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Grischa Perino

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Grischa Perino*
University of Heidelberg

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Abstract

We often use delegation as a commitment device if a government faces problems of time-inconsistency. McCallum (1995, AER P&P) challenged this practice, claiming that delegation merely relocates the commitment problem but does not solve it. In a model where delegation and specific policies are subject to the same commitment technology it is shown that McCallum's conjecture holds if optimal ex-ante policies are fixed. However, with a flexibility-credibility trade-off delegation is both desirable and improves credibility. While delegation does not increase commitment *per se* it makes it more attractive and increases investments in credibility. Delegation can therefore serve as a valid commitment device.

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*Postal Address: Alfred-Weber-Institute, Department of Economics, University of Heidelberg, Bergheimer Str. 20, D-69115 Heidelberg, Germany, perino@uni-hd.de, tel.: +49 6221 54 8014, fax: +49 6221 54 8020

1 Introduction

Delegation is a commonly used instrument to achieve governmental commitment in situations where time-inconsistency constrains economic policies.[1] However, the credibility of delegation itself has been challenged. McCallum (1995, 1997) conjectures in his *'second fallacy'* that delegation merely relocates the commitment problem, but does not solve it. A government that is unable to commit on specific policies lacks the ability to commit on institutional arrangements such as delegation. Analogously, if the government is able to credibly delegate, why not use the same mechanism to induce credibility into the desired policy in the first place.

Most papers that use delegation as a commitment device do not address this issue but assume that delegation is credible (Levine et al. 2005, Roelfsema 2007, Alesina and Tabellini 2007, 2008, Ludema and Olofsgard 2008). Exceptions are Lohmann (1992), Jensen (1997), Moser (1999) and Keefer and Stasavage (2003). In Jensen (1997) tit-for-tat strategies induce commitment. He finds that delegation has no effect unless it is costlier to override a bureaucrat's decision than to renege in case of discretion. In line with McCallum's *'second fallacy'* delegation dominates discretion only if commitment technologies differ. Moser (1999) and Keefer and Stasavage (2003) find that delegation improves commitment if there are heterogeneous veto players. This qualifies McCallum's conjecture for a specific internal structure of the government. Lohmann (1992) is closest to the present paper since she considers symmetric commitment technologies with an endogenous level of commitment. However, she does not explicitly solve the model with discretion and does not compare commitment levels of the two scenarios.

This paper builds on McCallum's critique by assuming that both delegation and specific policies are subject to the same endogenous commitment technology. It is shown that McCallum's conjecture holds in a simple time-inconsistency problem when the ex-ante optimal policy is fixed. The main contribution, however, is that delegation is desirable and unambiguously increases credibility if the optimal ex-ante policy is uncertain. In this case there is a flexibility-credibility trade-off since there are reasons other than time-inconsistency to adjust the policy ex-post. Delegation relaxes this trade-off and thereby makes commitment more attractive. While delegation does not improve commitment *per se*, it increases its marginal productivity and, hence, investments in credibility.

The link between increased commitment and delegation is illustrated in a simple investment game. However, the same reasoning applies to similar time-inconsistency problems in other

[1] See Rogoff (1985), Lohmann (1992), Levine et al. (2005), Roelfsema (2007), Alesina and Tabellini (2008) and Ludema and Olofsgard (2008).

areas of economic policy such as monetary policy, utility regulation and environmental policy.

2 The Model

2.1 The time-inconsistency problem

Consider a project, such as a technological innovation or a major construction work, that if successfully executed (i.e. the new technological solution is found or the construction completed on time and satisfying all safety rules etc.) yields a public benefit B. The firm that secures the mandate to undertake the project is paid an amount T upon successful completion. The firm's profits are given by

$$\pi(x,T) = \rho(x)T - x, \tag{1}$$

where x is the amount of effort dedicated to the project by the firm and $\rho \in [0,1]$ (with $\rho' > 0$ and $\rho'' < 0$) is the probability that the project is successfully completed.

The government has the following objective function

$$G = \rho(x)[B - \lambda T] - x, \tag{2}$$

where $\lambda > 0$ is the marginal cost of public funds. It faces the following time-inconsistency problem. When the government commissions the project it is willing to promise to pay a strictly positive amount $T^{ante}(B)$ determined by

$$\frac{\partial G}{\partial T} = \rho' \frac{\partial x}{\partial T}[B - \lambda T] - \lambda \rho(x) - \frac{\partial x}{\partial T} = 0. \tag{3}$$

However, once the project is completed it prefers to refuse payment ($T^{post} = 0$), e.g. by claiming that completion was not 'successful' or by openly reneging on the previous agreement.

Governments face an inherent difficulty to commit. Since, by definition, they have unrivaled authority, forcing them to stick to their promises is much more difficult than in cases where only private parties are involved (Acemoglu 2003). How a government can commit itself is discussed in the following section.

