Club Enlargement: Early Versus Late Admittance[1]

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PRELIMINARY AND INCOMPLETE

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Abstract

Within an incomplete contract framework, we analyze the enlargement strategy of a club facing applicants that di¤er in wealth and reform status. While an applicant bene…ts from entry, the club only gains if the entrant makes an adjustment investment. The club has a choice between early admittance, using its limited internal enforcement powers to ensure reform, and late admittance conditional on prior reform. Wealthy candidates enter early as the club can charge a higher entrance fee for undiscounted membership bene…ts. For poor applicants, the club applies a reversed admittance order: A less advanced applicant is admitted early to reform as member, while a more advanced enters late after it has reformed. Moreover, the admittance rents increase in the ratio of reform distance to wealth. The viability of the late admittance strategy depends on the club's commitment ability. If the club can credibly commit to a stage-…nancing schedule, it can induce applicants to reform without overfunding. In the repeated game, the threat of denying additional funding is not credible, and more overfunding is required for reform.

1 Introduction

Much economic activity evolves around clubs (Tiebout (1956), Buchanan (1965)). Owing to its public choice origins, the club literature has primarily analyzed the level of 'club good' provision and the equilibrium club size (Sandler and Tschirhart (1980) and Cornes and Sandler (1996)). To mitigate free riding problems, most clubs are endowed with a monopoly over the club entrance decision. This paper studies the strategic use of this exclusive right in the admittance of new members.

More specifically, we analyze a club's decision to admit an applicant whose type is characterized by its wealth and a reform requirement. While the entrant benefits from membership, the club only gains if the entrant reforms. Reform investments are not contractible. The club has a choice between early, late and no offer. This choice matters for an applicant's incentives and ability to reform. With early admittance, the club can apply its imperfect internal enforcement tools to force the entrant to reform. Under a late offer, admittance is conditional on prior reforms and the future membership benefits provide incentives to adopt to the club's standard.

Wealthy applicants are willing to pay more for joining the club early rather than late. Thus, beyond a certain wealth level, the club makes only early offers. Poor applicants are offered a reversed admittance order: Advanced types enter late only after having reformed, while less advanced types enter early and reform as new members. The prospect of future membership benefits provides incentives for applicants to reform rather than consume. By giving the applicant more money, the club raises the incentive to reform with a late offer. The additional funds generate a higher marginal utility if the applicant reforms (when consumption is lower) than otherwise. The overfunding needed to incduce reform increases with the reform distance. As a result, the use of leverage from late conditional admittance is a more cost-efficient strategy only for advanced types. For less advanced types, the early offer is cheaper because the club can ensure through its imperfect internal control that at least a portion of the reform funds is used for reform. Thus, both offers concede rents to the applicants that increase in the reform distance.

The power of using future membership benefits as incentive mechanism, and hence, the viability of the late admittance strategy depends on the club's commitment ability. If the club can commit not to renegotiate a stage-financing schedule, it can split the reform requirement into small steps and reduce the late offer transfer to the pure reform finance. Opportunistic behavior in the repeated enlargement game makes an incentive compatible late offer more costly, and the set of late offer types shrinks.

A topical application for our framework is the Eastern Enlargement of the EU. Membership applicants from Central and Eastern Europe (CEE) are severely financially constrained, and attainment of EU standards is often not their optimal development strategy because EU standards suit a rich group of highly developed countries. The twin roles of financier and enlargement monopolist give the EU strong influence over the reform agenda of applicants. Unlike Berglöf and Roland (1998), we allow for financing of reforms ahead of entry. We assume that complete contracts with a specified reform level are not possible because either reform is non-verifiable or there is no enforcement institution with authority over sovereign countries.

This paper is closely related to the literature on the coexistence of direct and intermediated lending. In moral hazard models of direct and indirect lending (e.g., Diamond 1991, Holmström and Tirole 1997), there are typically three regimes. Firms with sufficient wealth can issue direct debt. Firms with fewer own assets engage in asset substitution, unless they are monitored. Hence, they can only borrow from banks. Finally, undercapitalized firms cannot raise outside finance. These three outcomes correspond to the late, early, and no admittance offer in our framework where the reform distance can be interpreted as a measure of the moral hazard problem. Using future membership benefits as an incentive mechanism resembles the use of a liquidation threat or denial of future access to funding as instruments to discipline borrowers in a setting without collaterals or sufficient pledgeable returns (e.g., Bolton and Scharfstein 1990, Hart and Moore 1994, Gromb 1994).

The paper is organized as follows. We describe the model in Section 2. Section 3 characterizes the enlargement strategy of the club in the one-shot game. In Section 4, we restrict attention to applicants with zero wealth, and allow for several sequential transfers. We analyze opportunistic behavior and the role of commitment power with a late conditional offer. We conclude in Section 5. Mathematical proofs are in the Appendix.

2 Model

2.1 Framework

A club composed of homogeneous members that act as a single player faces an applicant for membership. The applicant's type is defined by its wealth $w \geq 0$ and its reform requirement d; where $d \equiv x^C - x^0 > 0$ is the distance between its initial position $x^0 \in [0, x^C)$ and the club standard x^C along some reform dimension x. While x is observable, it is not verifiable.

Reform is modeled as a costly adjustment of the applicant's initial position towards the club standard. Our focus is on conformity requirements rather than reforms that raise the applicant's welfare directly.

Assumption 1 (Reform) Investment in x yields no direct return to the applicant, but benefits the incumbent members of the enlarged club.

By investing F in reform the applicant moves from x^0 to $x = x^0 + F$.[1] Feasibility requires that $F \leq w + s$; where $s \in R$ is the financial transfer with an admittance offer. We assume that the club has financial slack. If an applicant has insufficient funds to meet the club standard, the club has to provide the necessary funds.[2] A positive transfer is a subsidy from the club to the applicant, while a negative one is an entrance fee the club charges for membership.

Instead of investing into reforms, the applicant may use its resources $(w + s - F)$ for consumption. The utility function $u : R_+ \to R_+$ is twice continuously differentiable with $u(0) = 0$; $u' > 0$ and $u'' < 0$.

Besides rejecting an applicant, the club has two enlargement strategies. The club can offer late admittance conditional on prior reform investment. Alternatively, it can offer early admittance, where any investment in meeting the club's standard is undertaken after the applicant has joined. By joining the club, the entrant becomes subject to club rules and institutions.

Assumption 2 (Internal Control) Under an early admittance offer, the club can enforce the use for reform of a fraction $\gamma \in (0, 1)$ of an entrant's post-entry wealth, while it has no enforcement power over non-members.

Even if the club provides reform funds, the applicant retains full discretion over the use of its entire resources $(w + s)$ under a late offer. In contrast, a newly admitted member controls only a fraction $(1 - \gamma)$, where γ reflects the strength of internal enforcement powers of the club. We assume that the club uses its enforcement powers to maximize the reform status of the new member even if full reform is not feasible.

[1] We assume that an investment in x is inconsequential for the value of the applicant's outside option. Rather than analyzing a hold-up problem arising from investment ideosyncracy, we focus in the following on the use of leverage from a late conditional entry offer for setting reform incentives.

[2] The applicant has no projects that generate returns it could pledge to outsiders. Hence, the club is the sole potential lender. Note, however, that outside lenders could provide an incentive compatible transfer s. (Independent of the source of s; the club gladly accepts new members whose reform investments it did not have to fund.) While s does not have to be provided by the club, outsiders do not get the enlargement gain Π^R and hence, have no incentives to provide reform finance.

The club, i.e., its current members realizes an enlargement gain Π^R from a fully adjusted new member, while it gets $\Pi^U < 0 < \Pi^R$ if the new member fails to meet the standard. In order to focus on the link between admittance and reform, we exclude that the club can profitably sell membership irrespective of reform.

Assumption 3 (Unreformed Entry) $\Pi^U + u^{-1}(\pi) < 0$:

The expression $u^{-1}(\pi)$ is the most the club can extract from an applicant when admittance does not lead to reform. Hence, for $\Pi^U + u^{-1}(\pi) < 0$ the club strictly prefers no offer to a non-reform implementing offer (see Lemma 15). Henceforth, unless explicitly stated, we abstract from offers that do not induce reform. Membership yields a benefit π to the applicant regardless of x; i.e., its degree of conformity with the club standard. While all parameters and variables are observable, only the receipts of payments and the entry into the club are verifiable. Hence, contracts on payoffs (π and Π^R) or reform (x) are not enforceable and a conditional late entry offer must instead be self-enforcing.[3] Furthermore, the applicant's payoff function is additively separable in the membership benefit π and the utility $u(\cdot)$ from consumption.

All decisions in the game are taken in a single period, referring to reform time rather than real time. At date 0, the club makes an admittance offer to the applicant. More precisely, the club chooses the triple $(\bar{x}; s; j)$ where $\bar{x} \leq x^C$ is the reform requirement, $s \in \mathbb{R}$ is the financial transfer, and $j = L; E; N$ is the timing of enlargement (late, early, and no offer). Then the applicant either accepts or rejects the offer. If no entry was offered, or if the applicant rejects an offer, the game ends and both players get the reservation payoffs normalized to zero. Upon acceptance, the amount s is transacted and the applicant decides on the levels of reform investment and consumption. At date 1, x realizes and the late conditional contract is executed. Figure 1 shows the timing of moves. There is a common discount factor $\delta < 1$. Hence, the date 0 value of the late enlargement benefits is $\delta\pi$ and $\delta\Pi^k$; $k = U; R$: For simplicity, the difference to the club between late entry and initially unreformed early entry with subsequent reform is negligible. Hence, the payoff to the club from early entry is $\delta\Pi^R$ if the new member reaches x^C by date 1; but Π^U otherwise.

[3] If π were verifiable, the club could contractually impose a penalty (withholding π) on elarly entrants failing to reform. As a result, reform could be implemented at a cost equal to the actual reform requirement, and early offers would weakly dominate late ones.

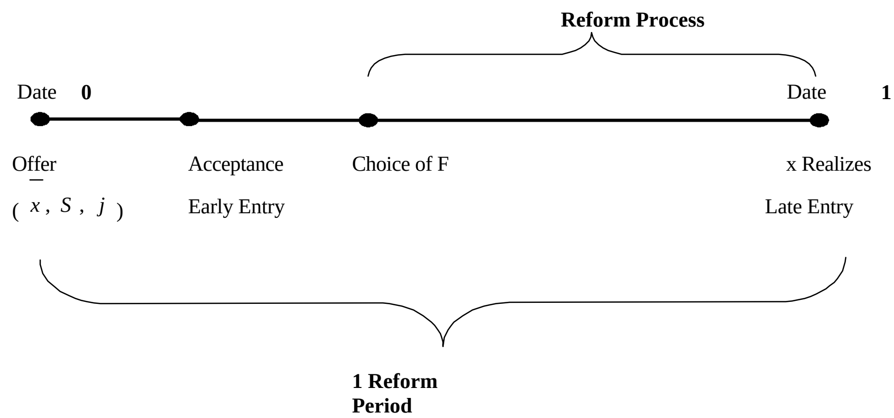

Figure 1: Timing

2.2 Discussion

Assumption 1 is motivated by the observation that many club standards are arbitrary or historically determined rather than inherently optimal, except that members adhere to them. For instance, when the Channel Tunnel project provided for a railway connection between the UK and continental Europe, England faced the pure adjustment cost of altering its railway track width. Our focus is on such conformity requirements rather than reforms that raise the applicant's welfare directly. That is, investing in the club standard constitutes a deviation from the applicant's optimal stand-alone resource allocation or development path.

At the point of joining, entrants typically submit to explicit and implicit club rules, surrendering some of their discretionary powers. Enforcement institutions may be formal, such as the European Court of Justice, or the arbitration mechanism of the WTO. Informal disciplining tools include the threat of expulsion, peer pressure, and discriminatory treatment in other aspects of club membership.

