

**PRINCIPAL-AGENT MODELING, LEARNING AND SCIENTIFIC ADVICE:
THE EUROPEAN COMMISSION AND AGRICULTURAL HORMONE
GROWTH PROMOTERS**

Principal agent modeling has become an influential way of thinking about policy making and implementation in a wide range of contexts, including policy-making involving governments and scientific experts. This article argues that decision-maker ‘principals’ can *learn* and develop institutions to overcome some of the threats of adverse selection and moral hazard in using scientist ‘agents’ as expert advisors. These learning processes have been evident in European Union policy-making regarding the use of hormone growth promoters in recent years. The findings illustrate that while policy-makers can be more influential on policy outcomes than simple principal-agent models suggest, the case illustrates that principals will not always have direct control over the learning process. Specifically, extended agency accounts must be alert to the exogenous sources of learning that might be at work and to non-learning factors that may enable and inhibit learning.

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INTRODUCTION

Principal-agent modeling has been increasingly used to model relationships in many areas, including those between government decision-makers and scientists (Braun 1993; Braun and Guston, 2003; Guston 1996, 2003). The modelling approach offers a useful ‘organizing perspective’ (Braun and Guston, 2003: 303) containing key features of the procurement of knowledge and management of expert scientific advisory groups. The first part of this paper sets out the principal agent modelling approach and the ‘learning’ extension to the model. The usefulness of these models requires empirical investigation; part two of this paper deploys the revised model in the context of European Commission policy-making about agricultural hormone growth promoters. Part three draws conclusions about learning and the potential relevance of the findings to other areas of policy making with similar contexts.

PART 1: PRINCIPAL-AGENT MODELLING OF SCIENTIFIC POLICY-MAKING AND ‘LEARNING’ PROCESSES

Decision-makers’ situation in procuring expert scientific advice seems closely related to the models of principal-agent theory. The simple models consist of a principal and an agent acting for the principal. The relationship involves information asymmetry, with the agent having information that is not available to the principal, and goal conflict such that the agent cannot be assumed always to act in the principal’s best interests. These features of the relationship are associated with a difficulty of writing contracts that get the agent to behave in ways that are consistent with the interests of the principal. The resulting types of behaviour include ‘adverse selection’ where an agent is chosen that is not that most beneficial to the principal because of concealed information about the agent’s characteristics, and ‘moral hazard’ by the agent not pursuing the principal’s interest.

The literature on principal-agent models developed in economics where a particular concern was how to create incentives for agents that did not want to bear the risk that would be necessary in a contract that would successfully align the interests of a principal and agent. For example, in the insurance industry, assuming an absence of full monitoring of behaviour by the insurer (the principal in this case), the person taking out insurance cannot easily be encouraged to drive carefully to avoid accidents unless the agent is made to bear some of the cost of the accident (Spence and Zeckhauser, 1971). However, it is exactly to avoid this risk that risk-averse agents often undertake to get themselves insured in the first place.

The bearing of risk from policy outcomes, and issue of formal delegation, which have formed the focus of much other work in principal-agent analysis (Miller, 2005), are less directly applicable to expert scientific advice in policy-making than in many other contexts. However, the central tenets of principal-agent modelling and problems of adverse selection and moral hazard appear highly relevant. Clearly, scientific experts possess an informational advantage and procuring scientific or other information in its essence entails a high level of uncertainty for decision-makers (Stiglitz, 2000: 1448-9). When they procure advice in all cases decision-makers take a step in the dark. Nor can decision-makers assume that experts share the same values and goals. Where goal conflict does exist, experts may seek to exploit their informational advantage to obtain outcomes favourable to their own interests which may not be the same as the government decision-makers’ interests. Scientists cannot be dismissed as disinterested

actors. The sociology of science's constructivist literature has produced a huge corpus of work attesting to the normative and political values that influence knowledge creation and research interpretation (notably Barnes and Edge, 1982; Knorr-Cetina and Mulkay, 1983; Latour and Woolgar, 1986). In the language of agency theory, the experts who advise governments are 'residual claimants' (Coase, 1937). They stand to profit or bear the losses from policy decisions made in their area of expertise and often have policy projects of their own to promote which may bring them into conflict with the decision-makers that seek their counsel.