2.2 Endogenous commitment

Time-inconsistency can be resolved if the government is able to commit. To do so it has to impose costs on any future deviation from the agreement with the firm. This can be achieved by formally codifying it into law. This involves costs $c \in [o, \infty)$ that are assumed to be endogenous (see e.g. Lohmann (1992)) since there are different levels and procedures available for codification, e.g. administrative procedures, laws, constitutional amendments and involvement of different chambers etc. Codification induces credibility since in order to renege on it ex-post, the government has to change the respective law or the constitution - which again is costly. For simplicity it is assumed that the costs of ex-post adjustments are exactly the same as the ones incurred when the agreement is codified. Hence, if the government reneges ex-post it has to pay c twice.

The government is constrained to follow the formal procedures of the legislating process. This, however, does not impose further restrictions on the policies or institutions it establishes or abolishes. Moreover, the available procedures of the legislating process are exactly the same regardless of what is actually codified. This fits McCallum's assumption that both specific policies and institutional arrangements such as delegation are subject to the same commitment technology.

With this endogenous commitment option the ex-ante objective function of the government becomes

$$G = \rho(x)[B - \lambda T] - x - c. \tag{4}$$

The timing of the game is as follows. First, the government sets c and T. Thereafter, the firm exerts effort x and finally the government decides whether to renege on the agreement or not.

The government pays only if this is less costly than reneging on the original promise, i.e. if

$$\lambda T \leq c. \tag{5}$$

Hence, the firm invests only if the promis is credible. In this case, effort increases in T.

In the first stage, the government chooses c and T such that the credibility constraint (5) is binding, i.e. $T = \frac{c}{\lambda}$. Otherwise (4) is strictly decreasing in c and it is therefore optimal to reduce commitment expenditures until (5) binds.

$$\frac{\partial G}{\partial c} = \frac{\rho'}{\lambda}\frac{\partial x}{\partial T}[B - \lambda T] - \rho(x) - \frac{\partial x}{\partial T}\frac{1}{\lambda} - 1 = 0, \tag{6}$$

therefore determines the optimal $c^*(B)$ and hence $T^*(B)$ under endogenous commitment. Note that $T^*(B)$ is strictly smaller than $T^{ante}(B)$ since the necessity to commit increases the marginal cost of raising T.

2.3 Uncertainty

Now assume that the value of the project B is uncertain ex-ante. The actual benefit realized ex-post is $B = b + \epsilon$ where ϵ is normally distributed with zero mean, variance $\sigma > 0$ and density $\phi(\epsilon)$. The government learns the true value only once the project is completed but the firm is assumed to know ϵ before it decides on effort. The real value of B is irrelevant for the government's reneging and the firm's investment decision. The equilibrium policy of the game with uncertainty is therefore $(c^*(b), T^*(b))$. Since the optimal ex-ante policy is a function of B the government would be better off if it could adjust $T^*(b)$ ex-post to $T^*(B)$. However, unless the government is able to write contingent laws (which is ruled out here), time-inconsistency renders this type of ex-post adjustment infeasible.

3 Delegation

Now the government has the option to delegate the decision of how much to pay to the firm to a bureaucrat. The bureaucrat is not prone to time-inconsistency. He therefore takes the firm's investment decision into account even if he decides ex-post. While the bureaucrat's incentives are perfectly in line with the ex-ante preferences of the government, the bureaucrat might not fully take exogenous shocks into account. His perception of the shock might be somewhat dampened (here this has the same effect as partial capture of the bureaucrat by the firm). Assume the objective function of the bureaucrat is

$$B(T^B) = \begin{cases} g\left(T^B - T^{ante}(b + \beta\epsilon)\right) & , \quad T^B \leq \frac{c}{\lambda}, \\ 0 & , \quad \text{else}, \end{cases} \tag{7}$$

where $g(a)$ is strictly positive, strictly increasing for all $a < 0$ and strictly decreasing for all $a > 0$ with a unique maximum at $a = 0$. $\beta \in [0, 1]$ indicates the responsiveness of the bureaucrat to shocks. The bureaucrat does not like to be overridden by the government.

The timing of the game with delegation is as follows: First, the government sets and pays c and delegates the decision. Second, the firm chooses effort knowing ϵ and β. Next, the bureaucrat decides on T^B and in the last stage the government can override the bureaucrat's decision by again paying c.

