The Strategic
Euro Laggards

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Abstract:
A government applying for a club membership may strategically delay entry to cope with the hold-up problem introduced by anticipatory investments of the private sector. In equilibrium of a two-period incomplete information game, we find that a pro-entry government may strategically delay to imitate an anti-entry government and thereby affect expectations of the private sector. The delay is more likely if the government has a good electoral prospect, is internationally weak, and is not considered to be too keen on entry. The model is related to the case of the Czech Republic where the government recently softened commitment in the euro adoption strategy.

Keywords: EMU, club enlargement, international unions, bargaining

JEL: D74, E42, F31, F50.

1. Introduction

The EMU enlargement literature discusses predominantly the existence of the conditions for an optimal currency area, alternatively understood as an optimal club size in the club goods literature (Dean, 2004). The key topics are price and output level convergence (Frenkel and Nickel, 2005), business cycle correlation (Horvath and Ratfaia, 2004; for a meta-analysis, see Fidrmuc and Korhonen, 2006), and (ir)relevance of Maastricht criteria (e.g., Hallett and Lewisc, 2007).

Purely positive approaches complement the normative picture by attempts to identify strategic microfoundations of entry (Willett, 2000). Two groups of explanations stand out. The political economy of exchange rate combines interest-group politics and the macroeconomics to explain the choice of an exchange rate regime (see Broz and Frieden, 2001; Frieden, Ghezzi and Stein, 2001; Frieden 2002). Grüner and Hefeker (1996) in particular investigate into lobbying of large European banks. As an alternative, two-level game approach links club conditionality to a conflict in domestic politics. EMU conditionality is thus used to curb public spending and/or reduce taxes; extra constraints on the international level bring domestic policy benefits to the conservative incumbent (Dyson, 2006; Donnelly, 2005).

This paper focuses on yet another strategic determinant of entry, related to bargaining on entry conditions. Intergovernmental bargaining about the Eurozone is neglected in the literature since the future EMU member states have already accepted immutable entry conditions formed on the basis of preceding intergovernmental bargaining (Eichengreen and Frieden, 2000). Nevertheless, linkages across policy dimensions (i.e., credibility devices extended from one dimension to another, enhanced by international institutions) allow for inflows and outflows of compensating transfers even if conditionality is fixed. Treaty negotiations, transfer payments, and CAP reform are the prominent examples. A particularly effective issue linkage is achieved by strategic delegation of a high-level representative (see Harstad 2007, 2008).[1]

In theory, a weaker commitment to euro entry might help to extract additional side payments in several ways. Fahrholz (2007) argues that compensations by means of structural funds can be raised by crisis behavior in the ERM II. The problem of this argument is assumption on the distribution of costs related to the crisis behavior, favoring the culprit. Also, the considered multilateral character of the ERM II, referring mainly to the possible participation of the ECB in interventions at the $\pm 15\%$ margin, is in practice very much limited by the very short term financing (VSTF) facility (Antal, Holub, 2007). Most importantly, any model of intentional crisis behavior seems to underestimate the magnitude of risks of the intentional crisis behavior (cf., LeBlang, 2003; Eichengreen and Rose, 2003).

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[1]For further details on the institutional linkages in the context of the EU-level bargaining, see Slapin (2008).

This paper claims that some benefits may seized rather by addressing a hold-up problem with domestic firms whose sunk costs undermine negotiation position of the domestic government. The costs relate mainly to exporters, large manufacturers, financial companies, and investors into the commercial properties, but a related effect might be seen also in unofficial use of the euro as a parallel currency. We follow a model of the EU enlargement in Wallner (2003) where anticipation of enlargement leads firms to make relational investments that undermine negotiation power of the accessing government. The resulting drop in the threatpoint allows the club to charge a higher entrance fee. If the club can give take-or-leave offer, the applicant even inevitably suffers from immiserization: it would be better off to be prevented from joining the club for good.

Unlike Wallner (2003), we show that the applicant government may effectively address the hold-up problem if it disposes with an option of costly delay. Furthermore, we demonstrate that a necessary condition for strategic delay to influence the investors with rational expectations is incomplete information about the multiple types of government, differing in club membership valuation. The case of entry into monetary union is modeled in a simple representative-firm economy, stressing thus intergovernmental bargaining over the interest-group conflict about the exchange rate. The main policy conjecture is that a strategy of a surprise entry involving a probability of delay delivers extra benefits compared to the strategy of a strict commitment to entry.