The simple model obviously has limitations as a characterization of most empirical circumstances but may have the capacity to capture the key parts of relationships that help understand the structures and outcomes of scientific policy making. In particular, it may characterize cases of policy legitimation where decision-makers have already decided what they want but need to have scientific validation of their position in order to bring about acceptance of the policy in the broader community affected by the policy. This context is specific, and its prevalence in scientific policy-making is a matter for empirical investigation, but it would seem to be potentially very relevant for principal-agent modeling issues of adverse selection and moral hazard with scientists selected who do not support the policy position and/or whose behaviour once appointed is not that desired by the principal. Here selecting the 'right' experts – i.e. whose preferences are aligned with those held by decision-makers – is critical.

The model is evaluated empirically in this paper alongside an extended model incorporating 'learning' about the relationship and negotiation by principal and agent. The extent to which decision-makers learn how to select and manage experts is informed by two aspects of the literature on learning – the conceptualisation of the *sources* of learning as endogenous or exogenous (Howlett and Ramesh, 2003) and Peter May's (1992) three-fold categorization of *learning types*.

Simply stated, learning concerns enhanced understanding. The results can be both positive and negative: decision-makers can learn what to do and also what not to do (Rose, 1991, 1993). Policy change is the *prima facie* indicator of learning where this ranges from the fundamental re-appraisal of policy goals to minor adaptation or re-framing of policy instruments.

To produce a learning sensitive account of decision-makers' relationship with their expert advisors, the assumption of traditional agency theory that information asymmetries and goal conflicts are fixed must be relaxed. Following the extended agency model articulated by Waterman and Meier (1998), this article treats these as dynamic variables. This approach also relaxes the unitary actor assumption situating relationships between principals and agents beyond a dyadic structure in their wider temporal and social contexts. By erasing the artificial boundary between the decision-makers and experts on the one hand and the wider temporal context and the rest of the socio-political world on the other we can highlight the processes that feedback affecting actors' actions (Majone, 1989: chapter 5; Williamson, 1993).

This approach exposes analysis to the possibility that decision-makers might learn to procure the 'right' advice. This article examines two aspects of learning. The first of these concerns the *sources* of learning and how much control decision-makers have over the learning process. Decision-makers are exposed to a wide range of potential

sources of learning and motivations for learning. Howlett and Ramesh (2003) summarise this aspect of the learning literature using a simple categorisation of learning as endogenous and exogenous.

Endogenous learning originates with decision-makers in the formal policy process. Here decision-makers' make deliberate and voluntary efforts to learn. Lessons are drawn from policy successes and failures they experience or observe and from updates in the information surrounding an issue. While endogenous learning is intentional, decision-makers' rationality is bounded – as such the process of learning here can be incremental (Braybrooke and Lindblom, 1963; Wildavsky, 1979: chapter 2) or systematic (Rose, 1991).

Changes in the external environment can also stimulate learning or coerce policy transfer¹ (Dolowitz and Marsh, 1996; Hecl, 1974: 305-6). Here policy adaptation is driven by decision-makers' responses to stochastic events that are not of their making. This learning is exogenous and, while decision-makers' ability to act is not nullified, their control is much reduced and learning can be unintended. Indeed, when it is direct, external coercion to learn leaves decision-makers' autonomy fundamentally compromised (Dolowitz and Marsh, 1996: 437-8). Thus, the logic underscoring exogenous learning is reactive; garbage can as opposed to conscious reflection.

As well as exploring the sources of feedback and to extent to which decision-makers draw lessons themselves or have learning imposed upon them, this article is also concerned with the *types* of learning that can be identified in the procurement and organization of expert advice. Different interpretations of policy learning abound². The aim of this article is to capture the different forms of learning that may reduce information asymmetries and help decision-makers uncover and manage goal conflicts. Peter May's (1992) conceptualisation of learning makes a convincing claim to mutual exclusivity and joint exhaustiveness. Certainly, May includes the types that recur most frequently in the literature and as such these form the focus of attention here. Two main categories of learning are identified: policy learning – where this can be social and instrumental – and political learning. These concepts are expanded and their relevance for the procurement of advice is outlined below.

- (1) *Policy learning as social learning* concerns what decision-makers discover about the substantive attributes of a policy. Here social interaction between policy actors allows decision-makers to clarify the causal logic underpinning their policy goals. The resulting boost in cognitive capacities enables decision-makers to revisit policy construction and adjust or reaffirm their objectives (May, 1992: 338). Where social learning is endogenous we would expect decision-makers to be integral to the production or affirmation of a discourse (for example, Jabko, 1999). For example, decision-makers may acquire additional policy information through oversight of their experts. In its exogenous form, decision-makers are reliant upon discourses developed in society (Hall, 1993), policy subsystems, other parts of government or other

¹ See James and Lodge (2003) for a critique on the limitations of the policy transfer concept.

