Self-Enforcing Stochastic Monitoring and the Separation of Debt and Equity Claims

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H.L. Cole Self-Enforcing Monitoring

Introduction

Study model of contracting, monitoring and investment

- Outside investors hire manager and invest in project
- Project subject to short-run information friction and longer-run agency friction
- Interim reporting, monitoring and payment option helps to reduce agency friction
- Builds off Atkeson and Cole (2005)
 - deterministic monitoring and commitment yield debt-like and equity-like payments and theory of executive compensation

- Extend simplified version of model to allow for stochastic monitoring and add requirement of self-enforcement
- Retain basic predictions of AC w.r.t. debt, equity and compensation. But adds other interesting implications.
- Motivation for separation of debt and equity payments into different securities
- Failure to repay can lead to monitoring but also to no-monitoring and partial debt forgiveness
- Misreporting important to support efficient outcome

Literature

- Builds off extension of Townsend's costly state verification model
 - Assumes information asymmetry between investors and manager
 - but only temporarily, and adds agency friction
- Stochastic monitoring as in Border and Sobel. (1987)
 - permanent information friction works much differently
- Issue of self-enforcing monitoring similar to Khalil (1997)
 - though structure is almost completely different.

- Separation results similar to Dewatripont and Tirole (1994) and Berglof and von Thadden (1994)
 - motivates short-term vs. long-term claims within model of complete but noncontractible information
 - short-term claims are better able to insist on liquidation
 - in bad intermediate output states or if short-term payments are not made
 - because have stronger bargaining position ex post
- Our story doesn't rely on noncontractible information

Model

- Contracting problem between outside investors and manager
- Investors have production technology but need manager to run it.
- ▶ Manager are risk averse and have opportunity cost U₀
- Production takes place over 3 periods

Three Period Model:

- 1. Invest funds, hire manager, contract
 - funds invested long term (payout in period 3) earn market return
 - liquid funds δ cost β (payout in period 2)
- 2. Output θ realized
 - θ private information to manager
 - Manager makes report
 - Outsider investors can pay γ to monitor
 - Can ask for interim payment v
- 3. Residual output θv invested at rate 1
 - θ becomes public
 - this manager becomes essential if quits lose $au(heta+\delta- extbf{v})$
 - x is payment to manager can renegotiate
 - investors get second payment of $\theta + \delta v x$
 - consume

Details

• Discrete set of outputs $heta \in \Theta$

• c.d.f.
$$P(\theta)$$
, p.d.f. $p(\theta)$

•
$$E\{\theta\} = 1$$

•
$$\theta \in [0, b], b < \infty$$

- risk neutral investors
- risk averse manager: $E \{u(c)\}$

•
$$u'(0) = \infty$$
, and $\mathbf{u}(\mathbf{0}) = \mathbf{0}$.

▶ reservation utility U₀

Enforcement

Assume limited enforcement technology

- 1. Contracts can always be renegotiated if both parties agree to the new contract.
- 2. The manager can always quit.
- 3. None of the parties can be forced to put in additional funds after subperiod 1.

Wage Renegotiation:

- Manager can threaten to quit, reducing residual by factor au
- ▶ can therefore renegotiate wages upward so $x \ge \tau(\theta + \delta v)$

Monitoring:

Monitors need to have incentive to invest γ

Efficient Mechanism

- Both parties to contract manager and investors who act as monitors - have incentive issues.
- Standard revelation principal does not apply.
- Besster and Stausez (2001) show all payoffs on Pareto frontier can be supported by
 - direct mechanism
 - agent randomizes over their responses
 - truthful revelation is a best response
 - but not the only equilibrium response.
- Unlike Revelation Principal, not all outcomes can be supported by BS mechanism.

Contract

Timing

Period 1	Period 2	Period 3
i) hire the manager	i) θ realized	i) θ public
ii) contract	ii) manager reports	ii) renegotiate ?
iii) invest	iii) monitor or not	iii) pay manager
	iv) interim payment	iv) residual paid out

- 1. message space = type space Θ ,
- 2. δ costly liquid funds which make payments in period 2
- 3. monitoring probability $m(\hat{\theta})$ for report $\hat{\theta} \in \Theta$
- 4. interim payment $v_1(\hat{ heta}, heta)$ if monitor and $v_0(\hat{ heta})$ if not
- 5. payment to manager $x_1(\hat{\theta}, \theta)$ if monitor and $x_0(\hat{\theta}, \theta)$ if not
- 6. reporting strategy $r(\hat{\theta}, \theta)$ probability of type θ reporting $\hat{\theta}$

Physical Constraints

liquid funds $\delta \geq 0$.