The club's enlargement payo¤s $¦^{U} < 0 < ¦^{R}$ are meant to re‡ect in a simple way that heterogeneity introduces frictions and inhibits decision making, and hence, is costly to the club. In the EU example, enlarging the membership list from 15 to over 20 requires reform of the unanimity decision culture that has evolved over the initial decades of the EC under smaller membership numbers. Heterogeneity in income, objectives and institutions makes collective action more di¢cult to coordinate. Furthermore, the more diverging standards are, the smaller the gains from trade among the club members.

The entrant's membership bene…ts ¼ are assumed to be independent of his reform status and predetermined. Making π sensitive to reform investments would move us away from the public good notion of the value of a club. Obviously, if benefits are sensitive to reform, the moral hazard problem is mitigated. The benefits π being a variable over which the club has no discretion captures the notion that they are predetermined by applying the current club rules to the newly admitted member. For example, the EU faces high (possibly prohibitive) costs of altering the sections of the acquis communautaire that detail the agricultural and regional support funds for which new members qualify. In addition, we assume that club rules prohibit exclusion from the club after entry, and that the rules can only be changed by a unanimous vote of all members. Hence, the club cannot use the threat of exclusion in the early entry case to induce the entrant not to consume the resources under its discretion.

There are three possible interpretations for the additively separable payoff function of the applicant. First, the applicant is a single agent and the private benefit π is non-monetary and non-transferable. Second, the applicant consists of a large group of individuals and the membership benefits accrue to a different set than the utility from consumption. Third, with verifiable benefits, club rules may exclude the withholding of membership benefits in response to insufficient reform. For instance, the EU could not coerce Greece into implementing environmental safety measures with the threat of withholding Structural Funds or CAP payments. (Similarly, it is generally not possible for a state to reduce a convict's pension claim as punishment.)

3 The Optimal Admittance Strategy

We solve for the optimal admittance strategy by backwards induction. First, we derive the minimum necessary transfer s to implement reform, given that the applicant has accepted an early or late offer. Second, we solve for the minimum necessary transfer such that an applicant accepts an early or a conditional late offer, given that full reform is subsequently implemented. Finally, we compare the cost of inducing any applicant type to accept an early or late offer and to reform. Bearing in mind that the club can also refrain from making an offer, the optimal admittance strategy obtains as a function of the applicant type.

The club maximizes $\delta\Pi^R - s$ by choosing a reform threshold $\bar{x}$, a transfer $s \in \mathbb{R}$, and the type of offer $j = \{E; L; N\}$, subject to the applicant's optimal response.[4] At date 1, x realizes as a function of the reform investment. The decisions left to the club depend on whether it has made an early or late admittance offer at date 0: In the case of an early offer, the applicant has

[4] In fact, the club's payoff range includes $\Pi^U - s$. By Assumption 3, unreformed entry is strictly dominated, and we restrict the analysis here to reformed entry. The case of unreformed entry is addressed in Appendix H.

already been admitted and $\delta\Pi^R$ materializes mechanically. For $x = x^C$; the date 0 value of the enlargement is $\delta\Pi^R - s$ and $\Pi^U - s$ otherwise. The entrant gets $\pi + u(w + s - F)$ independent of x. In case of a late offer, the club has to take the final admittance decision. The date 0 value of the enlargement payoff to the club is $\delta\Pi^R - s$ if $x = x^C$ and $\delta\Pi^U - s$ otherwise. If the club refuses admittance, its payoff is $-s$. Because the players cannot contract upon x; the admittance offer needs to be self-enforcing, i.e., subgame perfect. Hence, the club admits the applicant if $x = x^C$ and rejects it otherwise. For the time being, we assume that the club has set $\overline{x} = x^C$ and show later that it does indeed do so. Given this admittance rule, the applicant gets a payoff with a date 0 value of $\delta\pi + u(w + s - F)$ if $x \geq \overline{x}$, and $u(w + s - F)$ otherwise.

Upon acceptance of an offer, s is transferred, and the reform investment decision is taken. Let $d \equiv \left(\overline{x} - x^0\right)$ denote the distance between the applicant's initial position and the club's reform requirement. The club gains from enlargement if the applicant or newly admitted member fully reforms, i.e., if $x = \overline{x} = x^C$.

Lemma 1 (Reform Implementation) Under both early and late admittance, full reform can be implemented for any type $(d; w)$:

(i) In an early admittance offer, the minimum necessary transfer is

$$s^{E0} = \frac{d}{\gamma} - w.$$

(ii) In a late admittance offer, the mimimum necessary transfer is

$$s^{L0} = \begin{cases} d - w & \text{if } d < \hat{d}, \\ \hat{s}(d; w) & \text{otherwise,} \end{cases}$$

where $\hat{d} = u^{-1}(\delta\pi)$ and $\hat{s}(d; w)$ solves $\delta\pi + u(w + s - d) = u(w + s)$. Furthermore, $\hat{d}$ is increasing and $\hat{s}$ decreasing in δ.

In the case of early admittance, the entrant already enjoys the membership benefits and has no incentive to reform. Instead, it spends all its discretionary resources $(1 - \gamma)(w + s)$ on consumption. Depending exclusively on the club's limited internal enforcement, full reform is feasible only if the entrant's total resources after entry are no less than $\frac{d}{\gamma}$. Hence, the club has to set s such that $\gamma(w + s) \geq d$. While the club can induce reform for any early entrant, the cost $\frac{d}{\gamma} - w$ becomes prohibitive for sufficiently unreformed types. The borderline above which the club prefers no enlargement to the early offer is given by $d^{NE} = \gamma\left(\delta\Pi^R + w\right)$.

In the case of late admittance, investment in F is of value to the applicant only if it leads to entry, but comes at the opportunity cost of forgone consumption. Hence, the applicant either does not reform ($F = 0$) or invests exactly the amount needed to meet the entry condition ($F = d$). For full reform to be feasible, the club must leave the applicant at least $s = d - w$. Having the necessary funds at their disposal, only the most advanced applicant types ($d \leq \hat{d}$) reform fully. For all other types ($d > \hat{d}$), the utility from diverting $d - w$ exceeds the future membership benefits. Nonetheless, the club can induce these types to reform by giving them a larger amount. Such overfunding renders reform incentive compatible, because the marginal utility of consuming $w + s - d$ is larger when d is invested in reforms than when the entire $w + s$ is used for consumption. The minimum late offer transfer that provides reform incentives is $\hat{s}$. This transfer increases in d but decreases in δ.[5] A larger d raises the opportunity cost of reform, while a larger δ raises the benefit of reform. Finally, for every wealth level, there is a critical reform distance d above which the late offer ceases to be profitable for the club. The borderline is given by $\delta\beta R = \hat{s}$, which defines an increasing and concave curve $d^{NL} = w + \delta\beta R - u^{-1}\left[u\left(\delta\beta R + w\right) - \delta\pi\right]$.

The club's optimal admittance strategy does not follow directly from the lowest implementation cost of reform. In addition, an applicant must also accept an early or a late offer. The minimum necessary transfer that is both accepted and implements reform obtains from comparing implementation and individual rationality constraints in each case.

Lemma 2 (Acceptance Early) An applicant accepts a reform-implementing early offer with a minimum transfer

$$s^E = \begin{cases} d - w + u^{-1}[u(w) - \pi] & \text{if } \quad w \geq u^{-1}\left[\pi + u\left(\frac{1-\gamma}{\gamma}d\right)\right]; \\ \frac{d}{\gamma} - w & \text{otherwise.} \end{cases}$$

Figure 2 shows how the applicant types are separated according to the binding constraint. In Region I, applicants are poor relative to their distance to the club standard. Therefore, the club has to leave the applicant sufficient funds. That is, the binding FC-E determines s^E. Applicants in Region II are relatively wealthy, and the entrance fee is constrained by their outside option of not joining, $u(w)$. All types for which the FC-E and the IR-E simultaneously bind constitute the curve $\left(IR^E - FC^E\right)$, separating Regions I and II. Finally, for any given w, types from Region I require a larger s than those from II.[6]

[5] Total differentiation of the late offer transfer $s = d - w + u^{-1}[u(w+s) - \delta\pi]$ yields

$$\frac{ds}{d\delta} = -\frac{\pi}{u'(w+s-d) - u'(w+s)} < 0 \quad \text{and} \quad \frac{ds}{dd} = \frac{u'(w+s-d)}{u'(w+s-d) - u'(w+s)} > 0,$$

by concavity of u. In general, the curvature of s^L in d is ambiguous. (We discuss this issue in Appendix I.)

[6] The IR-E requires $\pi + u\left(\frac{1-\gamma}{\gamma}d\right) \geq u(w)$, where $\frac{1-\gamma}{\gamma}d$ is the minimum retained after reforming. Manipulation

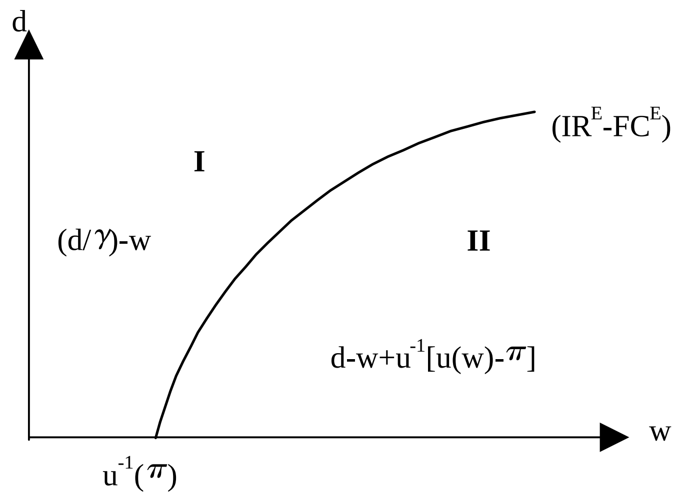

Figure 2: Acceptance Of An Early Offer

Lemma 3 (Acceptance Late) An applicant accepts a reform-implementing late offer with a minimum transfer

$$s^L = \begin{cases} \hat{s} & \text{if } d > u^{-1}(\delta\pi) \text{ and } d > w - u^{-1}[u(w) - \delta\pi]; \\ d - w + u^{-1}[u(w) - \delta\pi] & \text{if } d > u^{-1}(\delta\pi) \text{ and } d \leq w - u^{-1}[u(w) - \delta\pi]; \\ d - w & \text{if } d \leq u^{-1}(\delta\pi) \text{ and } w < u^{-1}(\delta\pi); \\ d - w + u^{-1}[u(w) - \delta\pi] & \text{if } d \leq u^{-1}(\delta\pi) \text{ and } w \geq u^{-1}(\delta\pi). \end{cases}$$

Figure 3 illustrates the binding constraint and consequent transfers for each applicant type. Region I contains applicant types that are relatively poor and have a large reform requirement. For those types, the incentive constraint IC-L binds. The types in Regions II and IV are rich relative to their reform distance, and the minimum accepted transfer is determined by their outside option $u(w)$. That is, the individual rationality constraint IR-L binds. The dividing line between Regions I and II, $(IR^L - IC^L)$ is given by the points where the IC-L and the IR-L simultaneously bind. This implies that the transfer is zero on this curve. Applicants in Region III are relatively poor, and the membership benefit outweighs the utility from consumption. Subsidized types ($d > w$) do not divert any resources, while types with $d < w$ are willing to pay an entrance fee. Thus, the minimum accepted transfer is determined by the feasibility

yields $\frac{d}{\gamma} - w \geq d - w + u^{-1}[u(w) - \pi]$.