² Early management-oriented accounts of organizational learning (Argyris, 1976; Argyris and Schön, 1978; Simon, 1957) have given way to studies examining the impact of social interaction and the power of ideas in enhancing governments' understanding of policy (Hall, 1993; Lindblom, 1990; Sabatier, 1988; Stone, 1985).

governments that uncover information previously unknown to them or hidden by their advisors (Waterman and Meier, 1998: 184).

- (2) *Policy learning as instrumental learning* concerns the viability of policy design or implementation. Where this is endogenous, decision-makers can draw lessons about policy tools from past failures they have experienced or experienced by others. For example, this might take the form of a formal appraisal of how a scientific group is monitored. (May, 1992: 337). In its exogenous form, decision-makers may be forced to change how they select or monitor advisors as a result of standards imposed at the international level.
- (3) *Political learning* is learning how to advance an idea effectively by shifting the boundaries of what is politically feasible, or as Hood puts it learning what can be 'got away with' (1996: 68). This logic can be easily related to procuring expertise for policy legitimization where the importance of political palatability of advisory relationships cannot be overstated. Decision-makers must know *who* it is politically acceptable to take advice from and *when* it is politically possible to attempt policy legitimization. For political learning to be endogenous opportunities for strategic action must be carved out by decision-makers. Where decision-makers have seized upon favourable political conditions to enhance a policy's prospects learning is exogenous.

PART TWO: THE EUROPEAN COMMISSION AND PROCURING ADVICE ON HORMONE GROWTH PROMOTERS

The important role played by experts in European Union (EU) policy-making has been well documented (see Radaelli, 1999 for a conceptual framework on different modes of the politics of expertise). This expertise takes various forms – ranging from advocacy coalitions and epistemic communities that lobby EU institutions to scientific advisory committees and ad hoc expert groups that are set-up (and terminated) by the European Commission (CEU) itself. Considerable attention has been paid to networks of experts (for example Zito, 2001), while the ascendancy of institutionalised 'informal' modes of expert governance is only now being reflected in the academic literature (Christiansen and Kirchner, 2000; Christiansen and Larsson, 2007; Larsson, 2003). Despite the increased interest in EU committee governance in general and expert enclaves in particular, information about the Commission's 800 plus ad hoc expert groups remains scarce. With around half the Commission's expert groups estimated to be of the ad hoc variety (Larsson, 2003: 15) empirical evidence is clearly required³.

Decision-makers, in the EU and beyond, assemble expert groups for a variety of reasons some more political than others (see Larsson, 2003: 84-88 for a fuller discussion). Where information overload or an issue's novelty or complexity prevents decision-makers identifying their policy preferences, decision-makers may be driven by an 'information motive' (Letterie and Swank, 1997). Here the substantive information experts provide enlightens decision-makers as to the consequences of

³ In 1999, an internal Commission document estimated that there were nearly 800 expert committees and groups on the Commission's books (cited in Rhinard, 2000). When dormant committees and sub-groups are factored in this figure rises further. Larsson found that 851 expert groups and committees were accompanied by 501 sub-groups pushing the total figure over 1200 (2003: 15, 2007: 35).

particular courses of action and so helps them de-limit their choices and clarify their interests (Weiss, 1977). In the European Commission, such advisory groups are usually found upstream in the policy process contributing to policy initiation and agenda-setting. With no policy preference established, experts' interactions with decision-makers are marked by informality often characterized by a blue skies or 'brain-storming' logic (Larsson, 2003: 21). For the information motive to be satisfied, decision-makers must gather a wide range of opinions and cast their net wide when selecting experts.

By contrast, experts can also be required to 'bolster' (Calvert, 1985) pre-determined policy preferences. This is particularly common where issues are marked by distributional consequences that put pressure on decision-makers to negotiate high levels of conflict in order to deliver policy commitments to favoured groups or to justify themselves to losing constituencies. Where advice is procured to satisfy this 'persuasion motive' (Letterie and Swank, 1997), expert groups exist as much for 'politics sake' as they do for policy. Advisors' knowledge and professional credentials become transformed into political tools that decision-makers can use to shut down unfavourable policy options, to lend credibility to their policy commitments or to 'de-politicize' an issue by framing a political preference in the most technical manner possible (Larsson, 2003: 22). Such activity occurs further downstream in the policy process where experts assist in the formulation and implementation of policies that legitimate pre-determined political preferences. Here selecting the 'right' experts – i.e. whose preferences are aligned with those held by decision-makers – is critical. While the Commission's prerogative ensures it can ignore a group of experts that are unwilling to sponsor a political initiative they risk the credibility of their policy if they take this course of action.

