DELEGATED PORTFOLIO MANAGEMENT, NO CHURNING, AND RELATIVE PERFORMANCE-BASED INCENTIVE/SORTING SCHEMES

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ABSTRACT

We show that optimal delegated portfolio management contracts -- which serve to screen out uninformed agents and reward potentially informed agents sufficiently to compensate their opportunity and/or effort costs – need not imply Churning, or randomised trading if uninformed, by the able screened agents, despite limited liability for them which limits the amount of screenable heterogeneity among agents. Relative portfolio performance-based mechanisms across agents augment the principal's screening ability, if agents' informative states are correlated, with optimal contracts the strictly better-performing agent.

Classification Numbers:

I. INTRODUCTION

The topic of optimal contracting among a principal and her agents engaged in delegated portfolio management, which was first analysed using the tools of the theory of mechanism design in the work of Bhattacharya and Pfleiderer (1985), has received further attention and scrutiny in some recent papers. Among these, prominent examples are the papers of Admati and Pfleiderer (1997), Dow and Gorton (1997), and also Das and Sundaram (1998), each of which focuses on different facets of the problems involved in evaluating or designing the contracts motivating the management of financial portfolios in the interest of the principal, the (syndicate of) primary investor(s). Dow and Gorton (1997) attempts to extend the work of Bhattacharya and Pfleiderer (1985) by incorporating the two incremental assumptions of random arrival (precision) of conditional information regarding risky asset return even for more able agents, and (b) limited liability for them in their agency contract payoffs. In contrast, Admati and Pfleiderer (1997) focuses largely on the issue of the usefulness of commonly used compensation schemes for portfolio managers, which often reward their managed portfolio returns relative to that of a well-diversified benchmark or index. They question the utility of such benchmarks, but leave the use of relative performance measures across multiple and potentially privately informed portfolio managers as an open issue. Dow and Gorton (1997) focuses more on the design of optimal (single-agent) incentive cum screening mechanisms for potential portfolio managers by the principal, who seeks to both discourage the worse type (of two) agents who never receive any information from seeking employment, and to compensate the better type of agents – who receive private information about the prospective return on a risky asset with some probability sufficiently so as to equal their higher outside opportunity costs or, equivalently in the model, to motivate them to put in the effort that leads to their (stochastic) information.

An additional goal of the principal is to try and obtain a fully efficient outcome in terms of the manner in which the hired agent manages her portfolio, which in their simplified setting requires also that he not trade whenever he has no private information regarding the prospective return on the

risky asset. They claim, in Proposition 1 of their paper, that this goal is unattainable in their setting, in contrast with that in the paper of Bhattacharya and Pfleiderer (1985) – the able and potentially informed portfolio manager would Churn, or make trades on the principal's portfolio even when he has no information on returns. They then utilise this result to construct an example of a (nevertheless) welfare-enhancing Noisy Rational Expectations equilibrium, when uninformed investors have hedging needs.

In this paper, I first show that the Churning result claimed by Dow and Gorton (1997) need not arise under reasonable assumptions about the agents' outside options and costs of trading, and that single-agent incentive schemes may achieve their goals without inducing churning.

However, the limited liability in the agents' contracts, which Dow and Gorton realistically incorporate in their modelling, does limit the principal's ability to screen between (among) two (multiple) types of agents, or to discourage the worse type (subset) while attracting the better (subset of) type (agents). She can achieve these goals only if the outside options or reservation values (cum effort costs to acquire information) are not too different across different types of agents. I then show that the principal may expand this domain of diverse reservation utilities across agents that she can screen among, by employing multiple agents and making their contractual payoffs (possibly) contingent on the relative portfolio returns.