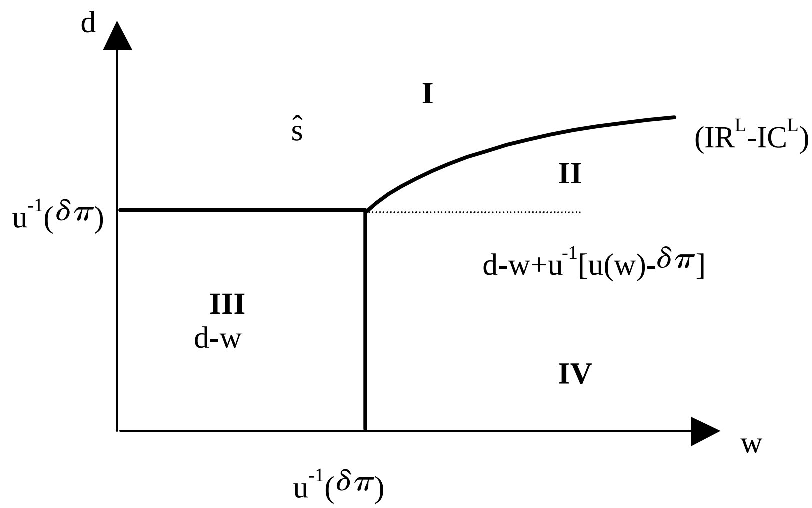

Figure 3: Acceptance Of A Late Offer

constraint FC-L. For any given w, types from Region I require the largest s.[7]

In addition to the transfer s and the timing of admittance, an offer made in the beginning of the period specifies a threshold $\bar{x}$. Setting $\bar{x} = x^C$ is immediate. In a late offer, the club will admit an applicant at date 1 only if $x = x^C$. Hence, a choice $\bar{x} < x^C$ is not time consistent and will simply be ignored by the club at the time of the final admission decision. In an accepted early offer, $F = d \leq \gamma(w + s)$ by Lemma 2. That is, the reform investment comes from the club controlled fraction of $w + s$ and the choice of $\bar{x}$ is inconsequential. Thus, in either offer it is a weakly dominant strategy for the club to set $\bar{x} = x^C$. While this threshold is implicitly understood by a rational applicant, we assume nonetheless that the club formally announces it.

The above analysis allows us to classify the applicant types into recipients of early, late, and no offer. To obtain an unambiguous classification, we make a further assumption.

Assumption 4 i) $\delta\pi < u\left(\delta\Pi^R\right) - u\left[(1-\gamma)\left(\delta\Pi^R\right)\right]$;

ii) $\frac{u'(x)}{u'[(1-\gamma)x]} > 1 - \gamma$, $\forall x \geq 0$.

[7] For the types in Region I,

$$s = d - w + u^{-1}\Bigg[\underbrace{u\Big(w + \overbrace{s}^{>0}\Big) - \delta\pi}_{>0}\Bigg].$$

For a given w, this is greater than $d - w + u^{-1}[u(w) - \delta\pi]$, the transfer for types from Regions II and IV. For types from Region I, $u(w + s) - \delta\pi > 0$ implies that the transfer to types in III $(d - w)$ is also less.

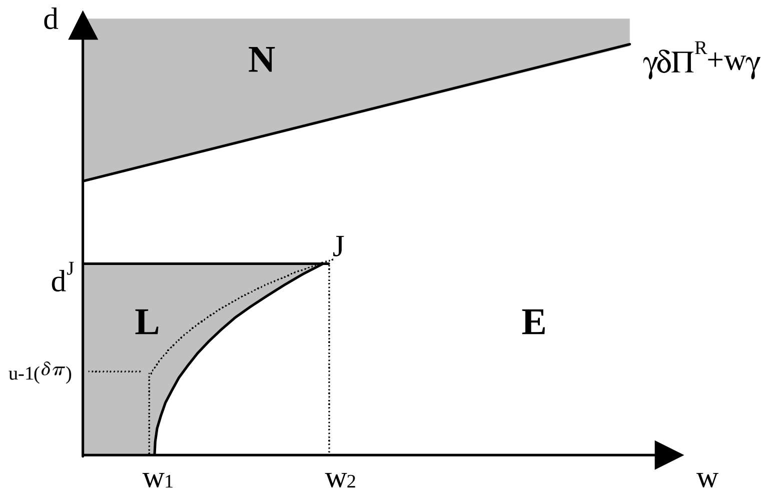

Figure 4: The Optimal Offer

Part (i) of Assumption 4 ensures that the least profitable type to get an admittance offer receives an early one. Part (ii) implies that the set of types for which late is the preferred offer is connected.[8] After presenting our results, we discuss the robustness with respect to this assumption. Define $w_1 \equiv u^{-1}(\delta\pi)$ and $w_2 : \delta\pi + u[(1-\gamma)w] = u(w)$.

Proposition 1 Only types with $w > \frac{d}{\gamma} - \delta\Pi^R$ receive an admittance offer. Among these types,
(i) for $d \leq w_1$, the club follows a 'reversed' admittance order;
(ii) for $w_1 < w \leq w_2$, the club offers early entry to the most advanced types, and follows a reversed admittance order otherwise;
(iii) for $w > w_2$, the club offers only early entry.

Figure 4 illustrates the Proposition. On the one hand, entering early rather than late is of value due to discounting. For rich applicants, the marginal utility of wealth is sufficiently low that they are willing to pay a higher price to gain entry early. For rich types, this discount effect dominates. On the other hand, poor types receive reform funding from the club. They have a high marginal utility of wealth and hence, a strong temptation to consume the funds.

[8] For example, $u(\cdot) = \sqrt{\cdot}$ satisfies Part (ii):

$$\frac{u'(x)}{u'[(1-\gamma)x]} = \frac{\frac{1}{2}x^{-\frac{1}{2}}}{\frac{1}{2}[(1-\gamma)x]^{-\frac{1}{2}}} = (1-\gamma)^{\frac{1}{2}} > (1-\gamma).$$

Logarithmic utility $u(\cdot) = \log(\cdot)$ also satisfies the condition $\frac{u'(x)}{u'[(1-\gamma)x]} = \frac{\frac{1}{x}}{\frac{(1-\gamma)}{x}} = \frac{1}{1-\gamma} > 1-\gamma$. The negative exponential function $u(\cdot) = -e^{-x}$ does not satisfy Part (ii).

An incentive compatible late offer is then more expensive for the club than using its imperfect internal enforcement technology to get reforms implemented. For an intermediate range of wealth relative to reform distance, the cheapest way to induce the applicant to reform is the use of leverage from conditioning entry on prior full reform. In this range, where both d and w are not too large, neither the wealth effect nor the overfunding effect are sufficiently strong to dominate the leverage effect.

For any given wealth level, types with too large reform distance do not receive an admittance offer. From a social efficiency perspective, too few types receive offers. The socially efficient cut-off rule for the early offer is $\pi + \delta\Pi^R - d = 0$, while the club applies $\delta\Pi^R - s = 0$; where $s \geq d$.

Our notion of reversed order of admission refers to 'reform time' (not calendar time). More advanced types, i.e., low d values, are admitted after they have reformed, while less advanced enter prior to reforming. Thus, the enlargement strategy applies “double standards”. Unlike more backward candidates, stronger candidates are asked to prove their willingness to conform with the club standard.[9]

Corollary 1 Among the entrants, wealthy types pay an entrance fee in addition to the full reform cost, intermediate types pay part of their reform cost, while poor types receive a rent in addition to their reform cost.

Corollary 1 is illustrated in Figure 5. In Region I, applicants are so poor relative to their reform distance that the club must provide more than the pure reform finance; under the late offer, such overfunding is necessary to meet the incentive constraint, while under the early offer the club is unable to control all of the new member's reform funds. In Region II; the club and the applicant share the reform costs, while in Region III the applicants are so wealthy and pay not only the full reform cost but in addition an entrance fee. The rent that the least advanced types earn under both early and late offers (from imperfect internal control over reform funds and from the reform incentive scheme, respectively) rise in the reform distance d, making reformed entry eventually prohibitively expensive for the club. Thus, the transfer decreases in the ratio of wealth to reform distance.

[9] Our reversed admittance order appears to contradict the common intuition that a club should pick the most advanced applicants for the nearest enlargement. The contradiction resolves if one considers a whole reform period an 'enlargement occasion'. The club then picks indeed the most advanced applicants for the occasion, but over the reform period applies the reversed admittance order.

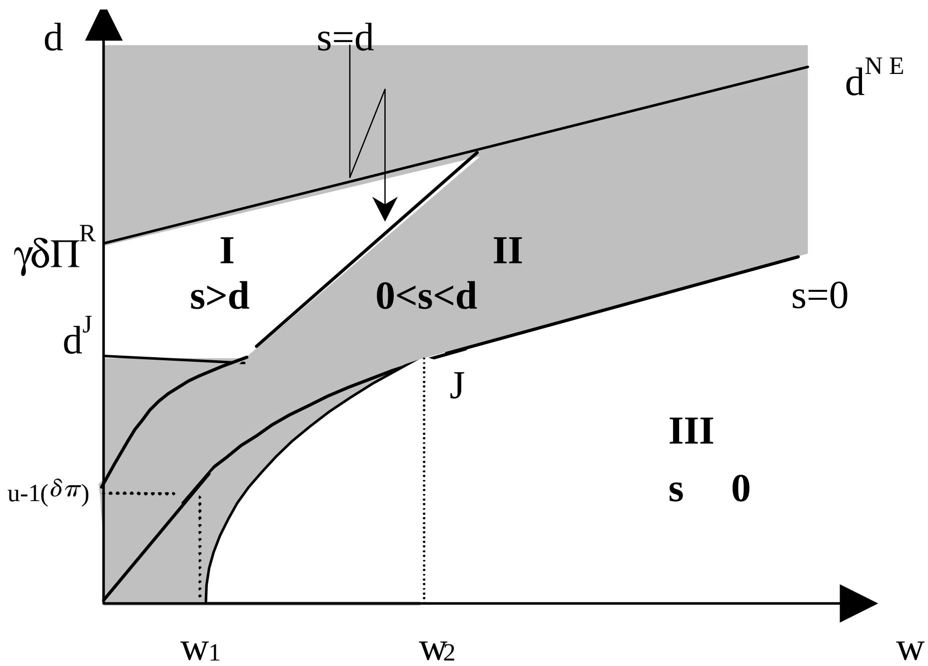

Figure 5: Transfer Payments With The Optimal O¤er

Corollary 2 (i) An increase in ° enlarges the set of early o¤er canditates, and weakly reduces the transfer to all candidates that previously received an o¤er.
(ii) An increase in ± or ¼ enlarges the set of late o¤er candidates, and weakly decreases the transfer to all candidates. In addition, an increase in ± also strictly enlarges the set of types receiving an o¤er.

Stronger internal enforcement (an increase in °) makes the early o¤er cheaper for the club and turns some previous recipients of late or no o¤ers into early o¤er types. The transfer s^E falls in those regions where the FC-E is the binding constraint; for wealthy applicants, the FC-E is slack and the IR-E binds, and hence, their entrance fee is unchanged. A rise in the discount factor makes late entry worth more and hence, increases reform incentives. Furthermore, it relaxes the IR-L. Accordingly, the club substitutes late for early o¤ers for some candidates. It also shifts d^{NE} upwards, and hence, early o¤ers are made to some former no-o¤er types. A larger ¼ raises the relative attractiveness of the late o¤er, because it relaxes the IC-L while the FC-E is una¤ected. Although it also relaxes the IR-E, the boundaries between early and late o¤er lie strictly in the set of types where the FC-E determines s^E. Hence, while a larger ¼ lowers s where the IR-E binds, it does not change the type of o¤er.