Policy learning and re-design are more likely to occur where a trigger can be identified (May, 1992). Hormone growth promoters is a good case for assessing the relevance of learning for principal-agent accounts of policy-making because it is a case that started with failure. While the article makes no assumption that decision-makers did learn, the refusal of the first advisory committee to support the EU's policy stance may have cajoled decision-makers into new patterns of thinking about how to secure scientific backing for their ban.

Analysis follows a 'process-tracing' approach (Berman, 2001; George, 1997) with actors' perceptions of how a procurement failure was transformed into a success identified through interviews conducted with decision-makers and members of the two scientific groups⁴. This is accompanied by the customary analysis of documentary evidence – predominately scientific reports, legislation, internal reports and government publications.

The 'hormones saga' (as it was known in Brussels) was not a short-lived affair – surfacing first in the late 1970s and continuing until the turn of the century. This longevity is the result of the European Commission's struggle to procure scientific evidence and experts that would justify the ban on public health grounds. The fact that the story has not been widely documented and has not been analyzed in terms of the political procurement of advice makes the synopsis that follows unavoidable and

⁴ 38 semi-structured interviews were conducted with active and retired scientists, civil servants, politicians and interest group actors. In most cases anonymity was requested.

advisable⁵. In 1981, the EU harmonized legislation to outlaw the administration of the synthetic estrogen and known carcinogen diethylstilbestrol (DES). This discovery had been triggered by high profile health scares in Italy where cases of breast growth (gynaecomastia) had been discovered in babies and pre-pubertal children after consuming food allegedly containing DES residues. The carcinogenic effects of DES had been known since the early 1970s (Bridges and Bridges, 2001: 149) and other growth promoting compounds had been developed as safe alternatives to speed up the production of meat ready for market⁶. While these were believed to be safe, DG Agriculture also moved to ban all other hormones used for non-therapeutic purposes.

The 'push' factors behind this comprehensive approach were two-fold. First, the consumer reaction in the Community to the DES scare had pushed the veal market to the brink of collapse. Second, the DES crisis opened a window of opportunity that allowed the Community to prohibit production aids that were increasing production in an already over-stocked sector of European agriculture. The ban was put on hold following interventions from the three member states⁷ (where the use of growth promoters was most prevalent) that as a barrier to intra-Community trade any ban would have to be supported by scientific evidence of a threat to human health.

In 1982, DG Agriculture assembled an expert advisory group to investigate the safety of five hormones in question. This first expert advisory group – the 'Scientific Group on Anabolic Agents in Animal Production' – was unwilling to bolster the EU's policy stance. In fact, the evidence created by this group formed the basis of an international scientific consensus that hormone-reared beef was safe for humans when used under 'appropriate conditions' (JECFA, 1988, 1999; Lamming, 1983). Nonetheless, a ban was introduced and depicted as a measure supported by the science on hormones: 'the assessments of their effects on human health vary' (Commission, 1988: 17)⁸.

When this was extended to the import of hormone-reared beef products the US was swift to impose retaliatory measures⁹. In 1997, the ban was deemed incompatible with the EU's international obligations under the Sanitary and Phytosanitary Measures (SPS) Agreement to justify a higher level of protection with scientific risk assessment (SPS Article 5.1). An unexpected concession was made however. In January 1998, the WTO Appellate Body (AB) accepted that the Community's use of a 'precautionary approach' had been an 'act of good faith' (WTO/AB 1998: paragraph 194). With this ruling came an opportunity to provide a new scientific risk assessment the Directorate for Consumer Protection and Public Health – DG Sanco – assembled a new advisory group. Though the consensus on safety still held internationally, this group produced a scientific report bolstering the EU's precautionary interpretation concluding that all the hormones in question posed unacceptable risks to consumer health. Scientific advisors have twice reaffirmed this stance (in May 2000 and April 2002) in response to contrary scientific opinions from the UK Veterinary Products Committee (VPC) and the international Codex Alimentarius.

⁵ See Peterson (1988) for an account up to 1988 and Princen (2004) for an analysis of the trade dispute.

⁶ These were three naturally occurring or endogenous hormones – 17 β -estradiol; progesterone; testosterone and two exogenous, synthetic compounds – trenbolone acetate and zeranol.

⁷ Belgium, Ireland and the UK.

⁸ The December 1985 directive – 85/649/EEC – was annulled by the European Court of Justice on technical grounds. The ban was re-instated in 1988 with directive 88/146/EEC.

