Supplementary Materials for Mark J. McCabe, "Principals, Agents, and the Learning Curve: The Case of Steam-Electric Power Plant Design and Construction," The Journal of Industrial Economics 44 (4), December 1996, pp. 357-376

This paper makes five references to different materials on the Journal's web page. Each is presented below, in their order of appearance.

1. Appendix

2. Regression results for nukes that include a "need for new capacity" variable are shown in Table 1.

Explanatory Note: The two versions of this variable - $(g_{CP}-g_3)/g_{CP}$ and $(g_{CP}-g_M)/g_{CP}$ - are constructed from load growth forecasts at three points during a unit's construction: the year a construction permit is granted (g_{CP}), three years after this permit is granted (g_3), and the year corresponding to the midpoint of construction (g_M). When the initial load forecast prove optimistic, e.g., $g_{CP} > g_3$, the expectation is that a principal will postpone project completion, increasing plant leadtime.

Previous empirical work, using $(g_{CP}-g_M)/g_{CP}$, suggests that longer leadtimes is associated with higher unit costs (see Cantor and Hewlett [1988] for further details). However, since this particular version of the variable is itself endogenous - the actual construction midpoint is something to be explained - I have also estimated the model using $(g_{CP}-g_3)/g_{CP}$. This alternative variable should be exogenous and is motivated by the fact that initial construction leadtime estimates typically ranged from six to eight years. Thus, $(g_{CP}-g_3)/g_{CP}$ measures the change in load growth at a point in time *initially* forecast to be the construction midpoint.

3. Regression results for nukes using "overnight costs" as a dependent variable are shown in Table 2.

4. Regression results for both coal and nuclear units, using log(1+experience) as the functional form for the learning variables, are shown in Table 3.

5. Regression results for Version A of Model 3, for both coal and nuclear units, are shown in Table 4.

Appendix

I. Utility Incentives To Learn

With a few exceptions, the electric utilities in our sample are subject to economic regulation at the state level. In theory, prices are set by a state public utility commission (PUC) so that both operating costs and capital costs are covered. Capital cost is equal to depreciation plus a "fair" rate of return on a firm's capital that is at least equal to the cost of capital.

The incentive effects of this form of regulation depend critically on the details of the price-setting process. In the well known Averch-Johnson (A-J) model (see Averch and Johnson [1962]), prices are adjusted instantaneously in response to any changes in costs so that the firm never earns more than the allowed rate of return. A utility's incentive to reduce costs depends then on the relationship between this allowed rate of return and the firm's cost of capital. If the allowed rate of return just equals the firm's cost of capital then no incentive exists because profits are always equal to zero (in fact, the level of capital is indeterminate). However, A-J's primary result, that the capital-labor ratio is too high, rests on the assumption that the firm's allowed rate of return is *higher* than its cost of capital. In this environment cost reduction can be profitable, e.g., if demand is sufficiently elastic then adding units of cheaper generating capacity can result in greater *aggregate* profits; of course, the rate of return would remain unchanged.

A more realistic portrayal of the price-setting process is described in Joskow [1974]. In practice, PUCs do not continuously adjust prices to insure that rates of return are less than some allowed level. Rather, the primary concern of regulatory commissions is to avoid increases in *nominal* prices. If nominal prices are relatively stable (as in the 1950s and 1960s) then strong incentives exist for firms to reduce costs. In fact,

> Firms which can increase their earned rates of return without raising prices or by lowering prices (depending on changing cost and demand characteristics) have been permitted to earn virtually any rate of return that they can. (Joskow [1974], p. 298)

Of course, during part of the sample period (the 1970s and early 1980s) the nominal cost of capital investments increased. This forced utilities to request frequent upward adjustments in their rates from regulatory authorities. Given the latter's objective function, these conditions would most likely produce a decline in average returns and limit the variation in their (real) level over time as regulators attempted to constrain returns to a "fair" level. Thus, regulation would resemble the A-J type. As explained above, cost-reduction can be profitable in an A-J world.[1] (note that cost-reduction in an inflationary environment does not preclude outcomes in which nominal capital costs increase.)