Proposition 1 crucially depends on Assumption 4. While the discounting e¤ect underlying the assignment of early o¤ers to wealthy types only requires concavity, the reversed admittance result for poorer types depends on the degree of curvature of u. More precisely, the late o¤er transfer s^L for candidates $d < u^{-1}(\delta\pi)$ is determined by the FC-L constraint and hence independent of u: Above the horizontal line d^J, however, early o¤ers become cheaper beyond by virtue of Assumption 4. This assumption ensures that s^L increases at a faster rate than γ; the rate at which s^E increases. Alternatively, the 'reversed' admittance result also obtains with the restriction that the function u belongs to the hyperbolic absolute risk aversion (HARA) family that satisfy DARA. Such functions imply that s^L is convex in d (Appendix I). If neither Assumption 4 nor DARA-HARA holds, s^L may be concave in d for any given w: In this case it is no longer guaranteed that s^L eventually exceeds the cost under the early o¤er s^E: As a result, reversed admittance may not obtain, as there may not be a set of types with $w < w_1$ where an early o¤er is the optimal choice of the club. Alternatively, the concave s^L may intersect s^E twice, generating either the reversed admittance pattern, or a pattern late-early-late, depending on whether the second intersection lies above or below d^{NE}. Crucial and common to both sets of assumptions (Assumption 4 and DARA-HARA) is that s^L increases by more than s^E: This qualitative feature is most easily achieved by assuming absolute club enforcement power established by incurring a …xed cost. In this case, the requirements for the reversed admittance result reduce to simple concavity of u.[10]

4 Commitment And The Viability Of Late O¤ers

In the framework of Section 3, there is but an endgame and potential commitment problems do not arise. For instance, if an applicant diverts all funds, the game ends before it has the opportunity to ask for more funding. Once two or more reform periods are considered, commitment a¤ects the viability of the late o¤er, while there is no room for opportunistic behavior in case of an early o¤er. To analyze the role of commitment in the use of leverage for setting reform incentives, we focus on the subset of relatively poor applicants where the moral hazard problem is not dominated by the discount e¤ect.

Assumption 5 (Zero Wealth) All applicant types have zero wealth.

[10] Note the importance of the concavity of u: With a linear felicity function, the marginal utility of consumption is a constant across states. Setting for illustration the marginal utility of consumption equal to one, the incentive constraint for reform under a late o¤er is $\delta\pi + \hat{s} = d + \hat{s}$: Hence, the club cannot lessen the applicant's incentive to consume the reform funds by providing ex ante overfunding. In that case, $d^{LE} = \hat{d}$; and late entry is only dominant for $d \leq \hat{d}$:

While we restrict the analysis for simplicity to zero wealth applicants, the results results in this section apply qualitatively also to positive wealth levels below w_1:[11]

On the one hand, late o¤ers are strictly dominant and $s^L = d$ if the club can fully commit not to renegotiate a stage-…nancing schedule. On the other hand, in a multi-period setting where the club cannot commit not to renew funding, the set of late o¤er types gradually shrinks as the number of periods increases. The applicant can exploit this lack of commitment in two ways. Having received reform …nance from the club, the applicant can deviate from the reform path by consuming the funds directly and returning next period for renewed funding. Alternatively, it can spend all or part to lower its reform status in order to extract larger rents in coming periods because of its larger reform distance. We also show that the club will renege on its promise to reward an applicant for having fully reformed. This commitment problem prevents the club from implementing the late admittance strategy in the cheapest incentive compatible way.

4.1 Stage-Financing

In the previous section, the club was restricted to making a single payment in the beginning of the (reform) period. We now assume that the club can split both funding and reform requirement into slices and condition the transfer of any subsequent slice upon previous reform. The following two assumptions ensure that the club can make a credible threat to refuse future funding.

Assumption 6 (Completion date) The club can commit to a completion date by which an applicant, holding a late o¤er, must meet the club requirement in order to get admitted.

Assumption 7 (Reform time) Changing the reform status by $¢x$ requires time $\underline{L}(¢x)$. For simplicity, $\underline{L}(¢x) = ¢x$.

Under Assumptions 6 and 7, an applicant cannot count on an extension and hence, failure to reform at any stage renders full reform impossible. Thus, the club will not disburse further funds. Furthermore, given Assumption 7, the applicant cannot accelerate the reform process. Hence, it cannot compensate for times without reform investments by compressing more investments into an arbitrarily short period later. Since $\underline{L} = d$, the minimum length of a full reform period di¤ers among applicant types, the more advanced being able to reach the club

[11] Due to Assumption 5 ($w = 0$), acceptance is weakly dominant for those types as the IC-L is slack.

standard faster. Of course, an applicant may prolong the reform process by spending time without reforming. Denote by $L \geq \underline{L}$ the length of the whole reform period until an applicant i, holding a late offer, reaches the club standard and is admitted. Accordingly, the discount factor is $\delta = e^{-rL}$; where r is the rate of time preference. First, we restrict attention to the class of stage-financing offers that implement full reform in the shortest time feasible $\underline{L} = d$ (fast reform schedule). Second, we prove that the fastest reform schedule is feasible and that it dominates all other schedules.

The club splits the reform period into $A \in N_+$ stages. Each stage $a \in [1; A]$ lasts l^a and is funded with s^a. The fast reform schedule without overfunding is given by $l^a = d^a$, $s^a = d^a$ if the applicant has invested F^{a-1} for $a > 1$. (Obviously, d^1 is unconditional.)

Since $e^{-rd}\pi > u(d_i)$ for all $d < \hat{d}$ (Section 3), it follows that disbursing all the reform funds up-front is incentive compatible only for the most advanced applicants ($d \leq \hat{d}$). All other candidates would divert funds if they were paid out up-front. Consider an applicant with a remaining distance $\tilde{d}$ to the club standard and discretion over an amount of money m. The applicant invests m in reforms if $e^{-r\tilde{d}}\pi \geq u(m)$.

Lemma 4 The maximum incentive compatible reform funds are given by $m = u^{-1}\left(e^{-r\tilde{d}}\pi\right)$: The amount m decreases with the remaining distance $\tilde{d}$.

A shorter distance $\tilde{d}$ increases the opportunity costs of diverting the funds now, because the membership benefits accrue sooner. Hence, the incentive compatible amount of reform finance rises monotonically the closer the applicant's ongoing reform take it to the entry threshold. A closer 'carrot' π exercises increased leverage on an impatient applicant. Because an applicant has to reform without any interruption under the fast reform schedule, Lemma 4 also determines the maximum interval between two consecutive disbursements of funds, and hence, a lower bound on the number of stages. Furthermore, continuous reform necessitates that the reform requirement equals the length of each stage, $l^a = d^a$. Recall that for the most advanced applicant types ($d \leq \hat{d}$), full reform without overfunding can be implemented using a single disbursement of d_i. That is, there is no need for stage-financing. For less advanced applicant types $d > \hat{d}$, splitting the disbursement of d into stages eliminates the need to offer rents. The inverse relationship between m and $\tilde{d}$ implies that the maximum interval between subsequent disbursements increases with the applicant's reform status. Hence, the maximum length of stage a, $\hat{d}^a$, is given by $\hat{d}^a = m\left(\hat{d}\right) = u^{-1}\left[e^{-r\hat{d}}\pi\right]$:

Lemma 5 For an applicant of type d, implementation of full reform without overfunding requires at least $\underline{A}$ stages where

$$\sum_{a=1}^{\underline{A}-1} \hat{d}^a < d \le \sum_{a=1}^{\underline{A}} \hat{d}^a. \qquad (1)$$

The stage length is chosen so small that the temptation to deviate reform funds at the stage is less than the cost of not joining the club. While the club can trivially construct any number of incentive compatible offers without overfunding by splitting stages up further, no smaller number can be incentive compatible. A smaller number would imply larger reform and funding requirements per stage, violating the incentive constraint in at least one stage of the offer. The initial reform status x^0 and the minimum number of stages are inversely related. In particular, if the club selects the maximum incentive compatible stage length for all following stages from the beginning, there is a scheme where the earliest stages are added to an otherwise unmodified stage-financing scheme of a more advanced type.

Proposition 2 Under Assumptions 6 and 7, full reform can be implemented with no overfunding for all types. The optimal stage-financing schedule is the fast schedule with continuous funding ($A = \infty$).

The Proposition follows by combining the results of Lemmas 4 and 5 and noting that the club always prefers increasing the number of stages because it delays disbursement of further funds. Since at each stage, a reform $d \geq \hat{d} > 0$ is incentive compatible, Proposition 2 implies that within a finite minimum number of stages full reform is incentive compatible for any type without overfunding. Since the enlargement gains accrue only after reform, both the club and the applicant strictly prefer the fast schedule.[12] Under the early offer, the entrant retains rents $\frac{1-\gamma}{\gamma} d > 0$; and hence, early entry is strictly dominated.

Under Assumptions 6 and 7, stage-financing indeed reduces the cost of enlargement to the club to funding the pure reform expense. However, both assumptions are crucial for a successful stage-financing approach, and they are not in general satisfied. First, the club must be able to commit not to refinance (and grant an extension) at the end of the reform period. Second, it must not be possible for the applicant to 'accelerate' reforms, i.e., compressing full reform into one single stage. This assumption is needed to exclude opportunistic behavior that does

[12] The club can implement full reform without leaving the applicant rents using any stage-financing schedule with $L > d$ with a sufficient number of stages. Consider a schedule where the club grants the applicant reform time $L = \underline{L} + \Delta$: Trivially, full reform can still be implemented by allocating the entire delay Δ in an additional, pure delay stage of length Δ and with $d^1 = s^1 = 0$ at the start of the schedule. Having delays at some later time may require more than one additional stage.

not require going beyond the end date. Without Assumption 7, refinancing the full reform requirement at the beginning of the last stage would be optimal for the club. The anticipation of renewed finance in turn discourages reform of the applicant in all earlier stages. Hence, the viability of a stage-financing contract depends on the club's commitment power not to grant additional funding. The next Section analyzes the lack of commitment power of the club in a repeated game framework.

4.2 Opportunism

[INCOMPLETE]

In the repeated game, the applicant can behave opportunistically in two ways. First, under a late offer it can consume all funds it receives at the beginning of the period and return for renewed funding in the next period. In contrast to the one-period model, in all periods preceding the endgame, the club cannot credibly commit not to fund again. Second, the applicant can modify its starting position x^0 strategically for a future enlargement situation. Since its rents rise in d, an applicant has an incentive to lower its position along dimension x in order to extract more money from the club with a renewed offer. Either type of opportunistic behavior has the effect of shrinking the set of applicant types for which a late admittance offer is used in early periods.

4.2.1 Strategic Consumption

As a simple illustration of the consequences of opportunistic behavior in the repeated game, consider first a once-repeated enlargement game of Section 2 under Assumption 5 (zero wealth). The first round covers dates 0 and 1; and the second dates 1 and 2.[13] The optimal late offer in the last period corresponds to the solution of the one-period model (Section 3). Hence, for $d > u^{-1}(\delta\pi)$ we have $\hat{s}$ from Lemma 1 as the optimal transfer. At date 0; the incentive constraint for reform is

$$\delta\pi + u(s_0) \geq u(s_0 + d) + \delta[\delta\pi + u(s_1)]; \qquad (2)$$

where equality defines $s_0 \equiv \hat{s}_0$: Suppose $\hat{s}_0 = \hat{s}_1 \equiv \hat{s}$: Substituting the definition of $\hat{s}$, $\delta\pi + u(\hat{s}) = u(\hat{s} + d)$ yields $0 \geq \delta[\delta\pi + u(\hat{s}_1)]$: Since $\pi > 0$ and $\hat{s}_1 = \hat{s} \geq 0$; this cannot be satisfied for any $\delta > 0$. Hence, $\hat{s}_0$ must exceed $\hat{s}_1$:

[13] Notice the timing structure: Since no reform takes place between the realization of x at the end of the first round and the issuing of an offer in the beginning of the next round, both take place sequentially at date 1:

The incentive constraint for $T = 2$, equation (2), generalizes immediately to any $2 < T < \infty$:

$$u(\hat{s}_0) - u(\hat{s}_0 + d) = -\delta\pi + \sum_{t=0}^{T-1} \delta^{t+1} u(\hat{s}_{t+1} + d). \tag{3}$$

Lemma 6 In the $T < \infty$ times repeated enlargement game, the incentive compatible transfer with a late offer strictly increases in T. Formally, $\forall t \in (0, T-1)$, $\hat{s}_t > \hat{s}_{t+1}$. Furthermore, $\frac{d(\hat{s}_t - \hat{s}_{t+1})}{dT} < 0$.