⁹ The US imposed a 100% *ad valorem* duty on goods to the value of EUR 93 million. Unilateral action was exercised under the so-called '301 law'. This allows the US Trade Representative to impose sanctions in a trade dispute for a value equivalent to what it is estimated a producer has lost.

The change in the way the scientific advice was procured and incorporated in this case cannot be explained by any major epistemic developments unrelated to an enhanced understanding of the principal-agent relationship. Indeed, the international scientific consensus created by the first advisory group remained intact on all but one of the growth promoters¹⁰. So what enabled the decision-makers of DG Sanco to procure advice so successfully?

Analysis of decision-makers' behaviour and the role of learning about principal-agent relationships in the case is guided by four sets of analytical questions. The first simply concerns the extent to which learning can be identified as a major factor behind an adaptation in approach. Here we must take into account the role of non-learning or 'haphazard' events (May, 1992: 339) that may have mediated the procurement of advice. The second concerns the *sources* of learning. The exact definition of endogenous learning used here requires specification. Endogenous learning is defined as that which originated or can be seen to be controlled by the Commission decision-makers of DG Agriculture or DG Sanco. The reason for this narrow definition lies in Commission officials' sole prerogative to select and manage the expert groups and committees that advise them. To what extent can the eventual successful procurement of advice be credited to Commission decision-makers alone? How did decision-makers use past experiences and new information to actively reduce information asymmetries and anticipate goal conflicts? To what extent were decision-makers dependent upon external forces in their ability to change the nature of the policy advice they procure? The third aspect of analysis on *types* of learning which enabled decision-makers to reduce information asymmetries and goal conflict aims to identify the contributions made by each type of policy learning and the extent to which any one type may have been more influential than the others. While none of these learning types need to be related to another (May, 1992: 340) an extension from one to another is easy to imagine. For example, in Radaelli's (1999) analysis of the politics of expertise in relation to EMU, the Delors' Commission's ability to execute a political manoeuvre and advance their policy goal relied upon the cognitive dimension monetary union having been worked out in advance. Can any patterns be identified where one type of learning is associated with one of the three collective action challenges more than the others?

Finally, analysis will identify *any scope conditions or barriers to learning*. This concerns factors that enable or inhibit learning itself and also those that facilitate and frustrate decision-makers' attempts to *translate* enhanced understandings into concrete and effective action. For example, it has been suggested that issue complexity and high political salience can lead decision-makers to filter information through their existing 'mental maps' (Argyris and Schön, 1978; Denzau and North, 1994). The pace of knowledge production and supply of sympathetic experts has also been shown to have an important say over when lessons can be cashed out (Dunlop, 2007). Such blocks mean that, even in the face of failure, enhanced understandings do not always translate into effective action.

The case study exhibited three key features of learning about the principal agent relationship, with modifications to institutional structures resulting from policy-

¹⁰ 17 β -estradiol has been accepted by scientists internationally to be a complete carcinogen.

makers experiences. First, decision-makers recognised that they were involved in non-hierarchical relationships, second, decision-makers had the ability to reduce the possibility of adverse selection, and third, decision-makers used management techniques to avoid moral hazard.

1. Decision-makers' recognition of the principal-agent problem

To maximise the chances of procuring the right advice, decision-makers must recognise the non-hierarchical potential of their relationship with scientists. Without clear parameters, decision-makers may lose control of their expert groups. DG Agriculture's relationship with the first growth promoter advisory group was marked by such a loss of control.

The reasons for this are two-fold. First, this relationship illustrates the threat posed by decision-makers' established 'mental maps' (Denzau and North, 1994) in the procurement of advice for policy legitimation. Officials lacked experience in procuring evidence *after* the policy decision had already been made. The bulk of DG Agriculture's scientific committees were located in the agenda-setting phases of an issue where policy enlightenment is the order of the day and few restrictions need to be placed upon advisors. By replicating these usual rules of engagement downstream in the policy process, officials ceded control of the issue.

Second, decision-makers' understanding of their policy preferences ran ahead of their understanding of the issue itself. Specifically, DG Agriculture officials did not appreciate that they were asking scientists to give advice on what was essentially a 'trans-scientific' issue (Weinberg, 1972). The move to ban was not motivated by a belief that hormone administration was unsafe in absolute terms but rather by the concern that the *possibility* of hormone misuse and uncertainty about the health implications of long-term residue consumption would fundamentally weaken consumer confidence in Community beef (Commission, 1980). While such questions can be expressed in a manner 'isomorphic with questions answerable by science' they require that judgements be made about what is acceptable risk and as such are essentially beyond the capacity of scientists to answer (Weinberg, 1988: 124). When these questions of risk management are posed to scientists, decision-makers should expect value judgements to enter scientific discourse (Weinberg, 1988: 124).

