LEADERSHIP, TRUST, AND POWER, by Roger B. Myerson, 4/2009

http://home.uchicago.edu/~rmyerson/research/power.pdf

Labarna was Great King, and his sons, his brothers, his in-laws, his family members, and his troops were united... He held the country subdued by his might... Each of his sons went somewhere to a country... These countries they each governed...
Later on, however, they took to conspiring continually, and they began to shed our blood... Whoever becomes king after me in the future, let his brothers, his sons, his in-laws, his family members and his troops be united! ...When the King seeks evil for his brother or sister, his Council must tell him straight, "This is a matter of blood." Remember the bloodshed that has cursed the royal family. If anyone among the king's family does evil and lays eyes on the king's head, summon the assembly, and if his testimony is dismissed then he shall pay with his head. They shall not kill him secretly. They shall not commit evil against his house and his children.... Giving away even a prince's blade of straw or chip of wood is not right. Officials in the palace staff commit these evil deeds if they want to take a prince's house.

Proclamation of Telipinu, King of the Hittites. [edited excerpts] (c. 1500 BCE).

Why is the Exchequer so called? ...Because the table resembles a checker board... Moreover, just as a battle between two sides takes place on a checker board, so here too a struggle takes place, and battle is joined chiefly between two persons, namely the Treasurer and the Sheriff who sits to render account, while the other officials sit by to watch and judge the proceedings.

Richard FitzNigel, Dialogue of the Exchequer (c. 1180).

Introduction. What fundamental forces sustain the constitution of a political system?
Constitutional rules are enforced by individuals, who must have incentive to enforce them.
There must be specific agents who expect to be rewarded as long as they act to enforce constitutional rules, but who would lose these rewards and privileges if they did not fulfill their constitutional responsibilities. These are the high officials of government.
A political system can survive only if it solves some basic agency problems in motivating such officials, who are subject to moral hazard and imperfect observability.
So agency problems are essential to the constitution of any political system.

High officials will eschew temptations to abuse power only if they expect future rewards for loyal service, which creates a systematic reason for back-loading their reward.
So the leader should take on debts to his officials, which he may be tempted to repudiate.
A political leader must be like a banker whose debts are valued as rewards for current service.

Officials must lose credit when there is evidence of their malfeasance,
but the leader must be credibly restrained from false judgment to escape from his debts.
Thus, judgments of high officials will require close scrutiny in the leader's court,
so that high government officials should not fear being cheated and replaced.

We show that such agency problems can cause the leader to govern with a closed aristocracy,
not based on any innate-inequality assumption of aristocrats being better than commoners,
but based on an innate-equality assumption that commoners are not better than aristocrats.

A model of incentives for governors [D, α, β, γ, K, H, δ]

Suppose a governor always has three options: to be a good governor, or to be corrupt, or to openly rebel against the leader (flee abroad with local treasures).
Let D denote the expected payoff to a governor when she rebels.
The leader cannot directly observe whether a governor is good or corrupt, but he can observe any costly crises that may occur under a governor's rule.
When the governor is good, crises will occur in her province at a Poisson rate α.
When the governor is corrupt, crises occur at a Poisson rate β, where $\beta > \alpha$, and the corrupt governor also gains an additional secret income worth γ per unit time.

The position of governor is quite valuable, but candidates have only some limited wealth K, and so they cannot pay more than K for the job. Suppose $K < D$.
The leader may derive some advantage from deferring payments to a governor, but the leader's temptation to sack a governor increases with the debt owed to her.
So let H denote the largest credit owed to a governor that the leader can be trusted to pay.
We assume that each individual is risk neutral and has discount rate δ.

The governor observes any crisis in her province shortly before the leader does.
The governor can make short visits to the leader's court, where the governor cannot rebel.
The leader wants good governing always, because crises and rebellions are very expensive.

We want to characterize an optimal incentive plan that minimizes the leader's expected cost subject to the constraints that a governor should never want to be corrupt or rebel.

The plan can be characterized at any time t as a function of the governor's credit u(t), where

$u(t)$ = (present discounted value of all future pay expected by the governor at time t).

Let G denote the lowest possible credit for a governor in office ($G \geq D$). Dismissal is $u=0$.