The last stage is equivalent to the game with discretion. The credibility constraint is $T^B \leq \frac{c}{\lambda}$. The bureaucrat therefore chooses $T^B(c, \epsilon) = \min\left[T^{ante}(b + \beta\epsilon), \frac{c}{\lambda}\right]$. Hence, if the shock ϵ is sufficiently negative, i.e. $\epsilon \leq \bar{\epsilon}(c, \beta) < 0$ with $T^{ante}(b + \beta\bar{\epsilon}(\beta)) = \frac{c}{\lambda}$, the bureaucrat will choose a payment below the credibility constraint. This is beneficial since these are cases when the project is of low value and an average reward would induce over-investment. Delegation therefore increases flexibility without a negative effect on credibility. If $\beta = 0$, i.e. if the bureaucrat completely ignores shock ϵ, this effect vanishes and delegation perfectly mimics discretion.

The firm anticipates the bureaucrat's decision and maximizes

$$\pi(x, T^B) = \rho(x)T^B(c, \epsilon) - x. \tag{8}$$

In the first stage the government does not yet know the size of the shock and hence faces the following optimization problem

$$\begin{aligned} \max_c E(G^{Del}) &= \int_{-\frac{b}{\beta}}^{\bar{\epsilon}(c,\beta)} \phi(e) \left[\rho\left(x\left(T^B(c,e)\right)\right)[b + e - \lambda T^B(c,e)] - x(T^B(c,e))\right] de \\ &+ \int_{\bar{\epsilon}(c,\beta)}^{+\infty} \phi(e) \left[\rho\left(x\left(\frac{c}{\lambda}\right)\right)[b + e - c] - x\left(\frac{c}{\lambda}\right)\right] de - c. \end{aligned} \tag{9}$$

Note that for all $\epsilon < -\frac{b}{\beta}$ the bureaucrat's payment is zero and hence the firm does not exert any effort.

Proposition 1 *The government prefers to delegate the payment decision if the value of the project is uncertain ex-ante and the bureaucrat at least somewhat responsive to the exogenous shock (i.e. $\beta > 0$).*

Proof: See appendix.

The intuition for Proposition 1 is that the additional flexibility delegation provides avoids excessive spendings on projects of little or even negative public value. In contrast to the uniform payment under discretionary policy-making delegation to a bureaucrat allows for some adjustment to exogenous shocks. Bureaucrats are therefore of value if they are able to react to contingencies that can not be codified into law, either because it is too costly or because they can not be verified.

The key result, however, concerns the degree of commitment the government chooses under different institutional arrangements. The optimal $c^{Del}(b, \beta)$ is determined by the first order condition corresponding to (9)

$$\int_{\bar{\epsilon}(c,\beta)}^{+\infty} \phi(e) \left[\frac{\rho'}{\lambda}\frac{\partial x}{\partial T}[B - c] - \rho(x) - \frac{\partial x}{\partial T}\frac{1}{\lambda}\right] de - 1 = 0. \tag{10}$$

Proposition 2 *The government chooses a higher level of commitment when it delegates ($c^{Del}(b, \beta) > c^*(b)$) if the value of the project is uncertain ex-ante and the bureaucrat at least somewhat responsive to the exogenous shock (i.e. $\beta > 0$).*

Proof: See appendix.

The first insight of this result is that McCallum had a point. If the ex-ante optimal policy is fixed or the bureaucrat's decision inert to shocks, delegation is perfectly equivalent to discretion if both are subject to the same commitment technology. However, if there is uncertainty that creates reasons to adjust the policy ex-post other than time-inconsistency, then delegation is both beneficial (Proposition 1) and induces higher commitment (Proposition 2). Delegation provides flexibility that does not hamper government's credibility. It relaxes the trade-off between credibility and flexibility and thereby induces higher commitment by the government.

3.1 Costly delegation

So far delegation was for free. However, granting discretionary scope to a bureaucrat is likely to be associated with additional costs, e.g. paying skill premiums and more sophisticated hiring processes. This gives rise to an extra cost of delegation.

Proposition 1 is qualified if delegation is associated with additional costs. In this case, the benefits of delegation are weighted against its costs. However, commitment is strictly higher if the government delegates even if delegation is costly. Given that the commitment technologies remain the same for delegation and specific policies, additional costs of delegation do not affect the incentives to invest in credibility.

3.2 Endogenous choice of bureaucrat's type

If the sovereign can choose the type β of a bureaucrat by a screening mechanism or if complete contracts are available, she would always prefer 'perfect' delegation ($\beta = 1$). An improved match between the government's and bureaucrat's preferences has three beneficial effects: no projects of negative value are financed, payments are reduced in response to small negative shocks and thereby it becomes optimal to increase the maximum credible payment which increases the probability that high value projects are successfully completed.

4 Conclusion

While delegation is regarded an effective commitment device the validity of this claim has hardly ever been checked. Inspired by McCallum's critique this paper assumes that there is no inherent commitment advantage to delegation. A government can commit to specific policies as well as to delegation using the same commitment technology. The first result is that for fixed ex-ante optimal policies McCallum's *'second fallacy'* holds. Delegation does neither improve commitment nor government's payoff.