The opportunity for the applicant to behave opportunistically in the beginning of the repeated game imposes a cost on the club that increases with the remaining length of the game. Thus, the cut-off between late and early admittance offers declines. Furthermore, the level $\hat{d}$ below which the late offer does not leave any rents to an applicant falls and reaches zero within a finite number of periods.

For simplicity, the effect of discounting on overfunding is discussed with reference to $T = 2$. From equation (2), it follows that

$$\frac{d\hat{s}_0}{d\delta} = \frac{(1 - 2\delta)\pi - u(\hat{s}_1) + \delta u'(\hat{s}_1) \frac{\pi}{u'(\hat{s}_1 - d) - u'(\hat{s}_1)}}{u'(s_0 + d) - u'(s_0)}. \tag{4}$$

Expression (4) is of ambiguous sign. At high values of δ, the applicant is patient and tries to maximize the total consumption regardless of when it happens. With larger discounting current consumption is more valuable, while any delay is costlier. Equation (2) implies

$$0 \geq [u(s_0 + d) - u(s_0)] + \delta u(\hat{s}_1) - (1 - \delta)\delta\pi. \tag{5}$$

The right-hand side consists of the opportunity cost of reforming in period 1; the second is the benefit of waiting for next period's transfer, and the third the cost of delaying entry. The first term weighs relatively most when $\delta = 0$; the second when $\delta = 1$; and the third when $\delta = \frac{1}{2}$. For extreme values of δ, the incentive constraint cannot hold (unlike the one-shot enlargement game where any reform can be made incentive compatible via a sufficiently large overfunding). For intermediate values of δ, the transfer $\hat{s}_1$ may rise or fall in δ.

In the beginning, the club has three enlargement strategies; that is $j = L$ in period 0, or in 1, and $j = E$ in period 0. Clearly, a profitable early offer at date 0 strictly dominates one at date 1 for any $\delta < 1$. First, consider the choice of offering late admission in period 0 versus 1. The former is more profitable if

$$\begin{aligned} \delta\Pi^R - \hat{s}_0 - d &\geq \delta^2\Pi^R - \delta(\hat{s}_1 + d) \\ \hat{s}_0 &\leq (1 - \delta)\left(\delta\Pi^R - d\right) + \delta\hat{s}_1. \end{aligned} \tag{6}$$

The right-hand side is the sum of the cost to the club of delaying $(1-\delta)$ the enlargement gain net of the resource costs of actual reforms $\left(\delta\Pi^R - d\right)$; and the present value of the future transfer. The club is the more inclined to pay for present entry the more costly delay is, and the more future entry will cost. As a result of the commitment problem making late offers more expensive in the repeated game, substituting early admittance in the first round for either late offer is more attractive than in the one-shot game.

Corollary 3 *The threshold between early and late offers, d_t^{LE}, weakly decreases in the number of periods remaining.*[14]

Consider now the infinitely repeated enlargement game. The incentive constraint in any period t is

$$\delta\pi + u(s_t - d) = \sum_{t=0}^{\infty} \delta^t u(s_t). \tag{7}$$

Only a constant value of $s_t = s^*$, $\forall t$, can be a solution. Any increasing or decreasing path would violate the players' budget constraints (finite resources as constraint on club spending). Hence, in equilibrium we have

$$\begin{aligned} \delta\pi + u(s^* - d) &= \sum_{t=0}^{\infty} \delta^t u(s^*); \\ \delta\pi &= \frac{u(s^*)}{1-\delta} - u(s^* - d). \end{aligned} \tag{8}$$

This condition defines the minimum incentive compatible level of overfunding with infinitely many periods remaining.[15] Clearly, $\frac{ds^*}{d\pi} < 0$ and $\frac{ds^*}{dd} > 0$. We apply the implicit function theorem on (8) to obtain[16]

$$\frac{ds^*}{d\delta} = -\frac{u(s^* - d) + \pi(2\delta - 1)}{u'(s^*) - (1-\delta)\,u'(s^* - d)}. \tag{9}$$

This expression is of ambiguous sign. For δ sufficiently close to 1 the derivative is negative, but for small δ the denominator is negative and the numerator ambiguous. The ambiguity

[14] Corollary 3 is a weak rather than strict statement because the cutoff d_t^{LE} is truncated below by 0.

[15] If the club membership benefits accrue in every period of membership rather than only once, the constraint is more easily satisfied:

$$\frac{\delta}{1-\delta}\pi = \frac{u(s^*)}{1-\delta} - u(s^* - d).$$

However, for all $d > \hat{d}$, $s^* > 0$, and hence, the commitment problem remains strictly costly for the club.

[16] With per-period benefits the expression takes a simpler form. After substituting for π from the incentive constraint from the previous footnote, $\frac{ds^*}{d\delta} = -\frac{u(s^*-d) - u(s^*)}{u'(s^*) - (1-\delta)u'(s^*-d)}$. Hence, $\frac{ds^*}{d\delta} > 0$ if and only if $u'(s^*) - (1-\delta)\,u'(s^* - d) > 0$. Clearly this can only hold for sufficiently large δ.

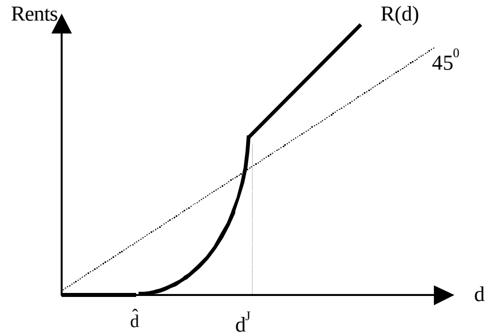

Figure 6: Strategic Deterioration

derives from the presence of two opposing effects that discounting has on the incentive to reform. On the one hand, impatience lowers the value of the consumption stream derived from not reforming ($\frac{u(s^*+d)}{1-\delta}$ falls). On the other hand, impatience also means that the discounted membership gain, i.e., the incentive to reform, is valued less. The two effects are of changing relative strength because the former is non-linear ($\frac{u(s^*+d)}{1-\delta}$ becomes arbitrarily large as δ rises) and the latter linear.

Hence, in the repeated game, the late admittance strategy becomes relatively less attractive, either because entry may be delayed (in the finitely repeated game), or because it involves larger rents for the applicant.[17] Thus, the range of applicant types for which late entry is the cheaper strategy shrinks (d^{LE} decreases).

4.2.2 Strategic Deterioration

Consider again the once repeated enlargement game. Instead of consuming the reform funds, an appliant can use the funds to divest, i.e., deteriorate its starting position from x^0 to $x^0 - F$. The incentive to do so stems from the fact that the rents to the applicant are increasing in d: This additional possibility to extract rents from the club aggravates the opportunistic behavior problem.

The gain from investing in strategic deterioration of x is shown in Figure 6. For $d < \hat{d}$ the applicant retains no rents in the late conditional offer, while for $\hat{d} < d < d^J$; it receives rents (Proposition 1). For $d^J < d < d^{NE}$; the rents are given by $\frac{1-\gamma}{\gamma}d$ under an early offer. The cost of strategic deterioration is given by the 45^0 line. The applicant engages in strategic

[17] Farell and Maskin (1989) show that renegotioation proof threats can be constructed in repeated prisoner's dilemma games. This threat involves zero rents for the punishing player. In our case, since the club can profitably employ the early entry offer, this credible threat strategy with a late offer is strictly dominated.

deterioration if the gain $R(d)$ net of the cost of deterioration yields a higher utility increase than the discounting cost of delaying membership.

If the applicant has an incentive to use reform …nance to increase the reform distance, it is a strictly dominant strategy for the club to defer a late o¤er. Hence, the club's action in the …rst period is determined by a comparison between an early o¤er now and a late o¤er next period. This comparison yields a strictly lower level of d^J; the cut-o¤ level of reform distance above which the club makes an early o¤er, and below which it makes a late o¤er in the next period. Discounting lowers the club's payo¤ from this deferred late o¤er and hence, d^J is lower now.

If the number of future periods rises, the late o¤er is deferred until the last period. Hence, it gets more discounted, and the threshold between a deferred late o¤er, and an early one now, shifts down.

Corollary 4 If the applicant has an incentive to strategically deteriorate, as $T \; ! \; 1;\ d_t^{LE} \; ! \; 0$ and the only o¤ers made are early o¤ers. For $T < 1$; any late o¤er is made in T.

In conclusion, both types of opportunistic behavior raise the cost to the club of the late conditional o¤er scheme. The longer the remaining time horizon, the lower the threshold between early and late admittance, and the lower the level $\hat{d}$ up to which the late o¤er requires no rents to the applicant.

4.2.3 Rewarding Entry

Assuming commitment, the stage-…nancing schedule reduces s^L to d. The idea is to raise the gain from not deviating relative to the stepwise reduced cost for the applicant. The ratio of bene…t to cost of reforming can also be raised if the club requires full reform in one go, but raises the bene…t of entering. In particular, the club could raise the applicant's reform incentives by o¤ering a reward conditional on entry. O¤ering a pure reward p to any successful entrant, the gain to reforming and entering is $\pm¼ + \pm u(p)$ while the opportunity cost is $u(d)$: Hence, a su¢ciently high p can induce any applicant type to reform fully.

However, as in the previous section, this strategy again relies on the assumption of exogenous commitment. Since reform is not veri…able, the applicant is not guaranteed entry even if it reforms. Since it cannot insist on admittance, its outside option ex post is worth zero, which is less than accepting entry without payment of p and at least receive ¼. (In fact, if the applicant were not …nancially constrained, the club could even extract part or all of ¼ as well). Hence, any prize o¤ered for entry is not renegotiation-proof.[18]

Note the crucial role of the non-veri…ability of the reform status x: If x was contractible, not only would a pure reward scheme become a viable alternative to the pure overfunding scheme, but the club could even use both to construct an even more cost-e¢cient way to induce full reform. The option of rewarding entry would clearly be a non-trivial addition to the contracting space, since a comparison of the incentive constraints for the pure overfunding (±¼ + ±u (s) ¸ u (s + d)) and the pure reward scheme (±¼ + ±u (p) ¸ u (d)) shows that the pure reward is strictly cheaper for ± su¢ciently close to 1: Furthermore, since both overfunding and the reward accrue in di¤erent periods, concavity of u (¢) implies that a mixed contract would be strictly superior to either pure one.[19]

4.3 Sources of Commitment Power

[PRELIMINARY]

The power of future membership as incentive mechanism depends on the credibility of the club's threat to refuse additional funding. In the preceding section, we show that with strong commitment ability, the club can use stage …nancing to reduce the transfer to poor applicants to the pure reform cost. In this case, the late o¤er is strictly dominant. In contrast, lacking any commitment power in the repeated game leads to opportunistic behavior that renders the late o¤er unpro…table.[20] Here, we discuss brie‡y two modi…cations of the basic model that create exogenous commitment. (In Section 4.1 commitment came from Assumptions 7 and 6.) Both mechanisms we discuss rely on competition among a pool of applicants.