Interim payments: $v_0(\hat{\theta}) \leq \hat{\theta} + \delta$ and $v_1(\hat{\theta}, \theta) \leq \theta + \delta$.

Wage payment $x_i(\hat{\theta}, \theta) \ge 0$, for i = 0, 1.

Feasible reports: $\left[\theta + \delta - v_0(\hat{\theta})\right] r(\hat{\theta}, \theta) \ge 0.$

Renegotiation-proof Wages

- The wages schedules conditional on monitoring, x₁, and not monitoring, x₀ won't be renegotiated.
- Hence
 - if monitor

$$x_1(\hat{\theta}, \theta) \ge \tau(\theta + \delta - v_1(\hat{\theta}, \theta))$$

and if not

$$x_0(\hat{\theta}, \theta) \geq \tau(\theta + \delta - v_0(\hat{\theta})).$$

Manager's Incentive Constraints

truth-telling is a best response

$$\begin{split} & m(\theta) u(x_1(\theta,\theta)) + (1-m(\theta)) u(x_0(\theta,\theta)) \\ \geq & m(\hat{\theta}) u(x_1(\hat{\theta},\theta)) + (1-m(\hat{\theta})) u(x_0(\hat{\theta},\theta)) \text{ for all } \hat{\theta}, \theta \in \Theta. \end{split}$$

all equilibrium reports do as well as truth-telling

$$0 = \begin{bmatrix} m(\hat{\theta})u(x_1(\hat{\theta},\theta)) + (1-m(\hat{\theta}))u(x_0(\hat{\theta},\theta)) \\ -m(\theta)u(x_1(\theta,\theta)) + (1-m(\theta))u(x_0(\theta,\theta)) \end{bmatrix} r(\hat{\theta},\theta)$$

for all $\hat{\theta}, \theta \in \Theta$.

Monitors' Incentive Constraint

- ▶ the net expected payment be equal to zero if $m(\hat{\theta}) \in (0, 1)$, nonnegative if $m(\hat{\theta}) = 1$ and nonpositive if $m(\hat{\theta}) = 0$.
- the net expected gain depends upon how the claims to output are distributed among the outside investors.
- Consider two cases: (1) an investor held all of the claims and (2) one investor (the monitor) held the claims to second period and a second investor held the claims to third period:
- 1. **Unseparated Claims Condition:** The expected gain to the monitors is

$$\leq \left[E\left\{ v_{1}(\hat{ heta}, heta)
ight\} - v_{0}(\hat{ heta})
ight] au - \gamma$$
,

2. **Separated Claims Condition:** The expected gain to the monitors is

$$= \left[E\left\{ v_1(\hat{\theta}, \theta) \right\} - v_0(\hat{\theta}) \right] - \gamma,$$

Definition: Contract is *self-enforcing* if there exists a $\phi \in [\gamma, \gamma/\tau]$ such that

$$\sum_{\theta} \left\{ \left[v_1(\hat{\theta}, \theta) - v_0(\hat{\theta}) \right] - \phi \right\} r(\hat{\theta}, \theta) p(\theta) \stackrel{\geq}{=} 0 \text{ if } m(\hat{\theta}) = 1$$
$$= 0 \text{ if } m(\hat{\theta}) \in (0, 1)$$
$$\leq 0 \text{ if } m(\hat{\theta}) = 0$$

for any reports $\hat{ heta}$ which occur with positive probability.

Assume investors/monitors sell portion to of residual claim to other passive outside investors.

Show efficient to have $\phi=\gamma$ - which implies only hold interim claim.