This incremental usefulness of relative performance-based contracting by the principal is shown to arise when the events of arrivals of private information, of equivalent import, are correlated across two able (potentially informed) agents, confirming an earlier conjecture in Bhattacharya and Pfleiderer (1985). However, the manner in which the principal uses the agents' relative portfolio returns information is qualitatively different from that in the literature on moral hazard or private actions (Lazear and Rosen, 1981). Here, the principal's contract, which maximises the extent of agents' heterogeneity that she is able to screen, has the feature that she pays a strictly contingent wage to the agent whose ex post portfolio return is strictly higher! The rationale is that,

when the able agents obtain (or not) congruent information in precisely (almost) the same circumstances, one agent's portfolio return being (much) higher than that of the other is "evidence" of churning and then being lucky on the part of the former. The utility to the principal of such evidence, which arises only off the equilibrium path, does not accrue from its usefulness in ruling out churning by the able agents employed in equilibrium. Instead, the value of such a wage contract, which penalises strictly superior relative performance, results from the (additional) punishment it could impose on a bad (always uninformed) agent who would (off-equilibrium) accept the contingent wage contract offered by the principal and then churn her portfolio, which is not desirable to a principal who takes asset returns as being unaffected by "her" trades.

In the next section, we introduce the model, and prove the two main results outlined above. In section III, we conclude with suggestions for further research both on likely generalisations of our results, and also on related themes pertaining to the linkages between the delegated management of investors' funds and the performance of financial markets in terms of their informational and allocational efficiency, and also volatility of prices and trading volumes.

II. OPTIMAL CONTRACTS FOR PORTFOLIO MANAGERS

A. *The Model, and Individualistic Contracts*

The principal who seeks to hire an able portfolio manager who is more capable of obtaining private information abut prospective asset returns, is a coalition of primary investors which has the initial wealth level of W. She may invest this wealth in any positive combination of two assets: a riskless asset paying the gross rate of return r>1, and a risky asset earning one of the two possible rates of return L < r < H. We assume that: (i) these two possible rates of return are equally likely (for notational simplicity) , with (ii) (L+H)/2 > r, so that the risk-averse principal (investors' syndicate) has an uniquely optimal passive portfolio P with the the proportion p of W invested in the risky asset. However, the principal seeks to do better than this, by hiring an able portfolio manager(s) for her fund, who would acquire – possibly only if she puts in some effort – private information about the prospective return on the risky asset, with the ex ante probability A. For simplicity, we take this information I to be perfect, when it arises; the able agent would know if the return would be L, or H, surely. To put bounds on the principal's desired portfolio response to such information, we assume that the principal can not borrow. Hence her desired I-contingent portfolio is to invest W in the risky asset when I=H, W in the riskless asset when I=L, and to retain the ex ante optimal passive portfolio P otherwise. This setting is identical to that in Dow and Gorton (1997).

The universe of potentially employable agents, who have no private wealth, consists in most part (Lebesgue measure) of agents without any forecasting ability who never acquire any information about prospective asset returns. Hence, in designing her contingent wage contract for a portfolio manager(s), the principal seeks to exclude such agents, or to ensure that they find their outside work option to be (weakly) preferable to her contract. In the event that such an incompetent agent does accept the principal's contract, he would have the choice of either doing nothing (holding the passive portfolio P), or churning the asset holdings by trading randomly and investing either W or 0

in the risky asset. We assume that the principal can observe (and ex post verify) both her portfolio choice and its ex post return, and that she offers the contingent utility payoffs to the agent of:

N	if P was the position,	(1a)
R	if W was invested in the risky asset with return H,	(1b)
R	if 0 was invested in the risky asset with return L,	(1c)
0	the minimum feasible payoff, otherwise.	(1d)

This payoff structure is optimal for the principal, whether or not her agents end up churning. The weakly positive payoffs {R,N} must be such as to exclude the incompetent agents, which requires the following exclusion constraints (E) to be satisfied.

If an incompetent agent suffers the opportunity (lost outside wage) cost of S on account of his employment in portfolio management per se, and an additional cost T if and only if she decides to trade, then discouraging her from applying to be a portfolio manager requires that:

(E) and,

$$N \leq S \quad (2a)$$

$$R/2 \leq [S + T] \quad (2b)$$

Dow and Gorton (1997) assume that S=0, implying by (2a) that N=0, ascribing this to a setting in which the agent can perform her outside option activity unless she is engaged in trading.

