On Executive Agency Systems

Keizo Mizuno', Nobuo Akai, Hiroshi Osano

Abstract

A public sector executive agency system induces a greater effort from an executive agent via an incentive payment scheme at the cost of public sector decentralization. We show that the level of revenue the agent obtains from a market determines the welfare superiority of executive agency systems relative to bureaucratic systems.

Keywords: Executive agency; Incentive payment scheme
JEL classification: H11; L32

Introduction

Radical public sector reform such as the introduction of an executive agency system, or privatization, has been a major controversial economic issue over the last two decades. While this wave of reforms began in the UK, the USA, and New Zealand, it has recently been extended to other countries. The UK government launched the Financial Management Initiative (FMI) in 1982. The FMI sought to promote an executive agency system in which authority and responsibility are delegated as far as possible to middle and junior public sector managers who are accountable for meeting their cost and performance targets. In Japan, the government introduced another type of executive agency system (the Independent Administration Corporation) in 2001 after reviewing the British experience. The main feature of these executive agency systems is the introduction of an incentive payment scheme for an executive agent.

In this short paper, we characterize executive agency systems and examine their benefits and costs. We then show that the main benefit of executive agency systems is to induce an appropriate level of

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1 The Corresponding Author:
Keizo Mizuno,
School of Business Administration, Kwansei Gakuen University,
1-1-55 Uegahara, Nishinomiya, Hyogo 662-8501, Japan.
Phone: 1-798-54-6181 Fax: 1-798-51-0903
Email: kmizuno@kwansei.ac.jp

2 See Minogue (1990) for the FMI system.
3 For the detailed features of the executive agency system in Japan, see Akai, Mizuno and Osano (2003).
4 Although no formal model has been constructed to discuss executive agency systems, our research is related to the literature on the scope or the authority of the firm like Grossman and Hart (1986), Hart and Moore (1990), and Aghion and Tirole (1997).
effort from an executive agent by the introduction of an incentive payment scheme, while it comes at the cost of public sector decentralization. In particular, when the revenue that the executive agent obtains from a market is extremely low or high, executive agency systems are superior to (traditional) bureaucratic systems from a welfare point of view.

2. The model

There are three active players in a political decision-making game: an executive agent, a parent department, and Parliament. As noted in section 1, the main feature of these executive agency systems is considered to be the introduction by Parliament of an incentive payment scheme for an executive agent.

An executive agent (A) has a utility function \( u^A = u^A(T - C(a)) \), where \( T \) is total revenue to the agent; \( T = py + S(y) \), where \( y \) is an observable output, \( p \) is the market price of the output, and \( S(y) \) is the incentive payment scheme. The number of participants in business seminars held at a university is an example of the observable output \( y \), if the executive agency system is applied to the higher education industry. \( C(a) \) represents the agent’s disutility incurred by implementing an unobservable effort \( a \). \( C'(a) > 0 \) and \( C''(a) > 0 \). We assume that the executive agent is risk averse, and the agent’s expected utility can be represented by the associated certainty equivalent \( CE^A \).

A parent department has a budget \( B \) to implement the activities \( b \) and \( d \). \( b \) is an activity related to the executive agent and \( d \) is the other. For simplicity, we assume that \( b + d = B \) and both \( b \) and \( d \) are publicly observable. To implement the activities, the parent department incurs a cost \( C'(b, d) \), where \( C''(b, d) > 0 \), \( C'''(b, d) > 0 \), \( C''''(b, d) > 0 \), and \( C''''''(b, d) > 0 \). The level of the cost \( C''(b, d) \) is observable, so that Parliament can reimburse it by using the transfer \( r \).