Contracting Problem

Choosing ϕ , δ , $m(\theta)$, $v_0(\hat{\theta})$, $v_1(\hat{\theta}, \theta)$ and $x_i(\hat{\theta}, \theta)$ so as to

$$\max \sum_{\theta \in \Theta} \sum_{\hat{\theta} \in \Theta} \left\{ \begin{array}{c} \theta - m(\hat{\theta}) \left[x_1(\hat{\theta}, \theta) + \gamma \right] \\ -(1 - m(\hat{\theta})) x_0(\hat{\theta}, \theta) \end{array} \right\} r(\hat{\theta}, \theta) p(\theta) - \beta \delta \quad (1)$$

subject to

the feasibility conditions, the renegotiation-proof wage constraint,

the incentive constraints on the manager,

the monitoring incentive constraint,

and the participation condition of the manager

 $\sum_{\theta \in \Theta} \sum_{\hat{\theta} \in \Theta} \left[m(\hat{\theta}) u(x_1(\hat{\theta}, \theta)) + (1 - m(\hat{\theta})) u(x_0(\hat{\theta}, \theta)) \right] r(\hat{\theta}, \theta) p(\theta) \geq U_0.$

Assume that monitoring must be extreme:

$$m(\theta) \in \{0,1\}$$
 for all $\theta \in \Theta$.

- 1. Start with commitment contract
- 2. Show how it can be made self-enforcing
- 3. Show how even limited randomization can improve things.

Proposition

There is an efficient contract with the following properties:

1.
$$v_1(\hat{\theta}, \theta) = \theta$$
 for all $\hat{\theta} \in \{\hat{\theta} \in \Theta : m(\hat{\theta}) = 1\}$,
2. $v_0(\hat{\theta}) = \theta^*$ for all $\hat{\theta} \in \{\hat{\theta} \in \Theta : m(\hat{\theta}) = 0\}$, where
 $\theta^* = \min\{\hat{\theta}|m(\hat{\theta}) = 0\}$,
3. $m(\hat{\theta}) = 1$ for all $\hat{\theta} < \theta^*$,
4. for $\hat{\theta} \neq \theta$, $x_1(\hat{\theta}, \theta) = 0$ if $\hat{\theta} < \theta^*$ and $x_0(\hat{\theta}, \theta) = \tau(\theta - \theta^*)$ if
 $\theta > \theta^*$,

the equilibrium payments to the manager have the form x_i(θ, θ) = w(θ), w(θ) = max {w̄, τ(θ − θ*)}, and
 δ = 0.

Proof: see Atkeson and Cole (2005).

- ► AC noted that condition (1) and (4) made the punishments as large as possible given (2).
- ► They then noted that given (4), one never wanted to tell a lie that lead to monitoring, and that that making lowest v₀(â) as large as possible weakly relaxed the renegotiation-proofness constraint.
- ▶ However, since min $\{v_0(\hat{\theta}) : \hat{\theta} \in \Theta \text{ and } m(\hat{\theta}) = 0\} \leq \theta^*$, it followed that the best misreport at least θ^*
- Therefore, there was no gain to raising v₀(θ) above θ*, hence
 (2) follows.
- Then they noted that any monitoring above θ* did not relax the incentive constraint and hence (3) follows.
- ▶ Given (1) (4), it follows that the renegotiation constraint and the incentive constraint reduce to the requirement that

$$u(w(\theta)) \geq u(\tau(\theta-\theta^*)) \text{ for all } \theta \geq \theta^*.$$

Since the manager is risk averse, it follows that compensation should be constant unless this constraint binds, and this implies (5). Proposition implies that

- interim payment looks like a debt contract
 - pay θ^* or get monitored and take everything
- Optimal compensation:
 - \blacktriangleright base wage \bar{w} and
 - ▶ performance bonus $w(\theta) \bar{w}$ triggered by a high θ
- assume w̄ invested up front
- residual payment in the third period resembles equity.
 - get nothing if $\theta < \theta^*$
 - get $heta heta^* [w(heta) ar w]$ above $heta^*$

Deterministic Monitoring without Commitment

lf

$$\mathsf{E}\left\{ heta| heta< heta^{*}
ight\} \geq\phi$$
 ,

then we will be able to completely replicate the commitment contract. The efficient contract with commitment self-enforcing requires only some simple changes:

1. monitor if
$$\hat{\theta} < \theta^*$$

2. $r(0, \theta) = 1$ if $\theta < \theta^*$ and 0 o.w.,
3. $x_1(\hat{\theta}, \theta) = \bar{w}$ if $\hat{\theta} < \theta^*$ and $\theta < \theta^*$, and $x_0(\hat{\theta}, \theta) = \max[\bar{w}, \tau(\theta - \theta^*)]$
4. $v_1(\hat{\theta}, \theta) = \theta$ if $\hat{\theta} < \theta^*$ and $v_1(\hat{\theta}, \theta) = \theta^*$ o.w.
5. $v_0(\hat{\theta}) = \hat{\theta}$ if $\hat{\theta} \le \theta^*$ and $v_0(\hat{\theta}) = \theta^*$ o.w.
6. $\delta = 0$