The model might be applied to the case of the Czech Republic where a right-center government in year 2007 canceled the pre-announced euro-adoption schedule and started to condition the EMU entry upon reform support of the opposition parties. The theoretical model actually predicts a mixed strategy of the pro-entry government, and in equilibrium, uncertainty over timing of entry in the presence of multiple types of government. We identify both as follows: (i) A strong laggard position of the President, and the President's appointees in the Bank Board of the National Central Bank, demonstrate the existence of other than a pro-entry type. (ii) Mixed strategy is observed in a sense that the government is not explicit about the link to the strong laggards, and mixes pro-entry and pro-delay messages. (iii) Public opinion is relatively polarized, as compared to to NMS-9, hence median voter is a fragile predictive heuristics and the distribution of outcomes in probabilistic voting models is rather flat. This implies that the government's strategy is not bound by pre-electoral expectations.

The paper proceeds as follows. Section 2 defines the setup and proves the existence of a hold-up problem for sufficiently high anticipations. Section 3 briefly discusses a benchmark single period case. Here, the government can avoid the hold-up problem only by means of a time-inconsistent policy. To provide realistic strategic instruments for the government, Section 4 extends the setup into a two-period two-type case with time-consistent policies only. Uniqueness of the perfect Bayesian equilibrium with strategic delay, as well as corresponding comparative

statics, are derived. Next, Section 5 applies the mechanism to the case of the Czech Republic in 2007–2008. Section 6 concludes.

2. The setup

Consider three players: a club of countries (C), a government of an applicant country (G), and a representative firm in the country (F). The government decides whether to irreversibly apply for entry or not, $e \in [0, 1]$. Suppose that the only economic effect of the entry is a real productivity shock in the country, without any effect on the productivity in the club. This assumption is only to avoid unnecessary notation when expressing the bargaining prize; an extra cost/benefit on part of the club would only affect participation constraint of the club. Assume that entry as such implies a prize v for the government, to be interpreted as a continuation value of ongoing political integration (i.e. positive for federalists and negative for autonomists).

The firm employs homogenous capital at amount $k \geq 0$. That is, the hold-up problem is not due to the relational investments like in Wallner (2003). The country is a small open economy facing a constant interest rate $r > 0$. The output is given by AK-production function, increasing and concave in capital k,

$$y = af(k), f_k > 0, f_{kk} < 0. \tag{1}$$

Productivity is low in the case of no entry, $\underline{a} > 0$, and high in the case of entry, $\bar{a} > \underline{a}$. The firms' profits are taxed by a corporate tax at a flat rate $\tau \in [0, 1]$. Hence, expecting the entry with probability $\xi \in [0, 1]$, the firm invests

$$K(\xi) := \arg\max_k \{(1 - \tau) [\xi\bar{a} + (1 - \xi)\underline{a}] f(k) - rk\}. \tag{2}$$

The implicit-form solution to Eq. (2) writes $(1-\tau)[\xi\bar{a}+(1-\xi)\underline{a}]f_k(K(\xi)) = r$. From the implicit function theorem, observe that the investments grow if the entry is more likely:[2]

$$K_\xi = -\frac{[\xi\bar{a} + (1 - \xi)\underline{a}]f_{kk}}{f_k(\bar{a} - \underline{a})} > 0 \tag{3}$$

It is convenient at this point to introduce $\underline{k} := K(0)$ and $\bar{k} := K(1)$. For any $k \in [\underline{k}, \bar{k}]$, total benefits of the entry for the firm, $(1 - \tau)(\bar{a} - \underline{a})f(k)$, can be divided into two parts. First, the firm cashes in extra profits of the producer's surplus above the interest rate, $s(k) := (1-\tau)\bar{a}f(k) - rk$. Second, the firm avoids a loss implied by overinvesting in the case of no-entry, $l(k) := rk - (1-\tau)\underline{a}f(k)$.