New governor will get feasible credit $g(0) \in [G,H]$, $g(0)>K$, so will pay K for the promotion.

At any u in [G,H], a **feasible incentive plan** can be characterized by

$y(u)$=(pay rate), $\pi(u)=E(\text{penalty}|\text{crisis})$, $\theta(u)$=(credit growth rate|no crisis), such that:

$y(u) \geq 0$ (governor has paid all prior assets K for promotion to office),

$\delta u = y(u)+\theta(u)-\alpha\pi(u)$ (promise-keeping constraint),

$y(u)+\theta(u)-\alpha\pi(u) \geq y(u)+\theta(u)+\gamma-\beta\pi(u)$ so $\pi(u) \geq \tau = \gamma/(\beta-\alpha)$ (deter corruption),

$u-\pi(u) \geq D$ (deter rebellion after crises),

and $\theta(H) \leq 0$ is required at $u=H$ (the trust bound on leader's credible promises).

These conditions can be satisfied over the interval [G,H] with $G = D+\tau = D+\gamma/(\beta-\alpha)$.

When expected credit after a crisis drops to some $\hat{u} = u-\pi(u) < G$, the governor is called to court for a trial where $q(\hat{u})$=P(dismissal), $Y(\hat{u})$=E(pay), $g(\hat{u})$=(credit if not dismissed), which is feasible iff $Y(\hat{u}) \geq 0$, $0 \leq q(\hat{u}) \leq 1$, $G \leq g(\hat{u}) \leq H$, $\hat{u} \leq (1-q(\hat{u}))g(\hat{u})+Y(\hat{u})$.

Recursion equation over short time interval ε, to first-order in ε:

$$u \approx \varepsilon y+(1-\varepsilon\delta)[(1-\alpha\varepsilon)(u+\varepsilon\theta)+\alpha\varepsilon(u-\pi)] \approx u+\varepsilon(y-\delta u+\theta-\alpha\pi)$$

$$\geq \varepsilon y+\varepsilon\gamma+(1-\varepsilon\delta)[(1-\beta\varepsilon)(u+\varepsilon\theta)+\beta\varepsilon(u-\pi)] \approx u+\varepsilon(y-\delta u+\theta+\gamma-\beta\pi).$$

$V(u)$ = (**leader's expected cost** of governing province when current governor is promised u).

$\tau = \gamma/(\beta-\alpha)$ = minimal crisis penalty. $G = D+\tau = D+\gamma/(\beta-\alpha)$ = minimal incumbent credit.

$V(.)$ must be a convex function with slope V' between 0 and 1 (...else randomize or pay) (1)

$V(0) = \min_g V(g)-K$ s.t. $G \le g \le H$. (2)

$\forall u \in [G,H]$: $\delta V(u) = \min_{y,\theta,\pi}\ y+\theta V'(u)+\alpha[V(u-\pi)-V(u)]$ s.t. $y \ge 0$, $\pi \ge \tau$, $\theta=\delta u+\alpha\pi-y$. (3)

$\delta V(H) = \min_{y,\theta,\pi}\ y+\theta V'(H)+\alpha[V(H-\pi)-V(H)]$ s.t. $\theta \le 0$, $\pi \ge \tau$, $y = \delta H+\alpha\pi-\theta \ge 0$. (4)

$\forall u \in (0,G)$: $V(u) = \min_{Y,q,g}\ Y+(1-q)V(g)+qV(0)$ s.t. $Y \ge 0$, $0 \le q \le 1$, $G \le g \le H$, $Y+(1-q)g \ge u$. (5)

In the optimal solution: $g(0) = G$, $V(0) = V(G)-K$. (2′)

$\forall u \in [G,H]$: $y(u) = 0$, $\pi(u) = \tau$, $\theta(u) = \delta u+\alpha\tau$, $V'(u) = [(\delta+\alpha)V(u)-\alpha V(u-\tau)]/(\delta u+\alpha\tau)$. (3′)

At $u=H$: $y(H) = \delta H+\alpha\tau$, $\pi(H)=\tau$, $\theta(H)=0$, $[(\delta+\alpha)V(H)-\alpha V(H-\tau)]/(\delta H+\alpha\tau) = 1$. (4′)

$\forall u \in [0,G)$: $Y(u) = 0$, $g(u) = G$, $q(u) = 1-u/G$, $V(u) = V(0)+uK/G$. (5′)

All pay y is deferred until credit reaches H. Penalty at low end is randomized dismissal.