First, the current membership size may be such that inclusion of all current applicants, even if reformed, would exceed a limit on pro…table enlargements. Reasons for such a saturation membership level may be convex crowding costs that on the critical margin exceed ±¦R:

[18] Going back to the applicants that di¤er in both d and w; there is a further way in which commitment problems prevent the club from making best use of the late o¤er. In the one-period model of Section 3, applicants with large wealth relative to reform distance had to pay an 'admittance fee' to the club. In the repeated game, the club, instead of admitting the reformed applicant, can take the fee and make a new take-it-or-leave-it o¤er next time, demanding additional payment. This problem is easily overcome by taking the entrance fee only upon actual entry. Both the payment and actual entry are observable and veri…able, so this contract would not pose problems.

[19] With x veri…able, the entrant's share ¼ of the total (gross) enlargement surplus ¦R + ¼ can be interpreted as re‡ecting relative bargaining power. We have so far assumed that ¼ is either non-veri…able or non-transferable, and that the club has all bargaining power. An alternative formulation would be to let ¼ + ¦R be transferable and give the applicant such bargaining power that it can extract a share ¼/(¦R + ¼) of ¼ + ¦R in ex post negotiations. This alternative setup results in the same incentive structure as before.

[20] Credible threats in repeated prisoner's dilemma games have been analyzed (Farrell and Maskin, 1989).

The club pre…nances at least one more applicants than it could take in. While it is still an equilibrium for all applicants not to reform, there is now another equilibrium where all reform and enter if there are su¢ ciently many o¤ers. The expectation that other candidates reform makes reform strictly optimal for any single potential deviant. Alternatively, the club may have limited resources. Spending all available funds on pre-…nancing current applicants creates a credible last opportunity for them to reform and pursue the enlargement gain ¼: Interestingly, the club makes all enlargement o¤ers simultaneously, thus making its resource constraint strictly binding. Bunched entry results as solution to the commitment problem.

5 Conclusion

We analyze the strategic use of the club membership and reform …nance decisions to induce an applicant to reform. The main result lies in a 'reversed' admittance order. Advanced applicant types enter after having reformed, while less advanced types enter early and have their reforms monitored by the club. All but the most advanced entrants obtain rents that increase with their reform distance. We also show that the use of future membership bene…ts as an incentive mechanism ceases to be e¤ective when the club cannot commit to deny refunding in the future. Crucial for the reversed admittance result is an assumption on the curvature of the applicant's utility function that lets the cost of the moral hazard problem under a late o¤er increase faster in reform distance than the club's internal monitoring cost. We have discussed alternative formalizations that are equivalent in creating a tradeo¤ between the leverage of a late o¤er and the monitoring capability of an early o¤er; if no such assumption is satis…ed, the late o¤er may be a dominant strategy for any applicant type.

The analysis can be extended in a variety of directions. The club standard may change over time, or be a choice variable of the club. Information asymmetries between an applicant and the club concerning the initial reform level or the cost of reforming (or equivalently, the productivity of any given investment) creates an adverse selection problem. Furthermore, the club may have the option to invest of its own, a¤ecting the payo¤ matrix of the game. In the EU enlargement situation, this version of the model could provide insights into the 'widening' versus 'deepening' debate, i.e., whether internal EU reform should precede enlargement or not. Finally, and again motivated by the EU example, heterogeneity of incumbent club members plays a crucial role in forming the enlargement strategy.

APPENDIX

A Proof of Lemma 1 (Reform Implementation)

Part (i): Once admitted, an applicant has no incentives to reform. Hence, $\gamma\left(s^E + w\right) \geq d$ must hold for full reform to be feasible, giving a minimum transfer of $s^E = \frac{d}{\gamma} - w$.

Part (ii): Provided an applicant has accepted a late offer, the club minimizes s subject to

$$w + s \geq d \qquad \text{(FC-L)}$$

and

$$\delta\pi + u(w + s - d) \geq u(w + s). \qquad \text{(IC-L)}$$

For types $\left\{(d; w) : d < u^{-1}(\delta\pi) \text{ and } w \in (0; \infty)\right\}$; the IC-L is slack, given that reform is feasible. Hence, the minimum incentive compatible transfer is $s^L = d - w$.

For types $\left\{(d; w) : d > u^{-1}(\delta\pi) \text{ and } w \in (0; \infty)\right\}$, $s = d - w$ violates the IC-L. Thus, the minimum incentive compatible transfer is such that $\delta\pi + u(w + s - d) = u(w + s)$. Finally,

$$\frac{d\hat{s}}{d\delta} = -\frac{\pi}{u'(w + \hat{s} - d) - u'(w + \hat{s})} < 0 \quad \text{and} \quad \frac{d\hat{d}}{d\delta} = \frac{\pi}{u'\left(\hat{d}\right)} > 0.$$

B Proof of Lemma 2 (Acceptance Early)

The club minimizes s subject to

$$w + s \geq \frac{d}{\gamma} \qquad \text{(FC-E)}$$

and

$$\pi + u(w + s - d) \geq u(w) \qquad \text{(IR-E)}$$

Feasibility of reform requires that $w + s \geq \frac{d}{\gamma}$ (Lemma 1), and the new entrant retains $w + s - d \geq \frac{1-\gamma}{\gamma} d$ after reforming. Thus, the IR-E requires $\pi + u(w + s - d) \geq \pi + u\left(\frac{1-\gamma}{\gamma} d\right) \geq u(w)$. Hence, for $w < u^{-1}\left[\pi + u\left(\frac{1-\gamma}{\gamma} d\right)\right]$ (Region I), the FC-E binds and $s^E = \frac{d}{\gamma} - w$. In Region II, the IR-E binds and $s^E = d - w + u^{-1}[u(w) - \pi]$.

Derivation of $\left(IR^E - FC^E\right)$: Substituting $w + s = \frac{d}{\gamma}$ from the FC–E into the IR-E directly yields $\pi + u\left(\frac{1-\gamma}{\gamma} d\right) = u(w)$ as the equation defining the $\left(IR^E - FC^E\right)$ curve. This curve is concave. Total differentiation yields

$$\frac{dd}{dw} = \frac{\gamma}{1-\gamma} \frac{u'(w)}{u'\left(\frac{1-\gamma}{\gamma} d\right)} > 0;$$

and hence,

$$\frac{d^2 d}{dw^2} = \frac{\gamma}{1-\gamma} \frac{u''(w)}{u'\left(\frac{1-\gamma}{\gamma} d\right)} < 0.$$

C Proof of Lemma 3 (Acceptance Late)

The club minimizes s subject to

$$\delta\pi + u(w+s-d) \geq u(w+s); \tag{IC-L}$$

$$\delta\pi + u(w+s-d) \geq u(w); \tag{IR-L}$$

and

$$w + s \geq d. \tag{FC-L}$$

From Lemma 1 it follows that for types $\left\{(d;w) : d < u^{-1}(\delta\pi) \text{ and } w \in (0;\infty)\right\}$ (Regions III and IV), the IC-L is always slack. By the same reasoning, the IR-L is slack for $w < u^{-1}(\delta\pi)$ (Region III), and s^L is determined by the FC-L. Conversely, for $w \geq u^{-1}(\delta\pi)$ (Region IV) the IR-L determines s^L.

Lemma 1 further implies that for types $\left\{(d;w) : d > u^{-1}(\delta\pi) \text{ and } w \in (0;\infty)\right\}$ (Regions I and II), the IR-L binds for $s \leq 0$ (Region II) and the IC-L binds for $s > 0$ (Region I), while the FC-L is always slack. Solving the IC-L (or IR-L) for $s = 0$ yields the $\left(IR^L - IC^L\right)$ curve, $d = w - u^{-1}[u(w) - \delta\pi]$. Being the IC-L for $s = 0$, the $\left(IR^L - IC^L\right)$ is concave in w. Totally differentiating the IC-L for $s \geq 0$ yields

$$\begin{aligned} \frac{dd}{dw} &= \frac{u'(w+s-d) - u'(w+s)}{u'(w+s-d)} \\ &= 1 - \frac{u'(w+s)}{u'(w+s-d)} \in (0;1); \end{aligned}$$

and

$$\frac{d^2d}{dw^2} = \frac{-u''(w+s)\,u'(w+s-d) + u'(w+s)\,u''(w+s-d)}{u'(w+s-d)^2}.$$

Hence, $\frac{d^2d}{dw^2} < 0$ if and only if $-u''(w+s)\,u'(w+s-d) < -u'(w+s)\,u''(w+s-d)$, which amounts to assuming DARA.

D Proof of Proposition 1

We first compare the cost to the club of making an early and a late offer of admittance for any type, and then analyze the choice between making an offer and making no offer.

Lemmas 2 and 3 together divide the space of applicant types into five regions (Figure 7). The club chooses between an early and a late offer by comparing for each region the respective transfers.

Lemma 7 (Regions 1 and 2) For all types with $w \geq u^{-1}(\pi)$ and $d \leq u^{-1}[u(w) - \pi]\frac{\gamma}{1-\gamma}$, $s^E \leq s^L$.

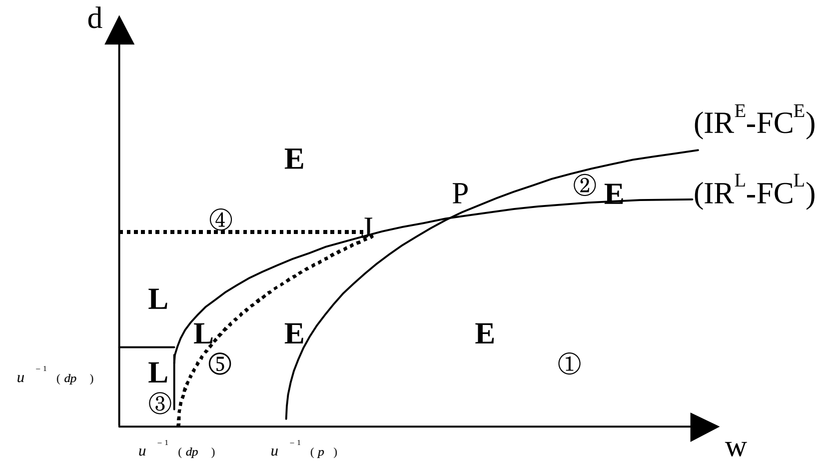

Figure 7: Early Versus Late Offers

Proof. For the above types, $s^E = d - w + u^{-1}[u(w) - \pi]$ from Lemma 2, while s^L is either equal to $d - w + u^{-1}[u(w) - \delta\pi]$ (Region 1) or implicitly defined by $s = d - w + u^{-1}[u(w+s) - \delta\pi] > 0$ (Region 2) from Lemma 3. Since $s^L > 0$ in Region 2 and $\delta\pi < \pi$, the early offer is more profitable in either case. ■

For all types $w < u^{-1}\left[\pi + u\left(\frac{1-\gamma}{\gamma}d\right)\right]$; the IR-E is slack. Hence, in the remaining part of the proof we only need to compare the FC-E with the transfer under the late offer.

Lemma 8 (Region 3) For types $\left\{(d,w) : d \in \left[0, u^{-1}(\delta\pi)\right), w \in \left[0, u^{-1}(\delta\pi)\right)\right\}$; $s^L < s^E$.

Proof. By Lemmas 2 and 3, $s^L = d - w < \frac{d}{\gamma} - w = s^E$; which follows from $\gamma \in (0,1)$. ■

Lemma 9 (Region 4) For types with $d > u^{-1}(\delta\pi)$ for $w < u^{-1}(\delta\pi)$ and types $d \geq w - u^{-1}[u(w) - \delta\pi]$ for $w \geq u^{-1}(\delta\pi)$, there exists a unique $\bar{d}$ defined by $\delta\pi = u\left(\frac{d}{\gamma}\right) - u\left((1-\gamma)\frac{d}{\gamma}\right)$ such that for $d < \bar{d}$; $s^L < s^E$; and $s^L \geq s^E$ for $d \geq \bar{d}$. Moreover, $\bar{d} < d^{NE}$.