For $k \in [\underline{k}, \bar{k}]$, the surplus is non-decreasing and concave, $s_k = (1-\tau)\bar{a}f_k - r \geq 0, s_{kk} = (1-\tau)\bar{a}f_{kk} < 0$, and the loss is non-decreasing and convex, $l_k = r - (1-\tau)\underline{a}f_k \geq 0, l_{kk} = (1-\tau)\underline{a}f_{kk} > 0$. Notice that under the most pessimistic outlook

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[2]Henceforth, partial derivatives are denoted by subscripts.

of the firm ($\xi = 0$), there is no overinvestment, hence loss is zero, $l(\underline{k}) = 0$, but surplus is still positive, $s(\underline{k}) > 0$.

From the aggregate perspective, entry brings extra gross product $s(k)/(1-\tau)$, and avoids losing gross product of overinvestment $l(k)/(1-\tau)$. Thus, the extra tax revenues of the government, respectively the value of the avoided lost revenues, are as follows:

$$S(k) = \frac{\tau s(k)}{1 - \tau}, L(k) = \frac{\tau l(k)}{1 - \tau}. \tag{4}$$

Upon entry, benefits of the membership (extra tax revenues from productivity increase in the applicant country, plus the continuation value of the membership) are subject to bargaining between the club and the applicant government. Suppose that the club and the government make alternating offers, with the club being a first mover. There is a constant risk of breakdown in each round, $q \in (0, 1)$. Let $\alpha \in [0, 1]$ be the share of prize of the government, and $1 - \alpha$ the share of the prize of the club. Following Osborne and Rubinstein (1990), the shares in the subgame-perfect equilibrium risk-neutral players satisfy $\alpha = (1 - q)(1 - \alpha)$, i.e. $\alpha = (1 - q)/(2 - q) \in (0, 1/2)$. An alternative way to capture power asymmetry between the government and the club would be to link country-size (respectively club size) to risk-aversion, and assume that the bargaining set is composed of lotteries over two pure agreements, either all for the club, or all for the government.

Total bargaining prize is $S(k) + L(k) + v$, and disagreement payoffs are zero for the club and $-L(k)$ for the government. Bargaining takes place only if the value of the membership is not too negative, $v \geq -S(k) - L(k)$. The subgame-perfect equilibrium writes

$$\pi^G = \alpha(S(k) + v) - (1 - \alpha)L(k) \gtreqless 0, \tag{5}$$

$$\pi^C = (1 - \alpha)\left(S(k) + L(k) + v\right) \geq 0. \tag{6}$$

Notice that immiserization happens if $\pi^G < 0$, which holds whenever the elative power of the club, $1 - \alpha$, is sufficiently large. Proposition 1 uses equilibrium in the bargaining subgame to establish the existence of the hold-up problem for sufficiently high levels of capital. Specifically, the proposition shows that above a critical level, the payoff of the government decreases in the expectations of the firm.

Proposition 1 *Upon entry, the maximal payoff for the government, $\max_k \pi^G$, is attained for $k^* := K(\alpha) < \bar{k}$.*

Here, too optimistic pro-entry expectations of the firm harm the government because the firm with large investments doesn't internalize the effect of investments on the threatpoint of the government. A conflict of interests between the government and the firm arises exactly on the interval of expectations $[\alpha, 1]$, or correspondingly, on an interval of investments $[k^*, \bar{k}]$. The firm would like to seize

maximal benefits, for which the expected rate of entry must be one, while the government wants to temper the anticipations of the firm towards $\xi = \alpha$ and thereby minimize or eliminate the hold-up problem.

3. Single period, single type

The equilibrium in the benchmark single-period game depends chiefly on commitment power of the players. Suppose that the government does not dispose with commitment, hence can play only a time-consistent policy (i.e., we assume either a simultaneous game, or a sequential game with firm as a Stackelberg leader). The government has two actions, no entry with payoff $-L(k)$, and entry with payoff $\alpha(S(k) + L(k) + v) - L(k)$. As long as the bargaining prize is positive, subgame-perfection implies entry with probability one, $e = 1$. By rational expectations, $\xi = 1$, and $k = \bar{k}$. As a consequence, the government suffers from the extreme version of the hold-up problem.