Too see this is incentive feasible:

- For reports θ̂ ∈ (0, θ*), which occur with probability 0, the expected return of the monitors is not pinned down by the actions of the manager and we are free to set their expectation equal to φ if they receive such a report.
- ► Given this, the monitors at least weakly prefer to monitor for any report θ̂ < θ*.</p>
- Since the expected payment to debt is θ* regardless of whether or not monitoring takes place for any truthful report θ ≥ θ*, the monitors strictly prefer not to monitor for reports θ̂ ≥ θ*.
- This establishes that monitoring is self-enforcing.
- Since the manager is being treated the same for any report $\hat{\theta} < \theta^*$ (when $\theta < \theta^*$), he is indifferent over these reports. If $\theta \ge \theta^*$ note that the manager does weakly better by telling the truth. Hence the suggested reporting strategy is a best response for the manager.

- Interim payment still looks like debt
 - monitor for report $\hat{ heta} < heta^*$ and take everything
 - \blacktriangleright don't monitor for report $\hat{\theta} \geq \theta^*$ and take θ^*
- misreports mean that only $\hat{\theta} = 0$ seen if $\theta < \theta^*$.
- equity-residual and wage payments essentially unchanged
 - except some misreporting is no longer punished.

Misreporting Key

If all managers were compelled to truthfully report their output levels,

- ► then no monitoring for output levels below φ could be supported.
- But in this case, the best lie would always be to report 0,
- and hence there would be no gain from monitoring,
- hence monitoring would be set to 0.



$$E\left\{ heta| heta< heta^{*}
ight\} <\phi$$
 ,

doesn't hold, then δ will need to be positive in order to generate the same outcome

- (modulo the cost of these funds $\beta\delta$).
- This will induce a trade-off between monitoring more (i.e. raising θ^*) and making δ positive.
- Taking θ^{*} as given, we need to make the following changes to the contract relative to that when the inequality was reversed.

4'.
$$v_1(\hat{\theta}, \theta) = \theta + \delta$$
 if $\hat{\theta} < \theta^*$ and $v_1(\hat{\theta}, \theta) = \theta^* + \delta$ o.w.
5'. $v_0(\hat{\theta}) = \hat{\theta}$ if $\hat{\theta} < \theta^*$ and $v_0(\hat{\theta}) = \theta^* + \delta$ o.w.
6'. $\delta = \max \left[\phi - E \left\{ \theta | \theta < \theta^* \right\}, 0 \right]$

- Now, the debt contract is no longer taking everything that the manager says he has
- in order to generate a larger gap between the monitoring and no monitoring payments via the additional funds δ.
- However, by expanding the set of possible reports, one can restore this property.
 - expand Θ to include $-\delta$.
 - ▶ have the manager report $\hat{\theta} = -\delta$ if $\theta < \theta^*$,
 - and we can set $v_0(\hat{ heta}) = \hat{ heta} + \delta$ for all $\hat{ heta} < heta^*$
 - when the manager reports $\hat{\theta}=-\delta$ and has $\theta\leq\theta^*$ he is paid \bar{w}

Randomized Monitoring is Efficient

- Deterministic monitoring is taking place for θ̂ < θ^{*} in order to shrink τ(θ − θ^{*}) for θ > θ^{*}.
- if monitoring probability π satisfied

$$\pi u(\tau(\theta - \hat{\theta})) \le u(w(\theta)),$$

then a manager with output $\boldsymbol{\theta}$ would have no incentive to misreport.

- ▶ monitoring with probability 1 everywhere is inefficient and inefficiency large for $\hat{\theta}$ close to θ^* .
- even for a report of 0 don't need $\pi = 1$ if $\bar{w} > 0$.
- Easy to construct improvements with commitment.