To compute V, find $\Psi(u) = [V(u) - uK/G]/V(0)$ for $u \in [0,H]$.

So $\forall \hat{u} \in [0,G]$, $\Psi(\hat{u}) = 1$; $\forall u \ge G$, $\Psi'(u) = [(\delta+\alpha)\Psi(u) - \alpha\Psi(u-\tau)]/(\delta u+\alpha\tau)$.

Then $\Psi'(u) > 0$ and $\Psi''(u) > 0$ $\forall u \ge G$.

But $\Psi'(H) = [V'(H)-K/G]/V(0) = [1-K/G]/V(0)$, because $V'(H)=1$ by (3′)-(4′).

Thus, $V(0) = (1-K/G)/\Psi'(H)$ strictly decreases when the parameter H is increased.

$V(u) = uK/G + V(0)\Psi(u)$ is strictly convex and $0 < V'(u) < 1$ when $G \le u < H$.

(V' jumps at G.) Randomization happens only in [D,G), where V is linear.

Properties of the solution The leader's ex ante expected cost $V(G)-K = (1-K/G)/\Psi'(H)$ is a strictly decreasing function of the trust bound H. Greater trust H is good for the leader.
If H were less than G then it would be impossible for the leader to design an incentive plan such that governors are always deterred from corruption and rebellion. (Fall of Rome, Ming.)

Leader incurs a liability G for payment $K<G$ when a new governor is appointed, yielding a net cost $G-K$, so expected cost minimization requires minimizing expected turnover of governors.
With high debt, temporarily suspending pay can be used as punishment instead of dismissal.
So deferring pay until debt reaches the bound H optimally minimizes expected turnover.

The leader randomizes between dismissal and reinstatement after crises when credit is $<G+\tau$.
Randomization, needed to soften the dismissal threat, is achieved by fair trial at leader's court.
But with $K>0$, the leader ex post actually prefers dismissal, as $V(G)-K < V(G)$.
For credibility, the leader may ask other high officials to witness the trial of any one of them (English exchequer, Hittite panku, Roman senate, ...). If the leader could not be trusted to randomize appropriately, then he could not always deter corruption and rebellion.

Randomized dismissal is cheaper than severance pay: $u+V(G)-K > V(G)-(1-u/G)K$.
The leader cannot gain by punishing ex-governors. Governors' expected payoffs cannot be less than G, to avoid rebellions, and so any plan to unproductively punish an ex-governor would have to be offset by increasing her probability of reinstatement after a crisis, instead of reselling her office for K. So punishment would reduce the leader's expected income from K.

The long-run stationary distribution of credit

In the long-run stationary distribution of the governor's credit $\tilde{u}$, let $F(u) = P(\tilde{u}<u)$.

For any u between G and H, to equalize the rate of transitions upwards across u and downwards across u, we must have $(\delta u+\alpha\tau)F'(u) = \alpha[F(u+\tau)-F(u)]$.

So $-F'(u) = \alpha(F(u)-F(u+\tau))/(\delta u+\alpha\tau)$, $F(G) = 0$, $1-F(H) = P(\tilde{u}=H) > 0$.

F can be computed from the formulas $F(u) = 1-\Omega(u)/\Omega(G)$ where

$\Omega(u)=0\ \forall u>H$, $\Omega(H)=1$, $-\Omega'(u) = \alpha[\Omega(u)-\Omega(u+\tau)]/(\delta u+\alpha\tau)\ \forall u<H$.

<u>Fact.</u> If $u \le H-m\tau$, then $F(u) \le [\alpha\tau/(\delta G+\alpha\tau)]^{m+1}$. With the stationary distribution F,

$E(\tilde{u}) \ge H-\alpha\tau^2/(\delta G)$ and $P(\tilde{u}=H) \ge (\delta H-\alpha\tau^2/G)/(\delta H+\alpha\tau)$.