The other case is that the government can credibly pre-commit to any, even time-inconsistent policy. From Proposition 1, the government clearly imposes $e = \alpha$ to induce a subgame where the firm subsequently sets $k = K(\alpha) = k^*$.

To use the latter case as an exclusive explanation of partial unwillingness of a pro-entry government to enter the club may be premature because of two aspects: (i) Policy commitments, unlike long-term investment decisions, are typically difficult to preserve over a long period of time. Given proliferation of evidence on dynamic inconsistency, an explanation based on time-inconsistent policies is not much appealing. (ii) The model implies a positive (albeit small) probability that a government with a sufficiently high continuation value never enters the club. A threat leading into such a striking outcome is very unlikely. The shortcomings inevitably result from simplicity of the single-period setting, wherein the conflict of interests between the firm and the government is solved to the advantage of either of players, and the result must be at an extremum.

The next section addresses both qualifications: The government does not have Stackelberg leadership, and unless it has a prohibitively low continuation value of membership, it eventually enters the club with certainty. The model thus captures a case of strategic laggards.

Importantly, the section will introduce two key ideas: (i) Further integration may be conditional on the monetary union, and (ii) governments or politicians differ in the valuation of the ongoing integration, and on the expectation that the integration is conditional on the union. The former is justified by the frequent claims that deepening of the European Union (e.g., centralization in social policy, fiscal policy, labor market regulations, and even tax harmonization) rests on success of the existing integrations, especially the monetary union (Dyson, 2006). Interdependence of policies (a.k.a. nested games, or policy spillovers) then largely affects attractiveness of irreversible decisions, of which the euro adoption is a primary

example. Secondly, heterogeneous valuation reflects a heterogeneous interests or beliefs. Their existence is apparent even within the group of old member states, where 'membership with derogation' of the UK, Sweden, and particularly Denmark (with hard peg to euro) is difficult to determine purely on macroeconomic grounds.

4. Two periods, two types

The economy lasts two periods, $t = 1, 2$, and a common discount factor is $\delta \in (0, 1)$. The government is either of two types, *neutral* or *autonomist*. The types differ only in continuation values of membership, where the neutral government is characterized by $\bar{v} = 0$, and the value of the autonomist type is set prohibitively low, $\underline{v} < -S(1) - L(1)$. Type is private information, and the firm's belief that the government is neutral in period t is $p_t := \text{Prob}(v = 0|t) \in [0, 1]$.

The game starts by a random draw of Nature that assigns the government type to be neutral with probability $p_1 \in [0, 1]$. In each of the two periods, timing is as follows: (i) The firm sets $k_t \geq 0$, and the government decides on entry, where we have to distinguish between strategies of different types: $\bar{e}_t, \underline{e}_t \in [0, 1]$. (ii) In the case of entry, bargaining takes place. As we will see below, by deciding to bargain, the government truthfully reveals its type, so we can maintain a bargaining solution that represents a non-cooperative bargaining with complete information of the club and the government, instead of war-of-attrition or similar incomplete-information bargaining models.

Entry is irreversible. In contrast, decision not to enter in period 1 may be reversed into entry in period 2, i.e. the government may behave as a strategic laggard. (iii) At last, Production takes place, profits are taxed and in the case of entry, bargaining prize is redistributed.

Exogeneity of the corporate tax rate $\tau \in (0, 1)$ deserves a note: In the case of an endogenous tax rate, not only entry policy but also tax rate would signal type. At this point, we are not interested in the interplay of these two tools, albeit it constitutes an interesting theoretical possibility. The main reason to sidestep this effect is that an exogenous linear tax system perfectly aligns the pre-bargaining interests of the government and the firm.

4.1 The last period

In period 2, the case of country already in the club is equivalent to constraining action of the government to $e_2 = 1$, hence by rational expectations $\xi = 1$ and $k_2 = \bar{k}$. If not in the club, the strategies differ by type. The autonomist government does not enter, $\underline{e}_2 = 0$, because bargaining prize is negative for any $k_2 \in [\underline{k}, \bar{k}]$, $S(k_2) + L(k_2) + \underline{v} < 0$. In contrast, the neutral government enters with certainty, $\bar{e}_2 = 1$, because no-entry brings only disagreement payoff $-L(k_2)$, whereas entry implies a bargaining share of $S(k_2) + L(k_2)$ above this payoff. Lemma 1 moreover

proves that the autonomist government does not enter in period 1 either, and as a corollary, that by deciding to enter the neutral government reveals its type. Proof of the lemma as well as all subsequent proofs have been relegated to the appendix.