The (rare) able agent is subject to the same trading cost T as the incompetent agent, as well as (possibly) the opportunity cost of employment in portfolio management per se of S. In addition, motivating her to expend the effort to seek (perfect) private information on risky asset returns requires that she obtain an additional payoff of E. Even if she expends effort, she obtains information about asset returns only with probability A, $0 < A < 1$. The principal seeks to ensure that the able agent does not churn the portfolio when she is uninformed, and this is implied by the condition:

(NC) $R/2 \leq [N + T]$ (3)

The following observation is now self-evident.

LEMMA 1 Principal's contingent wage contracts which exclude the incompetent agent can also ensure that the when she has no information on asset return.

Proof: Set N=S in (2a) and then all R that satisfy (2b) also satisfy the condition NC in (3).

In order to attract the able agent(s) to our principal's contract, and get her to exert costly effort, it must be the case that, in addition to condition (3) the principal's contract satisfies:

$$[A^*(R - T) + (1-A)^*N] \geq [S + E] \quad (4)$$

The amount E could also be interpreted as the differentially higher outside wage of able agents, so that our model is viewed as one of screening two types of agents with the reservation wage levels of S and (S+E) for incompetent and able agents, respectively. Note also that, with the information structure assumed, and the feasibility of contracts that rule out churning, issues pertaining to optimal contractual risk-sharing between the principal and the agent are moot.

We now delineate the conditions under which a contract satisfying (3) and (4) exists.

PROPOSITION 1. The principal's contract is able to exclude incompetent agents, and attract able agents who are induced to expend effort to collect information on asset returns, if and only if the able agent's probability of acquiring information satisfies the condition:

$$A \geq [E/(S+T)] \quad (5)$$

Proof: For the sufficiency part, set R=2*(S+T) and N=S, so that condition (4) implies that

$$[\ A*R/2 + \{A*(R/2 - T) + (1 - A)*N\}] > [\ S + E]$$

which holds if condition (5) is met. The necessity part follows immediately , since neither R nor N can be raised further without violating one of the conditions in (2a), (2b), (3).

The result in Proposition 1 stands in contrast to that in Proposition 3 of Bhattacharya and Pfleiderer (1985), in which far weaker conditions are needed to be satisfied for screening agents of heterogeneous abilities, and it illustrates the constraints that limited liability for agents imposes on the principal. If she could have imposed sufficiently high penalties on the agent for making uninformed trades in the (ex post) wrong direction – for inaccurate (implicit) noisy forecasts of returns more generally – she would have been able to screen agents differing to a greater degree in reservation wages, or to motivate more costly effort.

We may also compare our result to that in Proposition 1 of Dow and Gorton (1997). They assume that E=0, and also in effect S=0 and T=K – the outside option – for the incompetent agents, whereas S=K and T=0 for the able agents who choose to work in delegated portfolio management expend effort to try to acquire information on prospective returns.

Thus, N=0 to satisfy (2a) and R/2 < K to satisfy (2b). Hence, R>0 leads to churning by the able

agents for whom the cost of trading is assumed to be zero; trading is subsumed in the opportunity cost incurred to search for information. In their setting as well, if E>0 then a result exactly analogous to Proposition 1 holds, with K replacing (S+T) in condition (5).

Observe that, she discovers her (interim) state to be uninformative, their able agent's choice set is exactly the same as that of their incompetent agent's ex ante: to stay with the principal and do churning trades, or to leave and engage in some outside activity. Hence, we do not find their result to be compelling. Instead, we focus on the {S>0, E>0} case, with T possibly being zero, in which both types of employed agents give up their outside options.

B. ***Optimal Relative Performance Contracts***

We now show that it may pay the principal to employ multiple portfolio managers, and subdivide her portfolio among them, even when they receive similar information about the prospective returns on the risky asset(s), in exactly the same circumstances. The reason for this is that the use of relative performance contracts across these managers enables the principal to punish random trading without information more severely (more often), thus allowing her to screen diverse incompetent and able agents whom she would not be able to sort by self-selection using individualistic contracts. The resulting gain to her, of being capable of attracting able portfolio managers only, can outweigh her cost of hiring an additional manager. The principal's optimal contingent wage contract in this setting has the feature that her agents' payoffs decline with their relative portfolio performances -- the agent earning a strictly higher return on his portfolio is penalised with a strictly lower payoff!