Another consequence of capital cost inflation in the 1970s and 1980s was the willingness of regulators to "disallow" some or all of the costs associated with projects that turned out to be extremely expensive or unnecessary to meet demand. This threat of disallowance is an added incentive to control costs by exploiting opportunities for learning.[2]

II. Agent Incentives To Learn

i. The Basic Supergame - No Cost Uncertainty

There are two participants in this game: a principal, P, and its agent, A. Their common discount factor is δ. P has plans to hire A to build a single plant in each of the $T=\infty$ periods.[3] The design and construction process exhibits dynamic increasing returns due to learning. Prior to the start of the game a single (turnkey) plant has been constructed at cost C_0; the experience gained from this project is available to A in the game's first period.

Contracting is of the cost-plus form, C + F, where C is the realization of plant costs and F is a rent chosen by P. C is observable by both parties. At the beginning of period t the principal offers A this contract, with the value of F contingent on A's performance history.

After receiving a contract in period t, A chooses some level of cost-reducing effort, $E \in [0,\infty)$, expressed in monetary equivalents. In period t, a level of effort, E^*_t, produces the efficient level of cost reduction (efficient in the sense that the marginal benefits and costs of agent activity are equated, i.e., dC/dE = -1)). If A chooses $E_t < E^*_t$ then the level of cost reduction is less than optimal. A's objective is to maximize the present discounted value of its cost reduction efforts, π_A:

(1) $$\sum_{t=1}^{\infty} \delta^{t-1}(F_t - E_t)$$

P's objective is to maximize the present discounted value of the net benefits from cost reduction, π_P:

(2) $$\sum_{t=1}^{\infty} \delta^{t-1}(\Delta C_t - F_t)$$

where ΔC_t is the amount of cost reduction in period t. If the efficient level of effort is supplied by A in period t then $\Delta C_t = \Delta C^*_t$; If A chooses $E_t < E^*_t$ then $\Delta C_t < \Delta C^*_t$.

We assume that $\Delta C_t > E_t$ for $E_t \leq E^*_t$. That is, cost reduction is socially desirable in any period t. We also assume that, given $C_0, C_1, ...C_{t-1}$, P is able to infer A's levels of effort in preceding periods. Thus, the relationship between effort and cost-reduction is known by P (with no uncertainty). P is able to offer a contract in period t with full information about A's performance history. Finally, since it is likely that learning exhibits diminishing returns, let $\Delta C^*_t=\gamma^{t-1}\Delta C^*_1$ $\forall$ t, $0 < \gamma < 1$. E^*_t is assumed to follow the same process.

Now consider the firms' strategies. We require that strategies form a perfect equilibrium. That is, for any history at date t, P's (A's) strategy from date t on maximizes the present discounted value of its profits given A's (P's) strategy from that date on. Suppose P adopts the following strategy: in period one, a contract is awarded with F>0. The same contract is offered in period t if in every period preceding t the agent has reduced costs efficiently. Otherwise, no contract is offered in period t (the "grim strategy"). Given P's strategy, A will choose the level of effort in period t that maximizes (1).

Cost reduction is an equilibrium if the discount factor is sufficiently large. To see this, first consider A's effort decision in period 1. If A shirks, she earns period one profits of F but then receives zero forever more. However, if A exerts the efficient level of effort in period 1 and during all future periods then her profits are

(3) $$[F\bullet(1+\delta+\delta^2+...)] - [E^*_1\bullet(1+\lambda+\lambda^2+...)] = [F/(1-\delta)] - [E^*_1/(1-\lambda)]$$

where $\lambda = \delta\times\gamma$. Comparing these two payoffs, A will reduce costs if

(4) $$F \leq [F/(1-\delta)] - [E^*_1/(1-\lambda)]$$

or,

(5) $$E^*_1/F \leq [(1-\lambda)/(1-\delta)] \bullet \delta$$

Knowing this, P will choose an F that maximizes (2) subject to (5). If $\pi_P(F^*) > 0$, then a "learning" equilibrium exists where A exerts the efficient level of effort in each period.[4] Efficient cost reduction over time is the observed result.

ii. The Yardstick Supergame.

a. Perfectly Correlated Costs

Here we relax the assumption that P is able to distinguish between low and high cost outcomes in the periods prior to t by using information on A's cost over time (C_1,...C_{t-1}) and knowing C_0 and ΔC. Because of the uncertain impact of various technological and regulatory shocks on plant costs, P and at least one other principal must implement a system of yardstick competition where different agents' costs can be compared, and thereby provide an indicator of individual agents' performances.[5]

Suppose that there are n principals, P_1,...,P_n, each hiring a separate agent A_k (k=1,...,n) to build a single plant in each of the $T=\infty$ periods. We assume that plant designs are identical in any given period, though they may differ from period to period due to exogenous technological and regulatory factors.