Proof. For these types, s^L as defined by $s = d - w + u^{-1}[u(w+s) - \delta\pi]$ is compared to $\frac{d}{\gamma} - w = s^E$: Setting $s^L = s^E$ yields the definition of $\bar{d}$. Late admittance is cheaper if $\frac{d}{\gamma} - w > d - w + u^{-1}[u(w+s) - \delta\pi]$; or $\delta\pi > u\left(w + s^L\right) - u\left[\frac{(1-\gamma)}{\gamma}d\right]$; which holds for $d > \bar{d}$; while early is (weakly) cheaper otherwise.

Existence and uniqueness of $\bar{d}$ and $\bar{d} < d^{NE}$ all follow from Assumption 4. The difference $u\left(\frac{d}{\gamma}\right) - u\left((1-\gamma)\frac{d}{\gamma}\right)$ increases monotonically in d; and $d^{NE} = \gamma\Pi^R$: Hence, $\bar{d} < d^{NE}$ is implied by $\delta\pi < u\left(\Pi^R\right) - u\left((1-\gamma)\Pi^R\right)$: Existence of $\bar{d}$ follows from the fact that $u\left(\frac{d}{\gamma}\right) - u\left((1-\gamma)\frac{d}{\gamma}\right)$ equals zero for $d = 0$; that this difference increases monotonically, and that $\bar{d} < d^{NE}$. Finally, uniqueness follows directly from monotonicity of $u\left(\frac{d}{\gamma}\right) - u\left((1-\gamma)\frac{d}{\gamma}\right)$ in d: ■

Lemma 10 (Region 5) For types with $w \in \left(u^{-1}(\delta\pi), u^{-1}(\pi)\right)$ and $d < w - u^{-1}[u(w) - \delta\pi]$ and types with $w \geq u^{-1}(\pi)$ and $d \in \left[u^{-1}[u(w) - \pi]\frac{\gamma}{1-\gamma}, w - u^{-1}[u(w) - \delta\pi]\right)$, $s^L > s^E$ iff $d < u^{-1}[u(w) - \delta\pi]\frac{\gamma}{1-\gamma}$, and $s^L \leq s^E$ otherwise.

Proof. For these types, the club compares $s^E = \frac{d}{\gamma} - w$ and $d - w + u^{-1}[u(w) - \delta\pi] = s^L$. Hence, $s^E < s^L$ if $\frac{d}{\gamma} - w < d - w + u^{-1}[u(w) - \delta\pi]$. Rearranging yields $d < u^{-1}[u(w) - \delta\pi]\frac{\gamma}{1-\gamma}$. Equating s^E and s^L defines the $\left(FC^E - IR^L\right)$ curve, $d = u^{-1}[u(w) - \delta\pi]\frac{\gamma}{1-\gamma}$. This curve is concave. Total differentiation yields

$$\frac{dd}{dw} = \frac{u'(w)}{u'\left(\frac{1-\gamma}{\gamma}d\right)}\frac{\gamma}{1-\gamma} > 0 \quad \text{and} \quad \frac{d^2d}{dw^2} = \frac{u''(w)}{u'\left(\frac{1-\gamma}{\gamma}d\right)}\frac{\gamma}{1-\gamma} < 0.$$

■

Lemma 11 (Point J) The $\left(FC^E - IR^L\right)$ and $\left(IR^L - IC^L\right)$ curves have a unique intersection (Point J), with d^J implicitly defined by $\delta\pi + u\left(\frac{1-\gamma}{\gamma}d\right) = u\left(\frac{d}{\gamma}\right)$. Moreover, $d^J > u^{-1}(\delta\pi)$.

Proof. The $\left(FC^E - IR^L\right)$ curve is defined by $s^E = s^L$, while on $\left(IR^L - IC^L\right)$ the transfer $s^L = 0$. Hence, at any intersection $s^E = s^L = 0$ must hold, and this point also must lie on $d = \gamma w$ (the iso-transfer line with $s^E = 0$). Substituting $w = \frac{d}{\gamma}$ into $\left(FC^E - IR^L\right)$ (or $\left(IR^L - IC^L\right)$) yields $\delta\pi + u\left(\frac{1-\gamma}{\gamma}d\right) = u\left(\frac{d}{\gamma}\right)$. The expression defining d^J is identical to that defining $\hat{d}$. Thus, existence, uniqueness, and $d^J < d^{NE}$ all follow from Lemma 9. Moreover, $\hat{d} = d^J > u^{-1}(\delta\pi)$ because d^J is unique, and the $\left(IR^L - IC^L\right)$ curve is increasing, concave, and passes above γw at $w = u^{-1}(\delta\pi)$. ■

Note that the curve $(FC^E - IR^L)$, as given by $\delta\pi + u\left(\frac{1-\gamma}{\gamma}d\right) = u(w)$ is everywhere above the curve $(IR^E - FC^E)$, $\pi + u\left(\frac{1-\gamma}{\gamma}d\right) = u(w)$, and has the same slope. Hence, the latter intersects the $\left(IR^L - IC^L\right)$ (Point P) to the right of Point J. This completes the comparison of an early and a late offer.

Although full reform is feasible under either enlargement strategy, the cost of providing the applicant with sufficient acceptance and reform incentives may exceed the benefit of reformed enlargement to the club.

Lemma 12 (No Offer) Under Assumption 4, a profitable late admittance offer implies a profitable early offer, but the reverse does not hold.

Proof. The inequality $d^{NE} > d^{NL}$ requires $\delta\pi < u\left(\delta\beta R + w\right) - u\left[(1-\gamma)\left(\delta\beta R + w\right)\right]$. Part (i) of Assumption 4 implies that for $w = 0$, $d^{NE} > d^{NL}$. By Part (ii), $u\left(\delta\beta R + w\right) - u\left[(1-\gamma)\left(\delta\beta R + w\right)\right]$ increases monotonically in w. Hence, the d^{NL} curve lies everywhere below the d^{NE} curve. ■

Note that $d^{NL} > d^J$. From $d^{NL} = \delta\beta R - u^{-1}\left[u\left(\delta\beta R\right) - \delta\pi\right]$ at $w = 0$, it follows that $\delta\pi = u\left(\delta\beta R\right) - u\left(\delta\beta R - d^{NL}\right)$. Equating this expression with $\delta\pi = u\left(\frac{d}{\gamma}\right) - u\left(\frac{1-\gamma}{\gamma}d\right)$ (definition of d^J), we obtain $u\left(\frac{d^J}{\gamma}\right) - u\left(\frac{d^J}{\gamma} - d^J\right) = u\left(\delta\Pi^R\right) - u\left(\delta\Pi^R - d^{NL}\right)$. Rearranging yields $u\left(\delta\Pi^R\right) - u\left(\frac{d^J}{\gamma}\right) = u\left(\delta\Pi^R - d^{NL}\right) - u\left(\frac{d^J}{\gamma} - d^J\right)$. Since $\delta\Pi^R > \frac{d^J}{\gamma}$, concavity of $u(\cdot)$ implies that this can only hold if $d^J < d^{NL}$.

E Proof Of Corollary 1

Recall $w_1 \equiv u^{-1}(\delta\pi)$, $w_2 : \delta\pi + u[(1-\gamma)w] = u(w)$, and define $w_3 \equiv \frac{1-\gamma}{\gamma}d^J$. We first give a formal restatement of Corollary 1. The optimal transfer is

(i) $s \geq d$ for all types:

$\left\{(d,w) : d \in \left(u^{-1}[u(w)+\delta\pi] - w, \gamma\left(\delta\Pi^R + w\right)\right), w \in (0, w_3)\right\}$ and

$\left\{(d,w) : d \in \left(\frac{1-\gamma}{\gamma}w, \gamma\left(\delta\Pi^R + w\right)\right), w \in (w_3, \infty)\right\}$ (Region I);

(ii) $0 < s < d$ for all types:

$\left\{(d,w) : d \in \left(w, u^{-1}[u(w)+\delta\pi] - w\right), w \in (0, w_1)\right\}$; and

$\left\{(d,w) : d \in \left(w - u^{-1}[u(w)+\delta\pi], u^{-1}[u(w)+\delta\pi] - w\right), w \in (w_1, w_3)\right\}$; and

$\left\{(d,w) : d \in \left(w - u^{-1}[u(w)+\delta\pi], \frac{\gamma}{1-\gamma}w\right), w \in (w_3, w_2)\right\}$; and

$\left\{(d,w) : d \in \left(\gamma w, \min\left[\frac{\gamma}{1-\gamma}w, \gamma\left(\delta\Pi^R + w\right)\right]\right), w \in (w_2, \infty)\right\}$ (Region II);

(iii) $s \leq 0$ for all types:

$\{(d,w) : d \in (0, w), w \in (0, w_1)\}$; and

$\left\{(d,w) : d \in \left(0, w - u^{-1}[u(w)+\delta\pi]\right), w \in (w_1, w_2)\right\}$; and

$\{(d,w) : d \in (0, \gamma w), w \in (w_2, \infty)\}$ (Region III).

Proof. The $s = d$ line: For $d^J > d > u^{-1}(\delta\pi)$, the IC-L binds. Substituting $s = d$ in the IC-L yields $d = d - w + u^{-1}[u(w+d) - \delta\pi]$, which simplifies to $d = u^{-1}[u(w)+\delta\pi] - w$ with $\frac{dd}{dw} = \frac{u'(w) - u'(w+d)}{u'(w+d)} > 0$. DARA then implies concavity. For $d \geq d^J$, $s^E = \frac{d}{\gamma} - w$. Substituting $s = d$ yields $w = \frac{1-\gamma}{\gamma}d$. Substituting w in $d = u^{-1}[u(w)+\delta\pi] - w$ yields $u\left(\frac{d}{\gamma}\right) = u\left(\frac{1-\gamma}{\gamma}d\right)$. Hence, the two curves meet on the horizontal d^J line. The corresponding w coordinate follows from $w = \frac{1-\gamma}{\gamma}d^J \equiv w_3$..

The $s = 0$ line: For $\left\{(d,w) : d \in \left[u^{-1}(\delta\pi)\right], w \in \left[u^{-1}(\delta\pi)\right]\right\}$, the transfer is given by $s^L = d - w$. Hence, the $s = 0$ line has $d = w$. For $w \in (w_1, w_2)$ the $s = 0$ line is given by $\left(IR^L - IC^L\right)$. For $w > w_2$, the transfer is $s^E = \frac{d}{\gamma} - w$, and hence, the $s = 0$ line is $d = \gamma w$. ■

F Proof Of Corollary 2

The no-offer separating line is $d^{NE} = \gamma\left(\delta\Pi^R + w\right)$ with $\frac{dd^{NE}}{d\gamma} > 0$ and $\frac{dd^{NE}}{d\delta} > 0$. From Lemma 11, the upper separating line between late and early offer, d^J, is defined by $\delta\pi = u\left(\frac{d^J}{\gamma}\right) - u\left(\frac{1-\gamma}{\gamma}d^J\right)$. By Assumption 4, $\frac{dd^J}{d\gamma} = \frac{\frac{d}{\gamma}\left[u'\left(\frac{d}{\gamma}\right) - u'\left(\frac{1-\gamma}{\gamma}d\right)\right]}{\left[u'\left(\frac{d}{\gamma}\right) - (1-\gamma)u'\left(\frac{1-\gamma}{\gamma}d\right)\right]} < 0$, $\frac{dd^J}{d\delta} = \frac{\gamma\pi}{\left[u'\left(\frac{d}{\gamma}\right) - (1-\gamma)u'\left(\frac{1-\gamma}{\gamma}d\right)\right]} > 0$, and $\frac{dd^J}{d\pi} = \frac{\gamma\delta}{\left[u'\left(\frac{d}{\gamma}\right) - (1-\gamma)u'\left(\frac{1-\gamma}{\gamma}d\right)\right]} > 0$. The lower separating line is given by the $\left(FC^E - IR^L\right)$

curve, $d = u^{-1}[u(w) - \delta\pi]\frac{\gamma}{1-\gamma}$. It follows immediately that $\frac{dd}{d\gamma} = u^{-1}[u(w) - \delta\pi]\frac{1}{(1-\gamma)^2} > 0$; $\frac{dd}{d\delta} = -\frac{\pi}{u'\left[\frac{1-\gamma}{\gamma}d\right]} < 0$; and $\frac{dd}{d\pi} = -\frac{\delta}{u'\left[\frac{1-\gamma}{\gamma}d\right]} < 0$.