To receive knowledge that can be used to legitimate policy choices in trans-scientific dilemmas, decision-makers must direct their scientists' toward the risks that they need to be assessed and retain responsibility for the management decisions to be made. In the first call for scientific advice on growth promoters, rather than steer advisors toward the implications of maladministration and long-term impact, DG Agriculture officials framed the question it posed to its scientific advisory group in a general way that it belied the issue's inherent uncertainty¹¹. Control of the focus and method of risk assessment was placed firmly in the hands of the scientists. The result was research into the safety of hormones that was underpinned by a presumption that farmers were adhering to the recommended hormone dosage level. With no restrictions placed upon their role in risk management, the scientists used empirical criteria to establish what the Community should take as acceptable risk. They recommended that, as long as established animal husbandry practices were enforced,

¹¹ It asked: '[D]oes the use for fattening purposes in animals of the following substances: estradiol-17 β , testosterone, progesterone, trenbolone acetate and zeranol present any harmful effects to humans?' (Lamming, 1983).

the use of growth promoters would be laboratory safe and no blanket ban was required.

By contrast, decision-makers in DG Sanco maintained tight control over knowledge production. Officials commissioned a series of scientific studies on risks associated with growth promoter use in the real world and exceptional cases – research themes included the impact of long-term exposure, alternative analytical techniques, multiple hormone implantation, abuse and control issues, vulnerable populations (e.g. opposite sex twins) and the impact of hormone use on the environment (Commission, 1999). This enhanced control over risk assessment was the result of social learning generated by the European Parliament in the 1980s. The Agriculture and Environment Committees (EP, 1988a, 1988b) and the Committee of Inquiry into the Problem of Quality in the Meat Sector (EP, 1989) had consulted scientists, producer associations and officials from other governments to develop a view on the unknown risks growth promoters posed. This exogenous social learning gave DG Sanco officials ‘private information’ (Maskin and Tirole, 1990) which they drew upon to ‘get [them] up to speed’ with the issue (interview) and to ensure that the research commissioned was that most useful to their policy goal. Accordingly, the scientists were mandated to offer risk assessments on ‘the *potential* for adverse effects to human health arising from administration of the six hormones used individually or in combinations for animal growth promotion’ (Commission, 1999 emphasis added).

This expropriation of risk assessment was matched by DG Sanco’s assumption of full control over risk management. This clear demarcation of duties was again the result of exogenous learning. The BSE crisis was behind both these political and instrumental lessons. The parliament’s BSE Inquiry laid bare the extent to which scientific advisors had been able and expected to make political risk management decisions and specifically, the power exercised by UK scientists to push a policy of minimalist management that favoured their member state (EP, 1997: I.3 pt.8). This made it politically imperative that the Commission circumscribe the role of scientists in decision-making. This political learning enhanced understandings about policy instruments crystallizing the need to separate formally assessment and management (Commission, 1997: Part 3; EP, 1997).

2. Decision-makers’ reduction of the possibility of adverse selection

Analysis of cheap talk games tell us that efficiency is optimized and communication best where decision-makers select agents whose preferences match their own (Crawford and Sobel, 1982). Thus, to boost the chances of securing advice which will bolster their policy preferences, decision-makers require maximum information about their advisors’ values.

The appointment of the first growth promoters working group was a clear case of adverse selection. Inexperienced in dealing with politicized scientific issues downstream in the policy process and under pressure to act as quickly as possible, officials requested that scientists from its Scientific Veterinary Committee (SVC) assemble a short-life working group. With international experts on hormones already serving on this committee and further eminent specialists in the field invited to join, the scientific credibility of working group was assured.

However, officials remained in the dark as to goals carried by their advisors and how they would focus their efforts. The chairman understood his group's remit to be getting the science on growth promoters 'right in empirical terms' and translating this into policy (interview). This empiricist agenda was not deliberately hidden from decision-makers indeed the scientists took for granted that decision-makers would be aware of these goals (interview). However, the use of established contacts to assemble the working group and the absence of any formal selection procedures left officials with no opportunity to consciously engage with any signals that would reveal that their advisors held values that in practice could be incompatible with the Community's preference to prohibit.

The nucleus of the second working group was also comprised of scientists already advising DG Sanco or their member state administrations. However, the Scientific Committee on Veterinary Measures Related to Public Health (SCVPH) growth promoter sub-group, to give it its full title, was a *consciously* crafted advisory group. DG Sanco officials reduced the likelihood of any fundamental clash of values by interviewing prospective members and reviewing their work.