So $P(\tilde{u}=H) = 1-F(H)$ goes to 1 as $H\to\infty$.

If H is high then, in the long run, the leader usually pays high wages $\delta H+\alpha\tau$ to governors.

The long-run expected pay rate is greater than $\delta H-\alpha\tau^2/G$, which goes to ∞ as $H\to\infty$.

The governors' turnover rate $\int_{u\in[G,G+\tau]} \alpha(1-(u-\tau)/G))\,dF(u) \le \alpha F(G+\tau)$ goes to 0 as $H\to\infty$.

So with high H, successful governors tend to become entrenched in office.

Thus, even when the leader is secure in power and is as patient as his agents (same δ), agency costs give the leader an incentive to accumulate large expensive debts to governors.

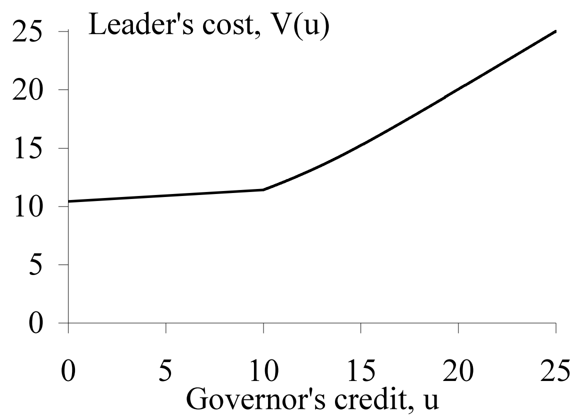
This effect may also explain dynastic decline.

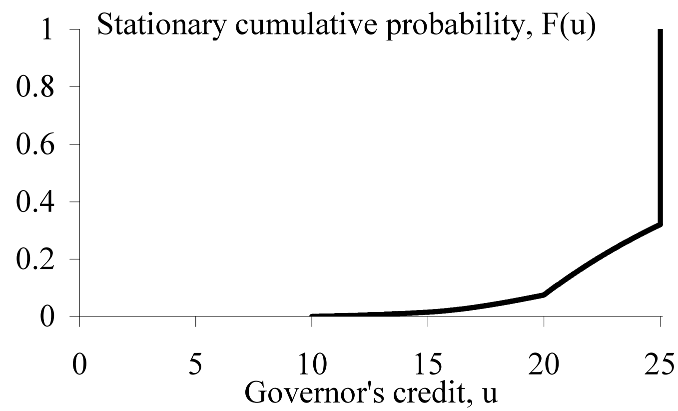
Example: Let $\delta = 0.05$, $\alpha = 0.1$, $\beta = 0.3$, $\gamma = 1$, $D = 5$, $K = 1$, $H=25$.

Then $\tau = \gamma/(\beta-\alpha) = 5$, $G = D+\tau = 10$, $V(0) = V(G)-K = 10.44$, $1-F(H) = 0.68$,

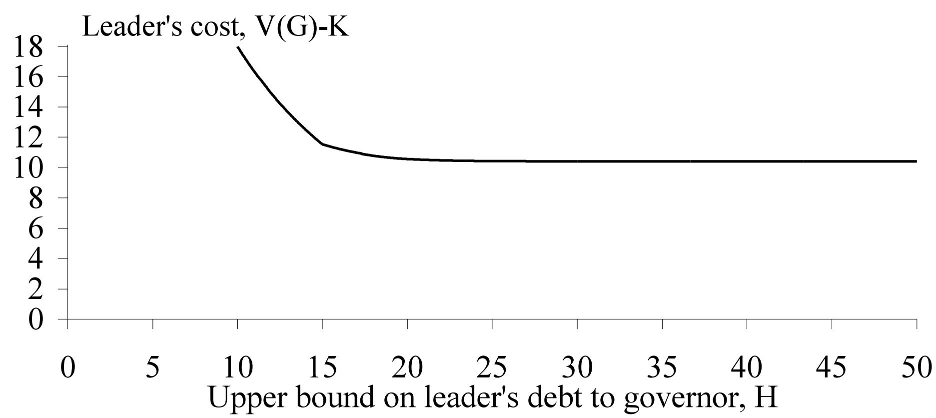
$E(\text{pay rate}) = (\delta H+\alpha\tau)(1-F(H)) = 1.19$,

$E(\text{dismiss rate}) = \int_{u\in[G,G+\tau]} \alpha(1-(u-\tau)/G))\, dF(u) = 0.00030$.