We assume that the two able agents, if hired, receive their (perfect) information together, or not at all. We modify the agents' payoffs, described in equations (1a,b,c,d) as follows:

now R is an agent's payoff if she traded in the correct direction made strictly higher return than the other agent, whereas M is her payoff if she traded correctly but obtained the same return as the other agent. The incentive constraints for excluding (not attracting) the incompetent agents now consist of condition (2a) above, and the inequality:

$$[A*M/2 + (1 - A)*R/2] \leq [S+T] \qquad (2c)$$

assuming that (as in equilibrium) the other agent is able, and she is not churning, which is assured by the following condition which replaces inequality (3) above:

$$R/2 \leq [N + T] \qquad (2b)$$

since the uninformed able agent knows that the other agent is uninformed and not churning.

Finally, the able agent is attracted to the principal's contract (and expends effort cost E) if:

$$[(1 - A)*N + A*(M - T)] \geq [S + E] \qquad (6)$$

which replaces the participation constraint (4) for individualistic contracts.

It is clear from the above that, for all M > R, setting N=S leads to condition (2a) being met and all {M,R} tuples that satisfy (2c) also implying that (2b) holds, so that no single able agent churns if her rival does not; this is the analog of Lemma 1 in this two-agent setting.

Further, if M=R then (2c) and (2b) are equivalent and so are the conditions (6) and (4), so that the conditions under which a solution to (2 a,b,c) and (6) exist are as in Proposition 1.

However, now the principal can do better by setting R=0 so that condition (2c) becomes:

$$A*M/2 < [S + T] \qquad (2d)$$

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and condition (2b), now for no churning by the able agent, is moot. A contractual solution satisfying the conditions (2a), (2d), and (6) exists under the condition defined below.

PROPOSITION 2. The principal's optimal contract attracts only (two) able agents, and obtains no churning by either of them as a Nash equilibrium outcome if and only if:

$$(2 –A) > [E / (S + T)] \qquad (7)$$

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a condition which is always satisfied if condition (5) for screening (motivating effort E) with individualistic contracts holds, for all A in (0,1), but the converse does not hold.

Proof: Setting N=S, and M to satisfy (2d) as an equality, we see that condition (6) holds if:

$$[A*(S + T) + E] < A*M = 2*(S + T)$$

=

which is equivalent to (7); this proves the sufficiency part, and necessity follows easily.

The second part of the proposition follows from noting that A<(2 – A), for A in [0,1).

Finally, we may ask if this no churning Nash equilibrium across able agents is unique, or if both of them churning can be a Nash equilibrium in which they are better off . Assume first that even if they both churn, when uninformed, they can not (communicate to) coordinate the of their churning trades, and each agent randomly picks extremal positions {W, or 0} in the risky asset with equal probabilities of half. Then, ruling out the Nash equilibrium of both the employed able agents churning requires, with R=0<M, that:

$$M/4 < [N+T] \qquad (2e)$$

Note that condition (2d) being met implies (2e) with N=S if A> 1/2, and substituting (2e) directly in condition (6), while setting N=S, we obtain the inequality:

$$(S + E) \quad < [3*A*M/4 + \{ (1 – A)*S + A*(M/4 – T)]$$

or,

$$E< [3*A*(S+T)] \qquad (8)$$

which is satisfied if condition (7) is satisfied strictly and in addition A > 1/2, which implies that $(2\text{-}A) < 3A$; it is also implied by the condition (5) for single-agent contracts. Note that for $A < 1/2$ condition (2e) holding implies that condition (2d) is also met.

However, if the two able agents can also coordinate on the direction of their churning trades, condition (2e) to rule out the churning Nash equilibrium is replaced by the inequality:

$$M/2 < [N + T] \qquad (2f)$$

and conditions (2a), (2d),(2f), and (6) can only be satisfied if condition (5) is strict. We have:

PROPOSITION 3. The principal's optimal contract can obtain the screening outcome described in Proposition 2 above as the unique Nash equilibrium across her two agents whenever the condition (5), for screening with individualistic contracts, is strict. If the agents can coordinate their churning trades perfectly, and only then, condition (5) is also necessary for multi-agent contracts to implement screening (without churning) as a Nash equilibrium, which is not payoff-dominated for the agents by another Nash equilibrium in which both able agents undertake churning trades when neither of them is informed.