Lemma 1 *The autonomist government never enters, $\underline{e}_1 = \underline{e}_2 = 0$.*

With Lemma 1, we can focus only on the neutral type, and accordingly simplify notation, $e_t := \bar{e}_t$. A corollary of the Lemma 1 is that the firm in any period anticipates $\xi_t = e_t p_t$. Specifically, $\xi_1 = e_1 p_1$, and $\xi_2 = p_2$, where by Bayes rule

$$p_2 = \frac{p_1 - e_1 p_1}{1 - e_1 p_1} \leq p_1. \tag{7}$$

Hence, the *less likely* the delay emerges, the stronger is the signal and the lower are the investments. Only if the strategic delay is used infrequently, the firm observing delay attributes it mainly to the autonomist government, and therefore turns pessimistic in investment prospects, i.e. p_2 falls. Specifically, $\partial p_2 / \partial e_1 < 0$, where for $e_1 = 0$, $p_2 = p_1$ and for $e_1 = 1$, $p_2 = 0$.

4.2 The initial period

To start with, consider the best response of the firm to e_1. The strategic power of investing k_1 is limited only to period 1. This is because when the strategy of the firm is set, also the posteriori belief p_2 is given (see Eq. (7)). As a result, the firm behaves as in a single period setting,

$$k_1 = K(\xi_1) = K(e_1 p_1) \leq K(p_1). \tag{8}$$

To analyze optimization of the neutral government in period 1, we have to first derive payoffs under either of actions, entry (E) and no entry (N):

$$\pi_E^G(e_1, k_1) = \alpha S(k_1) - (1 - \alpha) L(k_1) + \delta \left[\alpha S(\bar{k}) - (1 - \alpha) L(\bar{k}) \right] \tag{9}$$

$$\pi_N^G(e_1, k_1) = -L(k_1) + \delta \left[\alpha S \circ K(p_2) - (1 - \alpha) L \circ K(p_2) \right] \tag{10}$$

First of all, notice that $\pi_E^G(\cdot)$ is constant in e_1. Unlike that, π_N^G depends on e_1, because the rate of entry in period 1 affects a posterior in period 2, hence results in a different subgame in period 2. We know from Bayes rule that the larger is entry rate e_1, the stronger is a signal of no-entry, hence the expectations $\xi_2 = p_2$ fall, and the amount of capital k_2 also falls. Such a fall in capital increases payoff if $p_2 = \xi_2 \geq \alpha$, because for these values of the posterior belief, the hold-up problem is being remedied (see Proposition 1). For $p_2 < \alpha$, π_N^G in contrast falls in e_1, because $k_2 < k^*$, and the decrease in capital is both detrimental to the firm and the neutral government.

It is useful to derive the rate of entry maximizing the payoff of no-entry,

$$E^*(p_1) := \arg\max_{e_1} \{ \pi_N^G | k_1 = \text{const} \}. \tag{11}$$

To maximize this payoff, the hold-up problem in period 2 must be entirely eliminated, i.e. $\xi_2 = \alpha$:

$$\xi_2 = p_2 = \frac{p_1 - E^*(p_1)p_1}{1 - E^*(p_1)p_1} = \alpha \iff E^*(p_1) = 1 - \frac{\alpha}{1-\alpha}\frac{1-p_1}{p_1} < 1 \qquad (12)$$

Interestingly, the payoff from no-entry is independent on k_1. It has an inverse u-shape if $E^*(p_1) > 0$, which (by rearranging) is equivalent to a prior belief p_1 being sufficiently large, $p_1 > \alpha$. In other words, this is whenever hold-up problem in period 1 exists. Otherwise, $E^*(p_1) \leq 0$ and on domain $e_1 \in [0,1]$, the payoff is declining in e_1. In such a case, $p_1 < \alpha$, so the hold-up problem in period 1 does not exist. Still, in the latter case, we may observe strategic delay because the government has to take into account the possible hold-up in the next period 2.