Changing H (from 10 to ∞) could change $V(G)-K = (1-K/G)/\Psi'(H)$ from 18 to 10.42.



With H=10=G, we'd get pay $y=\delta G+\alpha\tau=1$, dismissal rate $\alpha(1-(G-\tau)/G)=0.05$, $V(G)-K=18$.

Tolerating corruption (= misappropriation of γ maintenance budget), but not rebellion.

Let L = (prince's cost of crisis). Suppose $\alpha L+\gamma < \beta L$ (so $L > \gamma/(\beta-\alpha) = \tau$). Let $K=0$.

Let $W(u)$ = (prince's optimal expected cost, including crisis costs, when governor is owed u).

At $u<H$, with deferred wages and minimal motivating penalties, we get recursion condition:

$W(u) \approx W(u) + \varepsilon \min \{\alpha L+\gamma+(\delta u+\alpha\tau)W'(u)+\alpha W(u-\tau)-(\alpha+\delta)W(u),\ \beta L+\delta u W'(u)-\delta W(u)\}$.

Let $\Lambda_0(u) = (\delta W(u)-\beta L)/(\delta u)$ if $u \geq D$; $\Lambda_0(u) = 0$ if $u < D$.

Let $\Lambda_1(u) = ((\delta+\alpha)W(u)-\alpha W(u-\tau)-\alpha L-\gamma)/(\delta u+\alpha\tau)$ if $u \geq G$; $\Lambda_1(u) = 0$ if $u < G$.

Differential equation for convex W: $W'(u) = \max \{\Lambda_1(u), \Lambda_0(u)\}\ \forall u$. [1]

At $u=H$, paying wage replaces $W'(u)$ by 1 in recursion: $\max \{\Lambda_1(H), \Lambda_0(H)\} = 1$. [2]

Numerical solution: Guess $W(0)$, integrate forward, check boundary condition at H.

At credit $u\geq G$, solution has good governance, crisis penalty τ, $\dot{u}=\delta u+\alpha\tau$ to H, $W'(u)=\Lambda_1(u)$.

$W'(\hat{u})=0\ \forall \hat{u}\leq D$. But now the optimal solution may start at G or D. There are two cases:

<u>Hard budget constraint</u>: $W(0) \leq \beta L/\delta$. No corruption, as before: $W(u) = V(u)+(\alpha L+\gamma)/\delta$.

Governors start at G. Positive probability of dismissal when post-crisis credit falls below G.

<u>Soft budget constraint</u>: $W(0) > \beta L/\delta$. Governor starts at credit $u=D$. Never dismiss.

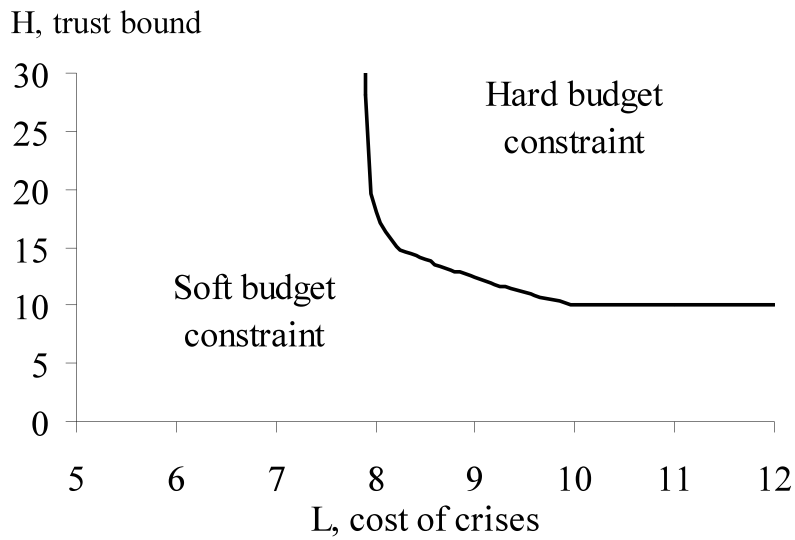
When $D\leq u<G$: tolerate corruption, no maintenance, no crisis penalties, $\dot{u}=\delta u$, $W'(u)=\Lambda_0(D)$.