Finally, it is easy to show that if agents' information arrival processes are uncorrelated, then multi- and single-agent contracts achieve screening, without churning, only if (5) is satisfied.

Empirically, the assumption of correlated information arrivals is often quite plausible though,for example when firms undergo major strategy changes or are faced with takeover prospects.

III.EXTENSIONS AND CONCLUDING REMARKS

Our first result, in Proposition 1, demonstrates that when the (opportunity and effort) costs of agents employed as portfolio mangers are modelled as being sunk at the time of their choices regarding trading – rather than as implying vast differences in the marginal costs of trading among agents, as in Dow and Gorton (1997) – delegated portfolio management contracts need not lead to churning by the optimally screened portfolio managers. Our second set of results, Propositions 2 and 3, illustrate how multi-agent relative performance contracts -- which the relatively more successful agent in spite of her trade being "right" ex post – can augment the range of heterogeneity across agents whom the principal is able to screen, without churning. An important extension would be to extend this result to settings with imperfect correlations among the agents'

information arrival processes, and among their signals regarding asset returns. It may then turn out that better relative performance is optimally rewarded up to a point, then penalised.

Even without relative performance contracts, and with the strong assumption of agents receiving perfect information on asset returns when informed – unlike in the model of Bhattacharya and Pfleiderer (1985) – the principal's optimal contracts in this paper, and also in Dow and Gorton (1997), exhibit non-monotonicity of the portfolio managers' payoffs with respect to their ex post portfolio returns. This is easily seen by noting that the riskless return r, which is obtained via trading away from the (initial) passive portfolio P , could imply a strictly a higher payoff for the agent (if the risky asset returns L) than when she does nothing, returning either [p*H + (1-p)*r] on the passive portfolio if the risky asset returns H or [p*L + (1-p)*r] otherwise.
Until as recently as 1998, the United States Investment Advisers Act of 1940, amended in 1970, ruled out such non-monotonic performance fees (designed to foster information use and collection), confining these to monotonic proportionate fees based on the performance of a fund, possibly relative to the returns on a publicly traded benchmark index. As we noted in Bhattacharya and Pfleiderer (1985), even a menu of such linear performance fee contracts which agents may self-select among has no ability to screen among agents differing in their forecasting abilities. However, there was no implication that agents would always take more risky portfolio positions relative to those desired by their principals, or churn, when they are compensated with these contracts. Recent work by Das and Sundaram (1998) considers also agents' contracts with option-like features, which do lead to excessive risk-taking. Normative theorising about the properties of alternative contract structures for portfolio managers remains an important topic deserving a great deal of further research, including the exploration of multi-period contracts utilising noisy statistical past information as well as agents' self-selection.

The notion that delegated funds management by agents may lead to excessive trading (and risk-taking) relative to that in their principals' interests, has a great deal of anecdotal appeal. It helps us

to rationalise the huge volume of trade in foreign exchange markets dominated by institutional investors, relative to the volume of international trade in goods and services.

Even rationalising banking panics and runs, and “herd behaviour” in traded asset markets, may be facilitated by these postulates of excessively random behaviour by agents managing asset portfolios, especially since the costs of gathering fundamental information about assets, or economies, are likely to be small relative to the financial stakes that (large) intermediaries would face if they were primary investors instead. The present paper shows that it is far from simple to establish robust theoretical linkages between delegation and excessive trading or risk-taking by the agents involved, if their principals (funds) understand their contractual environments and behave optimally.It is possible that the previous regulatory impediments to contracting might have led to laxity on the part of principals, or that the functioning of Boards for coalitions of many investors -- which can implement the more complex delegated portfolio management contracts here, without revealing proprietary trades to the public – is fraught with difficulties, for reasons not well understood by theorists. It is hoped that the results and comments reported in this paper will help to spur further research, on these important issues that have potentially enormous implications for global financial markets.

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