- ► With self-enforcement things are a bit trickier.
- Simple example of an improvement
 - $\Theta = \{\theta_0, \theta_1, ..., \theta_N\}$, where $\theta_j < \theta_{j+1}$, $\theta_0 = 0$, and we take $\theta^* = \theta_J$.
 - Assume that $E \{ \theta | \theta < \theta^* \} > \phi$ (which implies that $\delta = 0$) and $\bar{w} \ge \tau \phi$.
- Consider alterative mechanism in which we
 - ▶ partition the interval $\{\theta_0, ..., \theta_{J-1}\}$ into $\{\theta_0, ..., \theta_I\}$ and $\{\theta_{I+1}, ..., \theta_{J-1}\}$, where $E\{\theta|\theta \le \theta_I\} \ge \phi$.
 - ► Managers with output θ ≤ θ_I still report output of 0 and are monitored with probability 1, and receive compensation w̄.
 - Managers with output θ ∈ {θ_{I+1}, ..., θ_{J-1}} report output θ − φ, and hence payout θ − φ if they aren't monitored, and θ if they are monitored.
 - ► (This may require expanding the type space ⊕ to include these probability zero types).

- With this interim payout schedule, any monitor who receives one of these reports is by construction just indifferent between monitoring and not.
- Since w

 τφ, the types that make these misreports cannot renegotiate their wage contract upwards.
- We are free to set the monitoring probabilities for θ ∈ {θ_{I+1}, ..., θ_{J-1}} to just prevent any higher output type from misreporting this output level.
- By shrinking φ, we can shrink θ_I : E {θ|θ ≤ θ_I} ≥ φ, and get bigger savings.

- If $\bar{w} < \tau \phi$ then these types that misreport downwards will be able to renegotiate their wage up to $\tau \phi$ if monitoring does not take place.
- In which case, the compensation schedule will have to be changed to keep them indifferent, or

$$u(\tau\phi)(1-m(\theta-\phi))+u(x_1(\theta-\phi,\theta))m(\theta-\phi)=u(\bar{w}),$$

and

- their consumption when they aren't monitored, τφ, is higher than their consumption when they are monitored, x₁(θ − φ, θ) < w̄;
- though as $m(\theta \phi) \rightarrow 1$, $x_1(\theta \phi, \theta) \rightarrow \bar{w}$.
- This consumption gap is inefficient, and the expected level of compensation will be higher. Hence, there is now a cost associated with reducing the extent of monitoring.
- This cost is made smaller by shrinking φ.

Implications of Randomized Monitoring

Debt claims look even more like real world debt

- When face value of the debt $\theta^* + \delta$ is paid, no monitoring.
- When $\theta^* + \delta$ not paid,
 - monitoring may occur, in which case everything is taken
 - \blacktriangleright monitoring may not occur and investors settle for less than $\theta^* + \delta$
 - monitoring is motivated by belief that recovery will cover costs.
- Residual payment still looks like equity
- Compensation still looks like base pay w plus performance bonus

Show that efficient contract has the essential features of the example.

It is efficient to set $\phi = \gamma$; thereby making ϕ as small as possible. Let $\theta^* = \min\{\hat{\theta} : m(\hat{\theta}) = 0\}$. It is efficient to set $v_0(\hat{\theta}) = \theta^* + \delta$ if $\hat{\theta}$ is s.t. $m(\hat{\theta}) = 0$, and to set $m(\tilde{\theta}) = 0$ if $v_0(\tilde{\theta}) \ge \theta^* + \delta$.

Nice Contract

Want to construct alternative efficient mechanism which leads to a debt contract:

- A. for reports that can trigger monitoring, everything is taken, or $v_1(\hat{\theta}, \theta) = \theta + \delta$ and $v_0(\hat{\theta}) = \hat{\theta} + \delta$ if $m(\hat{\theta}) > 0$.
- B. for high enough reports that do not trigger monitoring, a constant amount is taken which is weakly larger than that what can trigger monitoring, or $v_0(\hat{\theta}) = \theta^* + \delta \ge \max{\{\hat{\theta} : m(\hat{\theta}) > 0\}} + \delta.$

Example to Illustrate Proof

Take everything you say you have if $\theta < \theta^*$

С	OLD MECHANISM		
	θ	10	15
	ω	7	10
	т	1/2	1/4
	v ₀	5	5

NEW MECHANISM			
θ	10	15	
ω	(5,1/2)	(5,1/4)	
m	1/2	1/4	
V ₀	5	5	

 \blacktriangleright Use second report in case of same v_0 with different monitoring probabilities.