As $\frac{d\left[\frac{d}{\gamma}-w\right]}{d\gamma} = -\frac{d}{\gamma^2}$ and $\frac{d\left[d-w+u^{-1}[u(w)-\pi]\right]}{d\pi} = -\frac{1}{u'(w+s-d)}$, $s^E = \max\left[\frac{d}{\gamma} - w; d - w + u^{-1}[u(w) - \pi]\right]$ weakly decreases in γ and π.

As $\frac{d\left(d-w+u^{-1}[u(w)-\delta\pi]\right)}{d\delta} = -\frac{\pi}{u'(w+s-d)}$, $\frac{d\left(d-w+u^{-1}[u(w)-\delta\pi]\right)}{d\pi} = -\frac{\delta}{u'(w+s-d)}$, $\frac{d\hat{s}}{d\delta} = -\frac{\pi}{u'(w+s-d)-u'(w+s)}$, and $\frac{d\hat{s}}{d\pi} = -\frac{\delta}{u'(w+s-d)-u'(w+s)}$, $s^L = \max\left[d - w; d - w + u^{-1}[u(w) - \delta\pi]; \hat{s}\right]$ also weakly decreases in δ and π.

G Proof of Lemma 6

The Lemma follows from (3) by noting that by concavity of u, $[u(s_0) - u(s_0 + d)]$ increases in s_0. Concavity of $u(\hat{s}_{t+1})$ also implies that successive increments in s_0 get smaller as T rises.

H Admittance Offers Without Reform

In this section we analyze the club's optimal behavior for non-reform implementing offers. First, we show that no offer strictly dominates a late, non-reform implementing offer. Second, we derive the optimal non-reform implementing early offer and identify the set of types that accept such an offer. Third, we show that Assumption 3 implies that the club strictly prefers no offer to a non-reform implementing early offer.

Lemma 13 (Never No-Reform Late) Making no offer strictly dominates an accepted, non-reform implementing late offer.

Without reform, the club never admits a late applicant as $\Pi^U < 0$. Hence, an applicant accepts a non-reform implementing late offer if and only if $s \geq 0$, since then $u(w + s) > u(w)$. Since $\Pi^U - s < 0$, the club strictly prefers making no offer.

Lemma 14 (Early No Reform) Applicant types with $w \geq u^{-1}\left[\pi + u\left(\frac{1-\gamma}{\gamma}d\right)\right]$ never accept an early, non-reform implementing offer. For $w < u^{-1}\left[\pi + u\left(\frac{1-\gamma}{\gamma}d\right)\right]$, the optimal non-reform implementing early offer has a transfer

$$s^{EN} = \begin{cases} \frac{u^{-1}[u(w)-\pi]}{1-\gamma} - w & \text{if } w \geq u^{-1}(\pi); \\ -w & \text{otherwise.} \end{cases}$$

Proof. The condition for an early offer that leaves insufficient funds for reform is $0 \leq \gamma(w + s) < d$. The applicant rejects such an offer if and only if $\pi + u[(1-\gamma)(w + s)] < u(w)$.

For $w < u^{-1}\left[\pi + u\left(\frac{1-\gamma}{\gamma}d\right)\right]$, the club minimizes s subject to

$$\pi + u[(1-\gamma)(w + s)] \geq u(w) \qquad \text{(IR-EN)}$$

and

$$\frac{d}{\gamma} > w + s \geq 0. \tag{FC-EN}$$

If $u(w) < \pi$, then the club can extract all the applicant's wealth, i.e., $s = -w$. Otherwise, the IR-EN binds. ■

We now compare admittance without reform with no offer.

Lemma 15 (Never No-Reform Early) Given Assumption 3, making no offer strictly dominates an accepted, non-reform implementing early offer.

Proof. Lemma 14 implies that the club's payoff from a non-reform implementing offer is at most $\Pi^U + u^{-1}(\pi)$. ■

While simple, the condition in Assumption 3 is overly strong, since it would be sufficient that no reform is dominated by either no offer or reformed entry.

I The Curvature of s^L

In general, the curvature of the transfer s^L in d is ambiguous. Let '$+$' denote the argument $w+s$ in u, and no subscript $w+s-d$. Differentiation of $\frac{ds}{dd}$ from Footnote 5 yields

$$\frac{d^2s}{dd^2} = \frac{u''\left(\frac{ds}{dd}-1\right)\left[u'-u'_+\right] - u'\left[u''\left(\frac{ds}{dd}-1\right) - u''_+\frac{ds}{dd}\right]}{\left[u'-u'_+\right]^2}$$

Substituting for $\frac{ds}{dd}$ and simplifying, the numerator can be written as $u'^2u''_+ - u'^2_+u''$. Hence, $\frac{d^2s}{dd^2} > 0$, i.e., s^L is convex in d, if and only if

$$-\frac{u''}{u'^2} > -\frac{u''_+}{u'^2_+}.$$

This condition holds for a diminishing coefficient of absolute risk aversion, weighted by the reciprocal of the marginal utility. Denote this weighted coefficient $\beta(\cdot) = \frac{\lambda(\cdot)}{u'(\cdot)} = -\frac{u''(\cdot)}{u'(\cdot)^2}$, where $\lambda(\cdot)$ is the standard coefficient of absolute risk aversion. While $\beta' < 0$ does not hold for (negative) exponential or logarithmic utility functions, it holds for instance for $u(\cdot) = \sqrt{\cdot}$.

We can show that $\beta' < 0$ is generally satisfied for a subset of DARA-HARA functions. Following Merton (1971), hyperbolic absolute risk aversion (HARA) functions can be written as

$$U(x) = \frac{1-\gamma}{\gamma}\left(\frac{\beta x}{1-\gamma} + \eta\right)^{\gamma}, \tag{10}$$

with $\beta > 0$, $\gamma \neq 1$, $\frac{\beta x}{1-\gamma} + \eta > 0$ and $\eta = 1$ if $\gamma = -1$. The coefficient of absolute risk aversion of this class of functions is

$$A(x) = \frac{1}{\frac{x}{1-\gamma} + \frac{\eta}{\beta}}, \tag{11}$$

which leads to

$$A'(x) = \frac{-1}{(1-\gamma)\left(\frac{x}{1-\gamma} + \frac{\eta}{\beta}\right)^2}. \tag{12}$$

Hence, $A'(x) < 0$ for $\gamma < 1$, which defines a subset DARA-HARA of the general HARA functions. With $U'(x) = \beta\left(\frac{\beta x}{1-\gamma}+\eta\right)^{\gamma-1}$ and $U''(x) = -\beta^2\left(\frac{\beta x}{1-\gamma}+\eta\right)^{\gamma-2}$; the weighted coefficient of absolute risk aversion of HARA functions is then

$$-\frac{U''}{U'^2} = \left(\frac{\beta x}{1-\gamma}+\eta\right)^{-\gamma}. \tag{13}$$

We have diminishing (weighted) absolute risk aversion if and only if

$$\frac{d}{dx}\left(\frac{\beta x}{1-\gamma}+\eta\right)^{-\gamma} = -\frac{\beta\gamma}{1-\gamma}\left(\frac{\beta x}{1-\gamma}+\eta\right)^{-\gamma-1} < 0. \tag{14}$$

Hence, a necessary and sufficient condition for this condition to hold is $\gamma \in (0, 1)$ under the restriction to real-valued utility. This defines the subclass of DARA-HARA functions for which the weighted measure of absolute risk aversion is decreasing.

J Proof of Lemma 4

The solution to $\max m$ s.t. $e^{-r\tilde{d}\pi} \geq u(m)$ for an applicant with $\tilde{d}$ is given by $m = u^{-1}\left(e^{-r\tilde{d}\pi}\right)$, with $\frac{dm}{d\tilde{d}} = -\left[u^{-1\prime}\left(e^{-r\tilde{d}\pi}\right) r e^{-r\tilde{d}\pi}\right] < 0$.

K Proof of Lemma 5

No overfunding implies $s^a = d^a$ for $a = 1, \ldots, \underline{A}$. Feasibility of full reform requires $\sum_{a=1}^{A} d^a \geq d_{-}$. Thus, for all $A < \underline{A}$, $\sum_{a=1}^{A} \hat{d}^a \leq d_{-}$ and either full reform is not feasible or at least one $d^a > u^{-1}\left[e^{-r\hat{d}_1\pi}\right]$. For $A > \underline{A}$, $\sum_{a=1}^{A} \hat{d}^a > d_{-}$ and an incentive compatible schedule with at least one stage less exists.

References

[1] Baldwin, Richard, Francois, Joseph and Portes, Richard, 1997. The Costs and Bene…ts of Eastern Enlargement: The Impact on the EU and Central Europe, Economic Policy 24, 127-76

[2] Berglöf, Erik and Gerard Roland, 1998, The EU as an 'Outside Anchor' for Transition Reforms. SITE Working Paper No. 132, Stockholm School of Economics

[3] Bolton, Patrick and Scharfstein, David, 1990. A Theory of Predation Based on Agency Problems in Financial Contracting, American Economic Review, 80, 93-106.

[4] Buchanan, James, 1965. An Economic Theory of Clubs, Economica 32, 1-14

[5] Cornes, Richard, and Sandler, Todd, 1996. The Theory of Externalities, Public Goods, and Club Goods. 2nd Edition, Cambridge University Press; Cambridge, New York and Melbourne.

[6] Diamond, D. 1991. Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt, Journal of Political Economy 99: 689-721.

[7] Farrell, Joseph, and Eric Maskin, 1989. Renegotiation in Repeated Games, Games and Economic Behavior 1, 327-360

[8] Gromb, Denis, 1994. Renegotiation in Debt Contracts, mimeo.

[9] Hart, Oliver and Moore, John, 1994. A Theory of Debt Based on the Inalienability of Human Capital, Quarterly Journal of Economics 109: 841-79

[10] Holmström, Bengt and Tirole, Jean, 1997. Financial Intermediation, Loanable Funds, and the Real Sector, Quarterly Journal of Economics 112 (3), 663-692

[11] Merton, R.C, 1971. Optimum Consumption and Portfolio Rules in a Continuous-Time Model, Journal of Economic Theory 3: 373-413

[12] Sandler, Todd and Tschirhart, John T., 1980. The Economic Theory of Clubs: An Evaluative Survey, Journal of Economic Literature 18(4), 1481-1521

[13] Tiebout, Charles, 1956. The Pure Theory of Local Expenditures, Journal of Political Economy 64, 416-24

[14] Tirole, Jean, 1988. The Theory of Industrial Organization, MIT Press, Cambridge, MA

[15] Williamson, Oliver, 1975. Markets and Hierarchies: Analysis and Antitrust Implications, Free Press, New York