Hart, Shleifer, and Vishny (1997)

The model:

Let G and M denote the government and the manager (or private owner), respectively. G wants to get some service from M and will pay M under the initial contract \( P_0 \) for the service. The service is provided by using a non-human asset F. The ownership of F determines who has the residual rights over the use of F, including the right to determine who has the authority to approve innovations in uncontracted-for contingencies.

The goal of the model is to analyze who should own F.

M can exert effort to implement cost reductions and benefit-enhancing innovations.

Cost reducing effort costs \( e \).
The cost of the service is reduced by \( c(e) \): \( c(0)=0, c'(0)=\infty, c'>0, c''<0, c'(\infty)=0 \). This cost reduction results in lower benefit from the service that is denoted by \( b(e) \): \( b(0)=0, b'\geq0, b''\geq0 \).

The cost of effort for innovation is \( i \). The net social benefit of innovation is \( \beta(i) \): \( \beta(0)=0, \beta'(0)=\infty, \beta'>0, \beta''<0, \beta'(\infty)=0 \) (i.e., innovation is always socially worthwhile).

In addition, it is assumed that \( c' - b' \geq 0 \) (cost reductions are socially efficient).

Social benefit: \( B = B_0 - b(e) + \beta(i) \)

Social cost: \( C = C_0 - c(e) - e - i \)

G and M are locked into their relationship (no other asset F is available to produce the service).

Timing:

\[
\begin{array}{ccc}
\text{Date 0} & \text{Date 1/2} & \text{Date 1} \\
M \text{ and G write} & M \text{ chooses} & \text{If no renegotiation,} \\
contract and & i \text{ and } e. & \text{basic good supplied.} \\
choose ownership & & \text{However, renegotiation} \\
structure. & & \text{will occur.} \\
\end{array}
\]

**Figure I**

Renegotiation is done via Nash bargaining where the surplus is divided 50/50. Any cost or quality innovation requires the agreement of the owner of F. Even if M owns F, however, quality innovation would be introduced only with the agreement of G, because otherwise G wouldn’t pay for it.
A portion $\lambda$ of innovations (including cost-reducing ones) is embodied in M’s human capital, i.e., if G owns F, G can realize $0 \leq (1-\lambda) \leq 1$ of net social gains from innovations $(-b(e)+c(e)+\beta(i))$ without M by hiring a different manager. If M owns F, then M appropriates all residual benefits from his efforts. If $\lambda=1$, the public employee is irreplaceable.

First-best:

$$\text{Max}_{e,i}\{-b(e) + c(e) + \beta(i) - e - i\} \quad (1)$$

FOC: $-b'(e^*) + c'(e^*) = 1 \quad (2)$

$$\beta'(i^*) = 1 \quad (3)$$

Private (M’s) ownership:

Here, reimbursement for quality innovation would have to be negotiated and G would get half of the benefit. Therefore, the parties’ payoffs are:

$$U_G = B_0 - P_0 + 1/2\beta(i) - b(e) \quad (4)$$

$$U_M = P_0 - C_0 + 1/2\beta(i) + c(e) - e - i \quad (5)$$

Since the parties are assumed to have rational expectations, M chooses $e$ and $i$ to maximize $U_M$, that is, to solve

$$\text{max}_{e,i}\{1/2\beta(i) + c(e) - e - i\}. \quad (6)$$

Denote the (unique) solution by $(e_M, i_M)$ (where $M$ stands for ownership by $M$). The first-order conditions for (6) are

$$c'(e_M) = 1 \quad (7)$$

$$1/2\beta'(i_M) = 1 \quad (8)$$

Note that both (7) and (8) represent distortion compared to (2) and (3).

The total surplus $S_M$ under $M$’s ownership is then given by

$$S_M = U_G + U_M = B_0 - C_0 - b(e_M) + c(e_M) + \beta(i_M) - e_M - i_M. \quad (9)$$
Public (G’s) ownership:

Here, G cannot appropriate $\lambda[-b(e) + c(e) + \beta(i)]$ and G and M bargain over this value, splitting it 50/50. Therefore, the parties’ payoffs are:

\begin{align*}
(10) & \quad U_G = B_0 - P_0 + (1 - \lambda/2)[-b(e) + c(e) + \beta(i)], \\
(11) & \quad U_M = P_0 - C_0 + \lambda/2[-b(e) + c(e) + \beta(i)] - e - i.
\end{align*}

In this case, M chooses $e$ and $i$ to solve

\begin{equation}
\max_{e,i} \lambda/2[-b(e) + c(e) + \beta(i)] - e - i.
\end{equation}

The unique solution to (12) denoted $(e_G, i_G)$ is found from the following FOC:

\begin{align*}
(13) & \quad \lambda/2(-b'(e_G) + c'(e_G)) = 1, \\
(14) & \quad \lambda/2\beta'(i) = 1.
\end{align*}