The other assumptions of section 1 apply to both principal/agent pairs and are symmetric, e.g., a common discount factor, δ, for all parties, the same initial costs, C_0, etc., except that principals need to compare their agents' costs to make inferences about agent performance. Of course, we also need to insure that these cost comparisons are themselves feasible: besides the factors influencing plant design we assume that exogenous economic shocks, e.g. inflation, in period t are perfectly correlated. Thus, if effort levels have been identical during periods 1,...t-1, and are the same in period t, then period t costs will be the same.

Now consider the firms' strategies. As before, we require that strategies form a perfect equilibrium. Suppose P_k adopts the following strategy: in period one, a contract is awarded to A_k

with F>0. The same contract is offered in period t if in every period preceding t A_k's costs are no higher than any other agent's costs. Otherwise, no contract is offered in period t. Given P_k's strategy, A_k will choose the level of effort in period t that maximizes (1). The same set of strategies are adopted by all other principals and agents, respectively.

Provided that (5) is jointly satisfied,[6] then it is clear that all agents exerting the efficient level of effort is an equilibrium. If A_k expects other agents to reduce costs in period t and all future periods, then A_k reveals that she did not exert effort by building a plant at higher cost in period t. Upon observing the high cost P_k denies A_k any contracts in future periods. Of course, if this expectation is reversed - no agent expects any other agents to reduce costs in period t or any future periods - then all agents shirking is an equilibrium as well.[7]

b. Imperfectly Correlated Costs

Suppose now that plant designs exhibit cross-sectional variation in each period, and that as a consequence expected plant costs are imperfectly correlated. More formally, assume that (1) after accounting for common design attributes, e.g. plant size, and past learning, ΔC^*_t is i.i.d. (with positive and finite support, $[\Delta C^*_{Lt}, \Delta C^*_{Ht}]$, $0 < \Delta C^*_{Lt} < \Delta C^*_{Ht} < \infty$),[8] (2) agents but not principals can accurately predict ΔC_t, conditional on effort, prior to its completion and that (3) conditions (1) and (2) are common knowledge.

Principals employ a modified form of the yardstick mechanism described above to induce agent learning. Since project costs in period t are uncorrelated, principals define some minimum ΔC_t ($\Delta CMIN_t$) to distinguish between shirking ($\Delta C_t < \Delta CMIN_t$) and efficient learning ($\Delta C_t \geq \Delta CMIN_t$). Conditions (1) and (2) imply that for any $\Delta CMIN_t$ within the interval $[\Delta C^*_{Lt}, \Delta C^*_{Ht}]$, some agents will be able to exert less than the efficient level of effort and still complete their projects at costs just equal to $\Delta CMIN_t$ (given the cdf, $D_t(\bullet)$, associated with period t cost reduction, the number of such agents equals $n(1 - D_t(\Delta CMIN_t))$. Agents for which $\Delta C^*_t < \Delta CMIN_t$ will exert no effort; for these agents, $\Delta C_t = 0$.

Since principals are aware of this potential asymmetry, what $\Delta CMIN_t$ is optimal? Suppose the following condition holds:

$$(6) \qquad [1 - D_t(\Delta C^*_{Lt} + \epsilon)](\Delta C^*_{Lt} + \epsilon) + [D_t(\Delta C^*_{Lt} + \epsilon)]\bullet 0 < \Delta C^*_{Lt} ,$$

$$\forall\ \epsilon, \forall t,\ (\Delta C^*_{Ht} - \Delta C^*_{Lt}) \geq \epsilon > 0$$

The lhs of the inequality is the expected cost of a project built for a principal that sets $\Delta CMIN_t = \Delta C^*_{Lt} + \epsilon$. Condition (6) implies that any $\Delta CMIN_t > \Delta C^*_{Lt}$ results in higher expected costs. When $\Delta CMIN_t = \Delta C^*_{Lt}$ expected costs are minimized: eliciting efficient effort from the highest cost agent(s) (while lower cost agents shirk to some degree) reduces costs the most in each period.