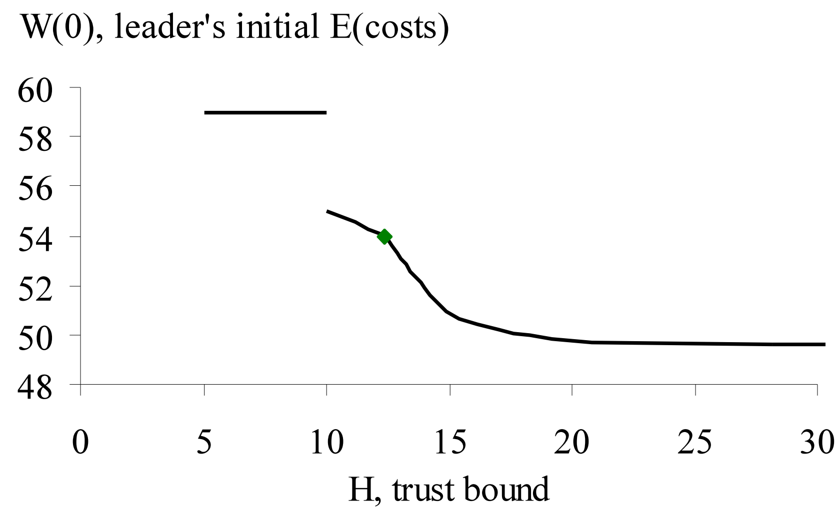
If $L \geq (\delta G+\alpha\tau+\gamma)/(\beta-\alpha)$ then the hard budget constraint applies for any trust bound $H\geq G$.

If L is smaller, then the soft budget constraint applies when H is close to G,

but increasing the trust bound H can cause a switch to hard budget constraint.

Example: We have δ=0.05, α=0.1, β=0.3, γ=1, K=0, D=5, $\tau=\gamma/(\beta-\alpha)=5$, G=D+τ=10.
The hard budget constraint applies for any trust bound H$\geq$G when the crisis cost is
L $\geq (\delta G+\alpha\tau+\gamma)/(\beta-\alpha) = 10$. So now let us consider L slightly smaller: Let L=9.
A hard budget constraint requires $54 = \beta L/\delta \geq W(0) = V(0)+(\alpha L+\gamma)/\delta = V(0)+38$.
But W(0) decreases as the parameter H increases.
Here with L=9, the hard budget constraint applies when H $\geq$ 12.36.
For H<12.36, governor starts at credit D. While credit is below G, the governor is corrupt, gets no pay and no penalties. Credit grows to G in time $LN(G/D)/\delta = 13.86$.
Then good governance is expected, until a penalty brings credit below G again.