Parliament provides a linear incentive payment scheme \( S(y) = \alpha + \beta y \), where \( \alpha \) and \( \beta \) are constants, and \( y = f(a, b) + \varepsilon \). \( f(a, b) \) represents an unobservable outcome such as the quality of the goods sold, where \( f(a, b) = \begin{cases} 0, & f(a, b) < 0 \\ f(a, b), & f(a, b) > 0 \\ f(0, 0), & f(a, b) = 0 \end{cases} \), and \( \varepsilon \sim N(0, \sigma^2) \) is a random term. Note that the level of the outcome depends not only on the effort level exerted by the agent but also on the activity level allocated by the parent department. We assume \( f(a, b) > 0, f(a, b') > 0, f(a, b) > 0, f(a, b') > 0, f(0, 0) > 0 \).

For simplicity, the utility function of consumer groups is represented by \( u^1 = U'(f(a, b)) + V(d) - M \), where \( U'(\cdot) > 0, U''(\cdot) < 0, V'(\cdot) > 0, V''(\cdot) < 0, \) and \( M \) represents total expenditure paid by the consumers. We assume that consumers are risk neutral.

The timing of the game is as follows. In the first stage, Parliament offers the incentive payment scheme \( S(y) = \alpha + \beta y \) and the parent department allocates the budget between \( b \) and \( d \). In the second stage, after observing them, the executive agent implements an effort \( a \). Then, the uncertainty \( \varepsilon \) is realized, and \( S(y) \) is paid to the agent in the third stage.

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**The first-best allocation**

Before characterizing the equilibrium, let us prepare the first-best solution as a benchmark. We can define the first best as an environment where the executive agent’s effort is observable and controllable, and lump-sum transfers can be employed. The first-best problem is then stated as follows.

\[
\max_{a, b, d} W = U'(f(a, b)) + V(d) - B - C(a) - C''(b, d) \quad \text{s.t.} \quad b + d = B \tag{1}
\]

Note that because of the possibility of lump-sum transfers to the agent, the cost incurred by the agent’s risk-averse attitude does not appear in (1). The first-best solution is then characterized as follows.

\[
U'(f(a^*, b^*))f_a - C(a^*) = 0 \tag{2}
\]

\[
U'(f(a^*, b^*))f_b - V(B - b^*) - C''^* + C_d^* = 0 \tag{3}
\]

3. The equilibrium

3.1 The executive agent in the second stage

Given the incentive payment scheme \( S(y) = \alpha + \beta y \) and the budget allocation \( \{b, d\} \), the agent’s problem in the second stage is stated as follows.

\[
\max_a CE^A = \alpha + (\beta + p)'f(a, b) - C(a) - \frac{1}{2} r^2 (\beta + p)' \sigma \tag{4}
\]

where \( r^2 \) measures the agent’s absolute risk aversion. Note that the agent’s risk premium (the last term in (4)) depends not only on the coefficient of the incentive scheme but also on the market price.

We then immediately have the following first-order condition.

\[
(\beta + p)'f_a(a^*, b) = C'(a^*) \tag{5}
\]

where \( a^* = a(a, B, p) \) have the following properties.

\[
a_{a}^* \equiv \frac{\partial a^*}{\partial a} = \frac{1}{D}f_a \equiv \frac{\partial a^*}{\beta} \equiv a_1^* > 0 \quad \text{and} \quad a_{\beta}^* \equiv \frac{\partial a^*}{\partial \beta} = -\frac{1}{D} (\beta + p)'f_{ab} \geq 0, \tag{6}
\]

where \( D \equiv (\beta + p)'f_{ab} - C'(a) < 0 \). It is easily seen that \( a_{\beta}^* = a_{\beta p} = a_{\beta b} \).

3.2 Parliament and parent department in the first stage

In the first stage, Parliament and the parent department determine \( S(y) = \alpha + \beta y \) and \( \{b, d\} \), simultaneously and independently.