Given (6), principals will set $\Delta CMIN_t = \Delta C^*_{Lt}$, resulting in cost reduction equal to ΔC^*_{Lt}. On average, learning is reduced compared to the case where costs are perfectly correlated (see footnote 6). A corollary is that, given the mean potential value of cost reduction, the aggregate level of cost reduction is inversely related to the degree of project-specific uncertainty (as this uncertainty increases, ΔC^*_{Lt} decreases).

Endnotes

1. By the 1980s some PUCs had adopted explicit incentive mechanisms for controlling utility costs, including capital costs. For a discussion of these programs see Joskow & Schmalensee [1986].

2. See Joskow & Schmalensee [1986], footnote 31, for examples.

3. This infinite horizon need not be taken too seriously. One can introduce the possibility that P's future plans are contingent without affecting the results. Suppose that for each period the probability is x (where $0<x<1$) that P's plans "survive", that is, P continues to build plants in this and future periods; 1-x represents the probability that P's need for additional plants disappears, or perhaps, that the technology becomes obsolete. Thus, the game ends in finite (but stochastic) time with probability 1 (since $x^{\infty}=0$). One can then define a new discount factor, $\delta'=\delta \bullet x$, which preserves the appearance of an infinite horizon in the supergame. See Tirole [1988], chapter 6. Note that this stochastic interpretation is implicit in our use of a supergame model to explain behavior in the nuclear industry. A halt in plant construction (as observed in the 1980s) can be seen as an event which had a nonzero probability in each period of the industry's history.

4. It is easy to show that behavior off the equilibrium path is sub-game perfect.

5. A simpler alternative is to have a single principal hire two or more different agents to compete in each period. However, because this choice was not observed in the nuclear industry, we address the slightly more complex case of multiple principals.

6. By jointly satisfied I mean that, contingent on at least one other agent having exerted efficient effort in the earlier periods, A's choice of an efficient level of effort in period t is optimal given expectations that one or more agents will do the same during t and all future periods.

7. Elimination of this shirking equilibrium is possible if the principals can make credible promises to reward a hard-working agent. Suppose in period t that all agents shirk save one, A_k. A_k then has lower costs for all future periods, given the grim strategy. Principals would then prefer to hire A_k for any future projects. Provided that A_k can meet the increased demand for its services - we assume a CRS production function - each principal will hire A_k. This outcome is clearly observable and verifiable. Thus, an enforceable contract can be written which rewards A_k with a premium payment when all other agents shirk in period t. If the principals agree to such a contract one can show that there exists a premium large enough to elicit high effort from an agent whenever $\Delta C > S \bullet (2-\delta)/n\delta$. If the premium is large enough then it is a dominant strategy for each agent to exert effort. Thus, in equilibrium no premium payment is observed.

8. We assume here that the mean value of this interval equals ΔC^*_t in the case of perfectly correlated costs. That is, the potential for learning is the same in the two cases.

References

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Table 1
Regression Results / Nukes Only / Need For New Capacity