Example to Illustrate Proof

If monitor take everything you have - $v_1(\hat{\theta}, \theta) = \theta + \delta$.

NEW MECHANISM			
θ	5	15	
ω	(5,1/2)	(5,1/2)	
#	1/2	1/2	
v_1	5	10	

NEW NEW MECHANISM

θ	5	15	15
ω	(5,1/2)	(5,1/2)	(15-2.5,1/2)
#	1/2	.1667	0.3333
<i>v</i> ₁	5	15	15

▶ Note that (.1667 * 10)/(.1667 + .5) = 2.5 and .1667 + .3333 = .5

Proposition

There exists a θ^* , such that for all $\hat{\theta} \ge \theta^*$, $r(\hat{\theta}, \hat{\pi}) = 0$ for all $\hat{\pi} > 0$ (and hence monitoring is taking place with zero probability), and it is efficient to set $v_0(\hat{\theta}, 0, \hat{\theta}) = v_1(\hat{\theta}, 0, \hat{\theta}, \theta) = \theta^*$.

Proof:

- Just as in the commitment case, for high enough reports neither the incentive or the no-perks constraint can bind. Hence, it is efficient to no longer monitor.
- ▶ Given this, the same argument as in the commitment case implies that this is an efficient way to set v₀ and v₁ with respect to the manager.
- Finally, note that this setting of v₀ and v₁ satisfies our self-enforcing constraint.

Compensation Results

- Define the manager's payoff conditional on his output as $y(\theta)$.
- $y(\theta) = u(\bar{w})$ unless either the incentive or equal utility constraints bind.
- When the incentive, no-perks, and equal utility constraints don't bind, then x₀(ω, θ) = x₁(ω, θ) = w̄.
- So long as the no-perks constraint doesn't bind x₀(ω, θ) = x₁(ω, θ)

- When a manager truthfully reports his type, then if θ ≤ θ*, v₀ = v₁ = θ and no-perks cannot bind
- ► However, for large misreports u(τ(θ − θ̂(ω))) > y(θ), and the no-perks constraint can bind.
 - In this case $x_0(\omega, \theta) > x_1(\omega, \theta)$.
- Monitoring now effects extent of consumption distortion, which increases incentive to monitor. Hence monitoring may not be decreasing in θ(ω).

Proposition

The conditional equilbrium payoff of the manager, $y(\theta)$ is given by

$$y(heta) = \max\left[u(ar w), \max_{\omega: \hat heta(\omega) \leq heta} (1-m(\omega)) u(au(heta-\hat heta(\omega)))
ight].$$

This characterization is essentially identical to what we found in the commitment case, and implies that the conditional payoff is increasing in θ.

Concluding Comments

- We have considered a simple model of a firm which hires a manager to produce output subject to a long-run agency friction and a short-run information friction.
- We allowed for stochastic monitoring because of its ability to efficiently economize on the extent of monitoring while inducing the correct incentives on reporting.
- Since monitoring is ex post inefficient and suppose to be undertaken randomly, we have required it to be self-enforcing.

- We have shown that efficient contract with self-enforcing monitoring shares many of the same characteristics that AC.
 - First, the intermediate payment has a debt like characteristic in which everything is taken when monitoring occurs, and that it is efficient to have a flat payment equal to the highest report that can trigger monitoring with positive probability for reports so high that monitoring will not occur.
 - Second, compensation takes the form of a base payment plus a performance bonus triggered by the binding of either an incentive constraint or an equal utility constraint.

- However, unlike the deterministic case with commitment, debt forgiveness is an integral part of the efficient contract with stochastic monitoring
- And, unlike the commitment case, misreporting plays an important role in sustaining monitoring.
- In addition, we have shown that complete separation of claims is efficient when monitoring is self-enforcing. This provides a rational for the unbundling of the debt and equity payments coming out of the firm.
- It is relatively straightforward to show that a dynamic version of this model will also have these features.

Comparing to Banks and Sobel (1987)

- BS examined a persistent information friction under commitment
- As in BS, we find that monitoring probabilities decline with reported output, while payments at least weakly increase.
- While they also find that monitoring probabilities go to zero at the highest reported output level, the extent of no-monitoring at the top seems much more pervasive in our model than theirs.
- In BS agent receives higher consumption when audited. Here agent is indifferent.