Consider the parent department’s problem. We assume that the parent department is concerned about the consumers’ benefits from the services it offers and the cost it incurs providing the services, with the certainty equivalent approach.
Given (6) and anticipating the incentive payment scheme offered by Parliament, the parent department solves the following problem:

\[
\max_{b^*, d^*} U(f(a^*, b^*)) + V(d) - \bar{B} - C^*(\beta, d) \quad \text{s.t. } b + d = \bar{B}
\]

(7)

Note that the parent department does not worry about individuals’ payments to the executive agent \( S(y) = a + By \). This can be a fault caused by a facade of the executive agency system, i.e., a decentralization of public sector governance. The solution is then found under the assumption of interior maximum.\(^1\)

\[
U'(f) \left[ f, \frac{\partial a^*}{\partial b} + b^* \right] - V'(\bar{B} - b^*) - C_{a}^* + C_{b}^* = 0
\]

(8)

Similarly, Parliament’s problem in the first stage is described as follows.

\[
\max_{(a, b)} U(f(a, b)) + V(\bar{B} - b) - \alpha - (\beta + p)f(a, b)
\]

(9)

s.t. \( CE^A = \alpha + (\beta + p)f(a^*, b^*) - C(a^*) - \frac{1}{2} r^A (\beta + p)^2 \sigma^2 \geq 0 \)

(10)

Note that Parliament is concerned about the consumers’ benefits net of their payment to the executive agent. A fault of the executive agency system is the absence of consideration of the administrative cost in the parent department section. (One should compare (9) with the parent department’s objective function (7).)

Using the property that should be determined in order for (10) to be binding, i.e., \( CE^A = 0 \), and assuming an interior optimum, we have the following first-order condition.

\[
U'(f) a^* - C'(a^*) \frac{\partial a^*}{\partial \beta} - \frac{1}{2} r^A (\beta + p)^2 \sigma^2 = 0
\]

(11)

We then see that equations (5), (8), and (11) characterize the executive agency equilibrium; \( \beta^*, b^*, d^* = \bar{B} - b^* \), and \( a^* = a(\beta^*, b^*; p) \).

3.3 The characteristics of the equilibrium

To examine the characteristics of the executive agency equilibrium, we try comparative statics. Since \( a^* = a(\beta^*, b^*; p) \) is indirectly determined by \( \beta^* \) and \( b^* \), we need to totally differentiate only (8) and (11). While we derive some interesting results from the comparative statistics, here we report on one basic but important feature of the executive agency equilibrium.\(^2\)

Proposition 1. Change in market price does not affect either the agent’s effort level or the activities

\(^1\) The second-order condition, derived below in comparative static exercises, is assumed to hold.

\(^2\) The proposition is derived by noticing \( a^*_p = a^*_p \) and \( a^*_b = a^*_b \), so that the proof is omitted.
Table 1: Welfare Comparison (\( \bar{B} = 5 \))

<table>
<thead>
<tr>
<th>FB</th>
<th>EA</th>
<th>( p=0.1 )</th>
<th>( p=0.2 )</th>
<th>( p=0.3 )</th>
<th>( p=0.5 )</th>
<th>( p=1.0 )</th>
<th>( p=1.1 )</th>
<th>( p=1.5 )</th>
<th>( p=2.0 )</th>
</tr>
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<tbody>
<tr>
<td>a</td>
<td>1.0</td>
<td>0.50</td>
<td>0.0787</td>
<td>0.1648</td>
<td>0.4615</td>
<td>1.0063</td>
<td>1.3846</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>2.0</td>
<td>2.0</td>
<td>1.575</td>
<td>1.6484</td>
<td>1.8462</td>
<td>2.0</td>
<td>1.9934</td>
<td>1.8462</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Table 2: Welfare Comparison (\( \bar{B} = 10 \))