	Model 1		Model 2		Model 3	
Variable	$(g_{CP}-g_3)/g_{CP}$	$(g_{CP}-g_M)/g_{CP}$	$(g_{CP}-g_3)/g_{CP}$	$(g_{CP}-g_M)/g_{CP}$	$(g_{CP}-g_3)/g_{CP}$	$(g_{CP}-g_M)/g_{CP}$
A (Bechtel/GC)	7.4678*** (1.8740)	7.8799*** (1.7872)	6.9198*** (1.7738)	7.4326*** (1.6945)	7.1421*** (1.7521)	7.5814*** (1.6461)
lnSIZE	–0.3097 (0.2876)	–0.3560 (0.2742)	–0.2343 (0.2712)	–0.2932 (0.2589)	–0.2584 (0.2681)	–0.3077 (0.2518)
WAGE	0.0683** (0.0322)	0.0682** (0.0306)	0.0694** (0.0306)	0.0689** (0.0291)	0.0594* (0.0301)	0.0592** (0.0282)
FIRST	0.3881*** (0.0682)	0.3855*** (0.0634)	0.3944*** (0.0653)	0.3852*** (0.0607)	0.3981*** (0.0644)	0.3961*** (0.0593)
COOLTWR	–0.1094 (0.0802)	0.0961*** (0.0763)	–0.0753 (0.0776)	–0.0581 (0.0740)	–0.0573 (0.0770)	–0.0443 (0.0722)
NEWCAP	0.1684 (0.3821)	0.6795*** (0.2568)	–0.0180 (0.3639)	0.6191** (0.2445)	0.1882 (0.3601)	0.7114*** (0.2370)
CONPERM	–0.0039 (0.0096)	–0.0046 (0.0091)	–0.0033 (0.0091)	–0.0045 (0.0086)	–0.0022 (0.0091)	–0.0031 (0.0378)
$CONPERM^2$	0.00051*** (0.00018)	0.0004*** (0.00017)	0.00058*** (0.00017)	0.00047*** (0.00016)	0.0005*** (0.00016)	0.0004** (0.00016)
$CONPERM^3$	$-3x10^{-6}$*** ($9x10^{-7}$)	$-2x10^{-6}$** ($9x10^{-7}$)	$-3x10^{-6}$*** ($9x10^{-7}$)	$-3x10^{-6}$*** ($9x10^{-7}$)	$-3x10^{-6}$*** ($9x10^{-7}$)	$-2x10^{-6}$*** ($8x10^{-7}$)
AELEARN	–0.0061 (0.0100)	–0.0048 (0.0095)				
OUTLEARN			–0.0198** (0.0077)	–0.0168** (0.0073)		
PAE			0.0600 (0.0937)	0.0539 (0.0891)		
INLEARN			–0.1162*** (0.0396)	–0.1130*** (0.0374)		
AGENTMGR					–0.0145** (0.0539)	–0.0133** (0.0062)
UTILEXP					–0.0975** (0.0378)	–0.1001*** (0.0354)
ΔAGENT					0.2415** (0.1042)	0.2606*** (0.0973)
Adj R^2	0.8501	0.8640	0.8675	0.8795	0.8699	0.8855

* Two–tailed t–test indicates significance at a 10% level
** Two–tailed t–test indicates significance at a 5% level
*** Two–tailed t–test indicates significance at a 1% level

Table 2
Regression Results / Nukes Only/Overnight Costs

Variable	Model 1	Model 2	Model 3
A (Bechtel/GC)	7.6746^{***} (1.6023)	7.2547^{***} (1.4721)	7.3230^{***} (1.4615)
lnSIZE	–0.3297 (0.2464)	–0.2670 (0.2256)	–0.2745 (0.2242)
WAGE	0.0577^{**} (0.0276)	0.0572^{**} (0.0255)	0.0488^{*} (0.0252)
FIRST	0.3904^{***} (0.0571)	0.3935^{***} (0.0530)	0.3987^{***} (0.0529)
COOLTWR	–0.1023 (0.0685)	–0.0641 (0.0645)	–0.0498 (0.0643)
CONPERM	–0.0013 (0.0082)	–0.0009 (0.0075)	–0.0034 (0.0075)
$CONPERM^2$	0.0004^{**} (0.00015)	0.00045^{***} (0.00013)	0.00038^{***} (0.00014)
$CONPERM^3$	$-2x10^{-6***}$ ($8x10^{-7}$)	$-3x10^{-6***}$ ($7x10^{-7}$)	$-2x10^{-6***}$ ($7x10^{-7}$)
AELEARN	–0.0059 (0.0085)		
OUTLEARN		-0.0181^{***} (0.0063)	
PAE		0.0896 (0.0779)	
INLEARN		-0.1144^{***} (0.0327)	
AGENTMGR			-0.0153^{***} (0.0055)
UTILEXP			-0.0969^{***} (0.0316)
ΔAGENT			0.2119^{**} (0.0865)
Adj R^2	0.8448	0.8704	0.8717

* Two–tailed t–test indicates significance at a 10% level
** Two–tailed t–test indicates significance at a 5% level
*** Two–tailed t–test indicates significance at a 1% level

Table 3
Regression Results / ln[1+*experience*]

