumer view; the producer view; the manager view; and the curator view.
- <sup>iii</sup> An earlier version of this paper also included an empirical examination of the third issue, selection processes relevant to workers changing their jobs. Colleague readers of this earlier version of our paper suggested it was too long and over complicated. We decided, therefore, to cut out this additional discussion and analysis.
- <sup>iv</sup> Another implication of this signalling problem which Weiss points out is that there can be job queues but no decline in wages.
- <sup>v</sup> This shift was evident in the panel survey findings,. However these results have been removed from this paper due to overload of material.
- <sup>vi</sup> Human capital theory would also make this prediction for periods of unemployment.
- <sup>vii</sup> There is evidence to support these expectations from these data. The results have been removed from the paper due to overload.
- <sup>viii</sup> Some of these written comments are reproduced in Dex and Sheppard (1999).
- <sup>ix</sup> See for example, Raiser et al (1999).
- <sup>x</sup> The beliefs about quality variables were correlated to varying degrees although most correlations were less than 0.3. These 6 variables were also passed through a Factor Analysis which produced two factors with eigenvalues values greater than one. These two findings suggests it may, in future, be worth estimating a MIMAC model, of a potentially unobservable factor 'quality of TV programmes', which would allow for the correlations between the variables to be recognised and modelled.
- <sup>xi</sup> The variables measuring standards of accuracy and ethical standards had a correlation coefficient of 0.53 which was very much larger than correlations between other quality variables.
- <sup>xii</sup> Copies of programmes written to do this estimation are available from the authors on request.
- <sup>xiii</sup> Experiences of above or below market wage rates and low budget programmes were only observed at earlier waves and might omit some individuals' experiences therefore. Given that the period gap is only 18 months we do not think that it is likely to introduce large or serious measurement error.
- <sup>xiv</sup> The constant independent variable was eliminated in the first set of base models and instead the thetas allowed to vary.
- <sup>xv</sup> Other transformation measures of this variable were tried without any substantial changes in the findings; for example the mid points of the bands were used with an arbitrary upper value included for the open ended top band.
- <sup>xvi</sup> Greene has included such a model with selection in LIMDEP (Version 6) saying that he was unaware of any published reference on this variant of the ordered probability model. The authors were unable to obtain any results from Greene's model using this data set.
- <sup>xvii</sup> Hard copies of the programmes, as previously, are available on request from the authors.
- <sup>xviii</sup> There was initial uncertainty about the appropriate value to set  $s_v$  to. We attempted to measure  $P(\text{data}|\text{model}, s_v)$  but the range over which this parameter varied as  $s_v$  varied from 0 to 1 was so small, compared with the errors in estimation (around 2 nepers) that no clear optimum for  $s_v$  could be identified. We therefore report the coefficients for models with  $s_v=0$  (no selection effects) and  $s_v=1$  (in the model with selection effects) only.
- <sup>xix</sup> Sensitivity analyses on the selection model prior standard deviations were also carried out. Both the standard deviations of the selection variables and those in the main models were widened five fold, as before. In the case of the selection variables, there was little change in the main conclusions. The posterior means and standard deviations in the main model exhibited similar effects from carrying out these changes on the models without selection noted earlier in the text. Widening the standard deviations was associated with the reduction in size of the posterior means and standard deviations, away from their prior values, but goodness of fit effects indicating far less satisfactory models (Table 2). The importance of being a Producer for thinking quality had declined was also evident, as earlier, in the posterior results.