<table>
<thead>
<tr>
<th>FB</th>
<th>EA</th>
<th>( p=0.1 )</th>
<th>( p=0.2 )</th>
<th>( p=0.3 )</th>
<th>( p=0.5 )</th>
<th>( p=1.0 )</th>
<th>( p=1.1 )</th>
<th>( p=1.5 )</th>
<th>( p=2.0 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>2.667</td>
<td>3.5022</td>
<td>0.21</td>
<td>0.4396</td>
<td>1.2308</td>
<td>2.667</td>
<td>2.9236</td>
<td>3.6923</td>
<td>4.0</td>
</tr>
<tr>
<td>b</td>
<td>5.333</td>
<td>7.5022</td>
<td>4.1995</td>
<td>4.3956</td>
<td>4.9231</td>
<td>5.333</td>
<td>5.3156</td>
<td>4.9231</td>
<td>4.0</td>
</tr>
<tr>
<td>EW</td>
<td>5.667</td>
<td>3.4049</td>
<td>3.3489</td>
<td>3.6912</td>
<td>4.5962</td>
<td>5.667</td>
<td>5.0812</td>
<td>4.0623</td>
<td>2.0</td>
</tr>
</tbody>
</table>

properties to \( a^* = a(b, \beta, \rho) \).

Anticipating his behaviour, the parent department allocates \( \bar{B} \) between \( b \) and \( d \) offering the transfer \( t \) in the first stage. The parent department’s problem is summarized as follows.

\[
\max_{x, y} U(f(a^*, b)) + V(\bar{B} - b) - \bar{B} - C''(b, \bar{B}) - \left[ t + p f(a^*, b) \right] 
\]

\[ s.t. \ C'(a^*) \equiv t + p f(a^*, b) - C(a^*) - \frac{1}{2} \rho \delta^2 \geq 0 \]

Note that the parent department’s objective function is exactly the same as the consumers’. This is a good aspect of the bureaucratic system: a centralization of public sector governance. We also see that the parent department has the one and only one incentive tool that induces the agent’s effort: the level of related activity \( b \). This is a fault of the system.

Using the property that \( t \) should be determined in order for \( CE^A = 0 \), we have the following first-order condition with respect to the activity \( b \).

\[
U(f(a^*, b))[\delta^* + f_x] - V'(\bar{B} - b^*) - C''(\bar{B}) + C''(a^*) = 0
\]

4.2 Comparison of an Executive Agency System and a Bureaucratic System

Let us compare the levels of expected welfare under the two systems. The benefit of the executive agency system is that it has two incentive variables (i.e., \( \beta \) and \( \bar{B} \)) to induce an appropriate level of effort from the executive agent, although it comes at the cost of the decentralization of the government’s governance. On the other hand, the bureaucratic system has the benefit of centralization and the cost of having only one incentive variable \( b \). These benefits and costs can appear explicitly when the market price of the observable output \( y \) changes. Let us see this point by a numerical example used in section II. Suppose again that \( U(f) = 5 + f(a, b), \ V(d) = d = \bar{B} - b, \ [f, d] = 0.5(b^2 + d^2 + bd), \ C(a) = 0.5a^2, \) and \( f(a, b) = 0.5ab \). Tables 1 and 2 summarize the data for the cases of \( \bar{B} = 5 \) and \( \bar{B} = 10 \).

When \( \bar{B} = 5 \), as the market price is high (\( p \geq 1 \)), the executive agency system achieves higher welfare than the bureaucratic system. On the other hand, when \( \bar{B} = 10 \), as the market price is relatively low (\( p = 0.1 \)) or high (\( p = 2.0 \)), the executive agency system achieves higher expected welfare than the bureaucratic system. From these numerical examples, we learn that the level of revenue that the executive agent obtains from a market, associated with the budget level, determines whether the executive agency system has higher welfare than the bureaucratic system.

Concluding Remarks

This short paper characterized executive agency systems and examined their benefits and costs. We showed that the main benefit of executive agency systems is to induce an appropriate level of effort from an executive agent by the introduction of an incentive payment scheme, while it comes at the cost of public sector decentralization. When the revenue that the executive agent obtains from a market is extremely low or high, executive agency systems are superior to (traditional) bureaucratic systems from a welfare point of view.

(Professor, School of Business Administration, Kwansei Gakuin University)

(Associate Professor, School of Business administration, University of Hyogo)

(Professor, Institute of Economic Research, Kyoto University)

References