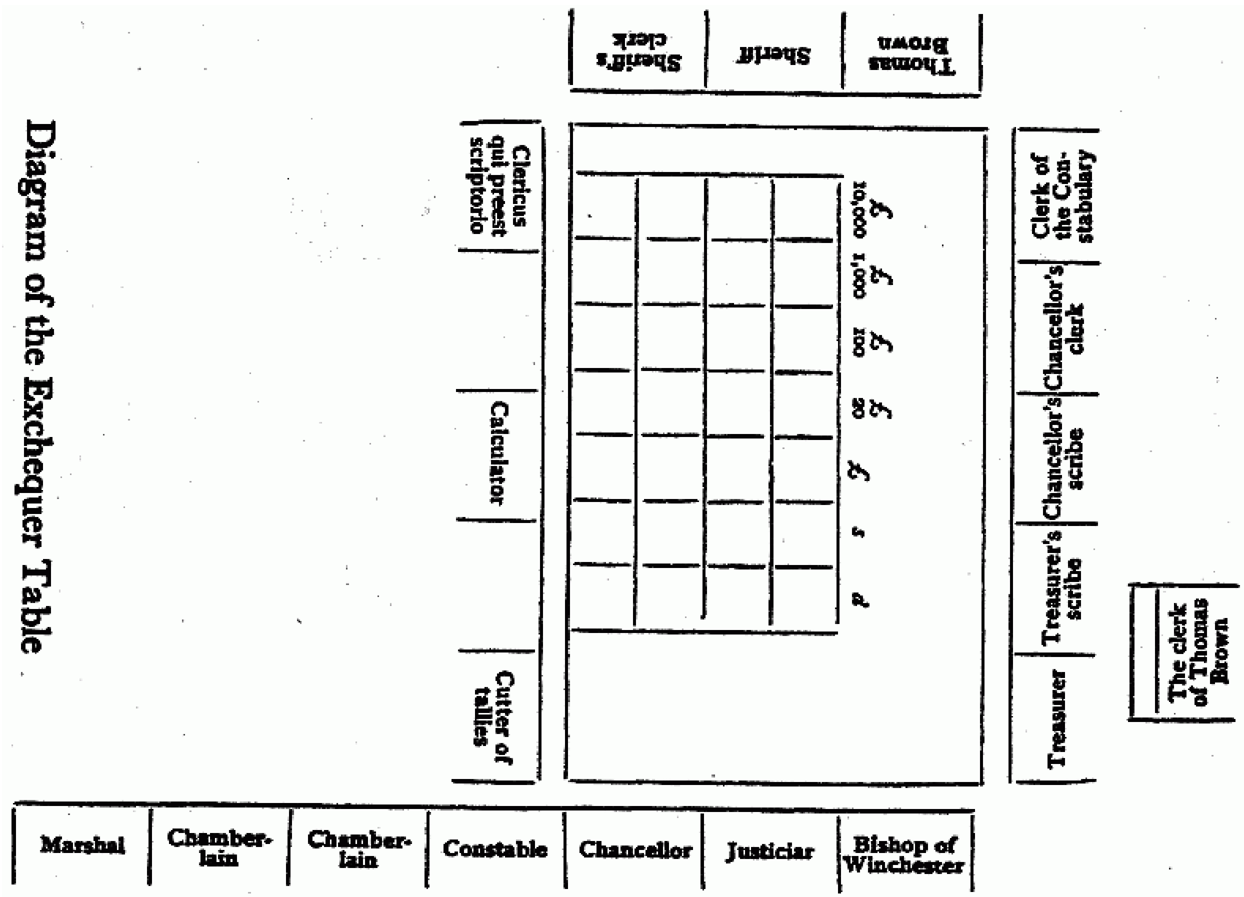




Discussion This model of high government officials is an extension of Becker-Stigler (1974), Shapiro-Stiglitz (1984). As Becker-Stigler showed, powerful officials who are hard to monitor should get great rewards for a good record, and the leader who raises them to such great expectations should charge them ex ante (in $ or prior service) for the privilege.
This backloading of rewards makes the leader a debtor to his high officials.
So an effective leader accumulates debts to high officials, and he must create institutions that give his officials some power to enforce these debts (panku, senate, exchequer, parliament).

The prospect of high payoffs makes the governor's office a valuable asset that a leader should not waste on a talented person who cannot pay for the office, unless talent inequalities are big.
The leader's ideal would be to sell the office for $K=G$, so that appointments cover their cost.
When $G=D+\gamma/(\beta-\alpha)$ is large, candidates who can pay so much may not exist.

The $G-K$ turnover loss would vanish if common people could trust the leader to hold deposits paying interest δ until the deposits grow to G and can buy a governorship.
So the key assumption is that commoners trust the leader less than high officials ($K<H$).
Throughout history, many rulers have held power without much trust from common people, but no ruler can hold power long without much trust from high officials of his government.
The need to keep officials' trust may prevent his punishing them for stealing from commoners.
So a privileged aristocracy with low entry rate is derived here from assumptions of equality among individuals' abilities (best commoner is not more talented) but scarcity of trust.



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Richard FitzNigel, Dialogue of the Exchequer (c. 1180).