However, if there is uncertainty that affects the optimal ex-ante policy and hence creates reasons for ex-post adjustment other than time-inconsistency, delegation can improve both government's payoff and credibility. Delegation of the policy task to a bureaucrat who is not prone to time-inconsistency but at least somewhat responsive to the resolution of uncertainty adds flexibility to the policy decision that does not interfere with credibility. While delegation does not improve commitment *per se* it makes it more attractive and hence increases investments in credibility.

This result contributes to the explanation of observed correlations between delegation and credibility in economic policy (Berger et al. 2001). Delegation is a valid commitment device in situations where policy-makers face a flexibility-credibility trade-off. On the one hand, this justifies the use of delegation to improve credibility of policies in a number of relevant situations. On the other hand, in the absence of a flexibility-credibility trade-off the necessity remains to justify why delegation indeed improves commitment.

A Appendix

A.1 Proof of Proposition 1

If there is no uncertainty, the government's optimization problems with and without delegation are equivalent since in both cases the credibility constraint is always binding. The same holds, if the bureaucrat does not update his information on the project value ($\beta = 0$) since $T^{ante}(b) > \frac{c}{\lambda}$ and hence $T^B(0) = \frac{c}{\lambda}$. Hence, without uncertainty or with a non-responsive bureaucrat, delegation and discretion are equivalent.

Note that the government's objective function under discretion can be written as

$$\max_c E(G^{Del}) = \int_{-\infty}^{+\infty} \phi(e) \left[\rho\left(x\left(\frac{c}{\lambda}\right)\right)[b+e-c] - x\left(\frac{c}{\lambda}\right)\right] de - c. \tag{A.1}$$

Moreover, the integral $\int_{-\infty}^{-\frac{b}{\beta}} \phi(e) \left[\rho\left(x\left(\frac{c}{\lambda}\right)\right)[b+e-c] - x\left(\frac{c}{\lambda}\right)\right] de$ is negative since the project value is strictly negative in these cases. Hence, if the shocks are in the range $[-\infty, -\frac{b}{\beta}]$ delegation yields strictly higher payoffs to the government. This also holds for shocks $[-\frac{b}{\beta}, \bar{\epsilon}]$.

$$\int_{-\frac{b}{\beta}}^{\bar{\epsilon}} \phi(e) \left[\rho\left(x\left(T^B(c,e)\right)\right)[b+e-\lambda T^B(c,e)] - x(T^B(c,e))\right] de$$
$$> \int_{-\frac{b}{\beta}}^{\bar{\epsilon}} \phi(e) \left[\rho\left(x\left(\frac{c}{\lambda}\right)\right)[b+e-c] - x\left(\frac{c}{\lambda}\right)\right] de, \tag{A.2}$$

since $T^{ante}(b+\epsilon) < T^B(c,\epsilon) < \frac{c}{\lambda}$. For all shocks $[\bar{\epsilon}, +\infty]$ both institutional arrangements are equivalent. Hence, government's expected payoff is strictly higher under delegation with uncertainty and $\beta > 0$. $\square$

A.2 Proof of Proposition 2

Note that $T^{ante}(b)$ (see (3)) implies

$$\rho' \frac{\partial x}{\partial T}[b - \lambda T^{ante}(b)] - \lambda \rho(x) - \frac{\partial x}{\partial T} = 0. \quad \text{(A.3)}$$

Since $\bar{\epsilon}$ is defined as $T^{ante}(b + \beta\bar{\epsilon}) = \frac{c}{\lambda}$ it holds that

$$\frac{\rho'}{\lambda}\frac{\partial x}{\partial T}[b + \beta\bar{\epsilon} - c] - \rho(x) - \frac{\partial x}{\partial T}\frac{1}{\lambda} = 0. \quad \text{(A.4)}$$

Hence, for all $\beta \in (0, 1]$ it holds that

$$\int_{-\infty}^{\bar{\epsilon}} \phi(e)\left[\frac{\rho'}{\lambda}\frac{\partial x}{\partial T}[b + e - c] - \rho(x) - \frac{\partial x}{\partial T}\frac{1}{\lambda}\right] de < 0, \quad \text{(A.5)}$$

and hence,

$$\int_{\bar{\epsilon}}^{+\infty} \phi(e)\left[\frac{\rho'}{\lambda}\frac{\partial x}{\partial T}[B - c] - \rho(x) - \frac{\partial x}{\partial T}\frac{1}{\lambda}\right] de > \frac{\rho'}{\lambda}\frac{\partial x}{\partial T}[b - c] - \rho(x) - \frac{\partial x}{\partial T}\frac{1}{\lambda}. \quad \text{(A.6)}$$

This implies that $c^{Del}(b, \beta) > c^*(b)$ for all $\beta \in (0, 1]$. □

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