This scrutiny was the result of instrumental learning forced upon DG Sanco as a result of the EP's BSE Inquiry. DG Sanco was guided by the principle that decision-makers should have access to scientific evidence which focussed primarily on the concerns of consumers (Commission, 1997: 9). Following the BSE report, a strict vetting system was introduced to ensure experts' public health credentials were considered alongside their scientific ones. In such a system, scientists opposed to a precautionary approach on food safety would be unlikely either to be appointed or to offer their services in the first place.

Social learning was central to DG Sanco's ability to select appropriate scientists. The substantive and normative discourse that had developed in the wider European polity in the 1980s and 1990s as the result of successive food scares affirmed the need for experts to focus on unknown risks in food safety issues. This gave decision-makers a more *specific understanding* of the 'resource credentials' (Rhinard, 2002: 194) required from scientists (interview).

The composition of the growth promoter sub-group reflected this precautionary approach to scientific evidence gathering. Members were acutely aware of the context within which they were operating, as one member commented: 'I cannot think of any member ... unsupportive of what the Commission was trying to do with hormones, not after BSE' (interview). Accordingly, the group reviewed the evidence from a precautionary viewpoint placing risk in the 'real world context' where hormones were, export controls failed and humans have different levels of susceptibility (Commission, 1999). Through careful selection and signalling, DG Sanco had created 'an extension of itself' (Coleman, 1990 cited by Braun and Guston, 2003: 303). This alignment practically eliminated the risk that DG Sanco would receive advice which ran inimical to its policy agenda.

The threat of adverse selection also had an international dimension. The WTO AB's unexpected admission that scientists whose opinions diverged from the 'monolithic' evidence in the mainstream were legitimate contributors to the evidence on growth promoter safety was critical to DG Sanco's re-adoption of a scientific strategy. The

transfer of this political learning assured officials that it would be politically feasible to select members that held precautionary interpretations of the evidence on hormones.

Despite all three types of exogenous learning being represented here this does not necessarily mean that taken together these types of learning were enough to generate change. There is evidence to suggest that the additional non-learning factor of *institutional reorganization* played a critical role here and acted as a focal point around which learning could be made effective. In 1995, DG Agriculture initiated a conference on hormone growth promoters. Much had been learned in this directorate since the time of the first advisory committee. Officials were part of the discourse on a consumer-centred approach to food safety (Commission, 1990¹²) and were aware of the tools required to ensure the ‘right’ scientists contributed to the conference. Despite this enhanced understanding, DG Agriculture ceded control of the event’s organization to a committee of non-Commission scientists. The result was a conference dominated by scientists who endorsed the scientific consensus established by the first working group (Commission, 1996). Indeed, it was dismissed by one member of the second working group as little more than a ‘public acknowledgement that the first group had been badly treated’ (interview). This illustrates the extent to which organizational culture and historical baggage can act as significant blocks to the implementation of policy learning. The enhanced understanding of the policy and political dimensions to knowledge procurement could only be applied in a different institutional venue.

This institutional change may also have altered the supply of experts willing to advise the Community. Several of the DG Sanco scientists and officials interviewed noted that the scientific reorganization and greater transparency in selection had signalled a more inclusive approach to scientists that previously would not have been interested in participating in the advisory system.

3. Decision-makers’ use of management techniques to avoid moral hazard

In relationships with the potential for informational asymmetries and goal conflict, decision-makers must guard against opportunistic behaviour of their agents or ‘moral hazard’. This is commonly achieved through the use of incentives, monitoring systems and penalties.

Officials’ lack of awareness of the potential for goal conflict with their scientists made the threat of moral hazard very real from the outset. As has been outlined, DG Agriculture was content to follow their advisors’ lead with regard to who joined the group and how they conducted their research. Moreover, the working group was not subject to any systematic formal monitoring procedures rather, officials were to be ‘kept informed’ as the research progressed (interview).

As the political pressure in the Community mounted this ad hoc approach appeared increasingly inappropriate and the scientists were asked to produce an interim report. The report made explicit the scientists’ empirical agenda and their likely conclusions that hormones were safe (Lamming, 1983). DG Agriculture moved to ban growth

¹² DG Agriculture lent its support to the EP Environment Committee’s campaign for the introduction of a ‘4th hurdle’ – where socio-economic assessment criteria would be added to the usual scientific measures of safety, quality and efficacy for production aids such as growth promoters.

promoters in 1985 and in doing so it suspended the group's work. However, officials' attempts to stop the publication of the experts' report failed. With the penalties of breaching their confidentiality agreement ambiguous and the UK government giving the group chairman its backing to go public, sixteen of the group's twenty-two members presented the findings at the British Veterinary Association conference.