Table. Summary of the model

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<thead>
<tr>
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<th>No renegotiation payoffs (threat points)</th>
<th>Surplus to be divided&amp;FOC’s</th>
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</table>
| **Private ownership** | G: $B_0 - P_0 - b(e)$ | M: $P_0 - C_0 + c(e) - e - i$ | \begin{align*}
\text{Surplus}=\beta(i) \\
& c'(e) = 1 \\
& (1/2)\beta'(i) = 1
\end{align*} |
| **Public ownership** | $B_0 - P_0 + (1 - \lambda)[-b(e) + c(e) + \beta(i)]$ | $P_0 - C_0 - e - i$ | \begin{align*}
\text{Surplus}=\lambda[c(e) - b(e) + \beta(i)] \\
& (\lambda/2)[c'(e) - b'(e)] = 1 \\
& (\lambda/2)\beta'(i) = 1
\end{align*} |
| **Objective function** | Max$_{e,i}$\{-$b(e) + c(e) + \beta(i) - e - i$\} | - $b'(e^*) + c'(e^*) = 1$ |
| **First best** | - $b'(i^*) = 1$ |

The total surplus $S_G$ under $G$ ownership is given by

\begin{equation}
S_G = U_G + U_M = B_0 - C_0 - b(e_G) + c(e_G) + \beta(i_G) - e_G - i_G.
\end{equation}
From the above, G ownership is superior to M ownership iff

\[ (16) \quad S_G > S_M \]

\[ \iff -b(e_G) + c(e_G) + \beta(i_G) - e_G - i_G > -b(e_M) + c(e_M) + \beta(i_M) - e_M - i_M. \]

Using FOC’s for the first-best, M ownership and G ownership, and (16) we can infer the following:

**Proposition 1.** \( e_M > e^* \), \( i_M < i^* \).

(Intuition: Because M doesn’t care about the reduction in quality due to \( e \), \( e_M > e^* \).
Because M cannot appropriate all benefits from \( i \), \( i_M < i^* \).)

**Proposition 2.** \( e_G < e^* \), \( i_G \leq i_M < i^* \) (with \( i_G < i_M \) unless \( \lambda = 1 \)).

(Intuition: This is due to the fact that M can appropriate only \( \lambda/2 \) part of the social benefit of cost reductions and of quality innovations, but at least M now takes into partial account \( b(e) \), because it represents part of the surplus to be divided. Note also that under private ownership, M get \( \lambda/2 \) of \( \beta(i) \) while under G ownership, M gets \( \lambda/2 \) of it.)

**The next two propositions provide conditions under which private ownership and public ownership can be ranked.**

**Proposition 3.**

1. Suppose that the function \( b(e) \) is replaced by \( \theta b(e) \), where \( \theta > 0 \). Then for \( \theta \) sufficiently small, private ownership is superior to public ownership.
2. Suppose that the function \( b(e) \) is replaced by \( \theta b(e) \) and the function \( c(e) \) is replaced by \( \phi c(e) \), where \( \theta, \phi > 0 \). Then, for \( \theta, \phi \) sufficiently small and \( \lambda < 1 \), private ownership is superior to public ownership.
The cases where in-house provision is superior are given by the following result:

**Proposition 4.**

1. Suppose that \( b(e) = c(e) - \sigma d(e) \), where \( \sigma > 0 \). Then for \( \sigma \) sufficiently small and \( \lambda \) sufficiently close to 1, public ownership is superior to private ownership.
2. Suppose that \( b(e) = c(e) - \sigma d(e) \), where \( \sigma > 0 \). Suppose also that the function \( \beta(i) \) is replaced by \( \tau \beta(i) \), where \( \tau > 0 \). Then for \( \sigma, \tau \) sufficiently small public ownership is superior to private ownership.

The intuition for both Propositions is straightforward. Also straightforward is the following:

**Proposition 5.** Costs \( (C_0 - c(e)) \) are always lower under private ownership. Quality \( (B_0 - b(e) + \beta(i)) \) may be higher or lower under private ownership.

**Competition**

If consumers purchase the service and can evaluate its quality and if suppliers operate in a competitive market without any government interference (in particular, government does not have to approve innovations), then private ownership is preferred, because M would then internalize (via price) the full social cost and benefit of his effort, \(-b(e) + c(e) + \beta(i)\). A public manager’s incentives, however, would be suboptimal, because he is replaceable and also would have to negotiate implementation of innovations with G.

**Corruption**

If at time -1/2 a politician privatizes F and can set the price low (e.g., at 0) then he can extract the entire M’s share of surplus, \((1/2)S_M\), for himself, because at that time, there is no relationship-specific investment and lots of M’s compete to purchase F.

If, however, the politician rents out F to M, he can extract 0, because M knows that he can be replaced at time 0. Even if M is not replaced at time 0, he would pay less in bribes to the politician, because the surplus would be low in cases when private ownership would have been preferred under benevolent government (because \( S_G < S_M \) in that case).

**Patronage**

Here the inefficiencies are somewhat different and to look at them we should go to “Politicians and Firms.”
Lack of commitment

If the government owns firms, it has information about the firm and might not be able to commit not to extract all of the firm’s rents or to force the firm to pursue inefficient goals. The result might be the “ratchet effect” that dulls manager’s incentives to increase profit or some other bad outcome. Privatization deprives the government of information necessary to do these nasty things.