Variable	Model 1 Nuclear	Model 1 Coal	Model 2 Nuclear	Model 2 Coal	Model 3 Nuclear	Model 3 Coal
A (Bechtel/GC)	7.1789^{***} (1.8591)	8.8361^{***} (0.6089)	6.9361^{***} (1.8352)	8.4468^{***} (0.5850)	7.3341^{***} (1.8090)	8.5276^{***} (0.5881)
lnSIZE	–0.3197 (0.2817)	-0.3629^{***} (0.1118)	–0.2378 (0.2808)	-0.2995^{***} (0.1066)	–0.3038 (0.2759)	-0.3096^{***} (0.1059)
WAGE	0.0724^{**} (0.0316)	0.0040 (0.0269)	0.0695^{**} (0.0318)	-0.0049 (0.0257)	0.0663^{**} (0.0310)	-0.0020 (0.0257)
FIRST	0.3946^{***} (0.0316)	0.2349^{***} (0.0398)	0.4038^{***} (0.0663)	0.2198^{***} (0.0378)	0.4194^{***} (0.0656)	0.2397^{***} (0.0384)
COOLTWR	–0.0951 (0.0798)	0.1754^{***} (0.0523)	–0.0875 (0.0807)	0.1981^{***} (0.0522)	–0.0956 (0.0786)	0.1877^{***} (0.0530)
SCRUBBER		0.3342^{***} (0.0995)		0.2199^{**} (0.1068)		0.1794^{*} (0.1050)
HOUSE		0.0174 (0.0477)		0.0487 (0.0480)		0.0358 (0.0451)
CONPERM/ OPDATE	–0.0078 (0.0103)	-0.2110^{***} (0.0393)	0.0019 (0.0097)	-0.2054^{***} (0.0371)	0.0011 (0.0100)	-0.2178^{***} (0.0378)
$CONPERM^2/OPDATE^2$	0.00051^{***} (0.00017)	0.0204^{***} (0.0046)	0.00048^{***} (0.00017)	0.0185^{***} (0.0043)	0.00047^{***} (0.00016)	0.0203^{***} (0.0041)
$CONPERM^3/OPDATE^3$	$-3\text{x}10^{-6***}$ ($9\text{x}10^{-7}$)	-0.0005^{***} (0.0001)	$-3\text{x}10^{-6***}$ ($9\text{x}10^{-7}$)	-0.0005^{***} (0.0001)	$-3\text{x}10^{-6***}$ ($9\text{x}10^{-7}$)	-0.0005^{***} (0.0001)
AELEARN	0.1790 (0.1600)	–0.0859 (0.0680)				
OUTLEARN			-0.1221^{*} (0.0649)	–0.0131 (0.0649)		
PAE			0.0946 (0.1502)	-0.1754^{***} (0.0553)		
INLEARN			-0.2818^{**} (0.1403)	–0.0740 (0.0732)		
AGENTMGR/ OUTLEARN76					–0.0787 (0.0539)	–0.0300 (0.1109)
PAE76						-0.1584^{***} (0.0567)
UTILEXP					–0.1869 (0.1303)	–0.0562 (0.0713)
ΔAGENT					0.2335^{**} (0.1150)	0.2029 (0.1352)
Adj R^2	0.8537	0.6175	0.8574	0.6603	0.8602	0.6603

* Two–tailed t–test indicates significance at a 10% level
** Two–tailed t–test indicates significance at a 5% level
*** Two–tailed t–test indicates significance at a 1% level

Table 4
Regression Results / Version A

Variable	Model 3 Nuclear	Model 3 Coal
A (Bechtel/GC)	7.0860*** (1.7502)	7.1603*** (0.7169)
lnSIZE	–0.2534 (0.2683)	–0.3321*** (0.1020)
WAGE	0.0576* (0.0303)	0.0158 (0.0260)
FIRST	0.4078*** (0.0640)	0.2291*** (0.0380)
COOLTWR	–0.0572 (0.0775)	0.1580*** (0.0531)
SCRUBBER		0.1986* (0.1035)
HOUSE		0.0275 (0.0453)
CONPERM/ OPDATE	–0.0019 (0.0100)	–0.1976*** (0.0369)
$CONPERM^2/OPDATE^2$	0.00051*** (0.00016)	0.0203*** (0.0038)
$CONPERM^3/OPDATE^3$	-3×10^{-6}*** (9×10^{-7})	–0.0005*** (0.0001)
AGENTMGR/ OUTLEARN76	–0.0142** (0.0071)	0.2798** (0.1208)
PAE76		0.2156** (0.0946)
UTILMGR	–0.0751 (0.0926)	0.5041** (0.2223)
INLEARN	–0.1005** (0.0383)	0.2772** (0.1250)
ΔAGENT	0.2141* (0.1265)	0.2089 (0.1280)
Adj R^2	0.8695	0.6807

* Two–tailed t–test indicates significance at a 10% level
** Two–tailed t–test indicates significance at a 5% level
*** Two–tailed t–test indicates significance at a 1% level