As the long-established international experts on growth promoters, the group's role as policy advisor was 'by the way' of the main business of paradigm building. The self-sufficiency of these advisors and in particular their commitment to an alternative 'principal' – laboratory based empirical risk assessment and to the wider scientific community – created externalities (Moe, 1987). The scientists' retaliation was damaging. It underlined the policy's lack of scientific legitimacy and provided the USA with valuable epistemic ammunition with which to challenge the ban internationally.

This case raises the possibility that the design of effective *ex ante* control mechanisms or *ex post* sanctions may be impossible where the 'wrong' advisors have been selected. The absence of any effective control mechanisms made it easier for scientists to shirk and their belief in the data gave them the motivation. However, the main drive behind the scientists' action was rooted in the nature of the group that had been assembled. As the leaders in the field, Lamming and his colleagues were building a scientific consensus and had reputations to protect. This made it impossible for DG Agriculture to salvage anything from the delegation. Dissemination for these scientists was 'non-negotiable' (interview) – to withhold data was an 'academic crime' which would have left the research process incomplete and the scientists appearing suspect.

DG Sanco's growth promoter sub-group produced its report on time and on message. Following the management principles established in the post-BSE reorganization, DG Sanco officials convened the group's meetings, drafted its minutes and controlled communication with the scientists regarding their EU business. This increased control over their working group was again the result of exogenous instrumental and political learning. The BSE Inquiry had been explicit that DG Agriculture's failure to apply the appropriate checks and balances in its management of the SVC had enabled UK scientists to convene and run meetings almost independently (EP, 1997).

While observing the post-BSE procedures, DG Sanco's monitoring of its working group was light touch (interview). Oversight of the advisors' progress was delegated to the main scientific committee on veterinary affairs relating to public health (SCVPH) which then reported back to officials in DG Sanco. The control that decision-makers had already established over its working group may have downgraded the importance of more 'hands-on' monitoring (see Brehms and Gates, 1999). Certainly, the selection of experts whose preferences were aligned with DG Sanco's ensured that the group had no reason to be unresponsive to decision-makers. In addition, the specific protocol which steered the group's work made slippage unlikely. This was also a highly efficient move; simultaneously externalizing monitoring costs and ensuring that group members felt politically 'untainted' (interview). Thus, learning in one collective action problem reduced the threat posed in another.

PART THREE: CONCLUSION

Extended principal-agent modelling of the relationship between European Commission decision-makers and their scientific advisors reveals that learning about the principal-agent relationship and how better to operate it was evident in policymaking about hormone growth promoters. This story of learning would not have been uncovered by traditional agency analysis. The findings not only confirm the need for such dynamic accounts of relationships underpinned by the principal-agent logic but also suggest that extended principal-agent models must be careful not to over-emphasise the control over learning they award to principals. While policy-makers may be more influential on policy outcomes, at lower cost to the principal, than simple principal-agent models suggest, extended accounts must be alert to the different sources of learning that might be at work and to non-learning factors that may enable and inhibit learning.

Specifically, the case illustrates that principals will not always have direct control over the learning process. Here, learning did not arise directly from the failure in the first procurement or from any endogenous lessons crafted by decision-makers but rather took exogenous forms. The account highlights the centrality of a single traumatic event – the BSE Inquiry – in activating the learning process. Thus, while DG Sanco officials’ used their prerogative to assemble the ‘right’ group of experts their success was heavily dependent upon this principal’s ability to react to events beyond their direct control. The findings also emphasize the interplay of all three learning types in helping decision-makers procure knowledge successfully. It seems unlikely that any of the three types of learning alone would have been sufficient to affect the adaptation in approach found in this case.

The findings also illustrate the importance of considering the interaction between learning and non-learning factors in extended agency analysis. Organizational culture and decision-makers’ cognitive short-cuts emerged as blocks to the application of enhanced understandings. Institutional reorganization to DG Sanco opened a window of opportunity to the learning process and altered the supply of scientists willing to advise decision-makers.

While the findings presented here are intimately related to the hormone growth promoter case, this analysis does have broader relevance for a wide range of policy issues and for analysts in the EU and beyond. Extended agency analysis offers a useful analytical tool with which to investigate advisory relationships in complex knowledge-dense issues. The learning perspective it entails fits the contemporary reality of the crowded policy space, where events unfold over time to cajole decision-makers into new patterns of thinking about how to update, implement and legitimate their policy choices.

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