The next step is to characterize the government's best response, denoted as $E(k_1)$.

$$E(k_1) := \arg\max_{e_1} \left\{ e_1\pi_E^G(e_1, k_1) + (1-e_1)\pi_N^G(e_1, k_1) \right\} \qquad (13)$$

Lemma 2 derives a necessary condition for the best response to include delay. Then, Lemma 3 proves that the best response, $E(k_1)$, is non-decreasing in k_1.

Lemma 2 *The necessary condition for $E(k_1) < 1$ is $\exists e_1 \in [0,1] : \pi_N^G(e_1, k_1) \geq \pi_E^G(e_1, k_1)$. Specifically:*

$$p_1 \geq \alpha : E(k_1) < 1 \implies \pi_N^G(E^*(p_1), k_1) \geq \pi_E^G(E^*(p_1), k_1) \qquad (14)$$

$$p_1 < \alpha : E(k_1) < 1 \implies \pi_N^G(0, k_1) \geq \pi_E^G(0, k_1) \qquad (15)$$

At this point, it is useful to see that for rationalizable amounts of investments, a larger amount of capital makes entry relatively more valuable:

$$k \in [\underline{k}, \bar{k}] : \frac{d(\pi_E^G - \pi_N^G)}{dk_1} = \alpha[S_k(k_1) + L_k(k_1)] > 0 \qquad (16)$$

Using this monotonicity, we introduce a critical amount of investment, $\tilde{k}$, for which the government is indifferent between full entry and delay, but only for an exactly single value of delay $e_1 < 1$.

$$\forall e_1 \in [0,1] : \pi_E^G(e_1, \tilde{k}) \geq \pi_N^G(e_1, \tilde{k}) \wedge \exists e_1 \in [0,1) : \pi_E^G(e_1, \tilde{k}) = \pi_N^G(e_1, \tilde{k}) \qquad (17)$$

We may distinguish between two values of the single level of entry, depending on the presence of the hold up problem in the initial period.

$$p_1 \geq \alpha : \pi_E^G(E^*(p_1), \tilde{k}) = \pi_N^G(E^*(p_1), \tilde{k}) \qquad (18)$$

$$p_1 < \alpha : \pi_E^G(0, \tilde{k}) = \pi_N^G(0, \tilde{k}) \qquad (19)$$

Lemma 3 (Best response of the government) *For $k < \tilde{k}$, the best response is increasing in k_1, $E_{k_1} > 0$. For $k \in (\tilde{k}, \tilde{k} + \epsilon)$, $E_{k_1} = 0$. The best response is step-wise increasing at $k = \tilde{k}$,*

$$\lim_{k_1 \to \tilde{k}^-} E(k_1) = \max\{0, E^*(p_1)\} < 1 = \lim_{k_1 \to \tilde{k}^+} E(k_1). \qquad (20)$$

4.3 The Bayesian equilibrium

Now, we proceed to the core result. Proposition 2 identifies the necessary condition for the strategic delay to exist and be unique. It is demonstrated on Figure 1 and used below for the comparative statics analysis.

Proposition 2 (Uniqueness) *The necessary condition for the existence of a unique equilibrium with strategic delay, $e_1 < 1$, is*

$$\delta\{\underbrace{S(k^*) - S(\bar{k})}_{-} + \frac{1-\alpha}{\alpha}\underbrace{[L(\bar{k}) - L(k^*)]}_{+}\} \geq S \circ K(p_1) + L \circ K(p_1). \qquad (21)$$
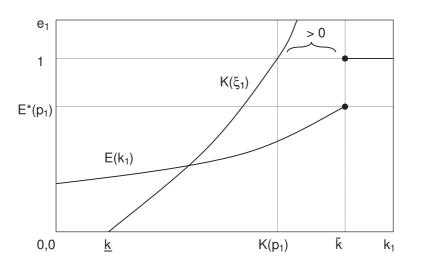

Figure 1: Necessary condition for a unique equilibrium with strategic delay

Eq. (21) provides comparative statics on the existence of the strategic delay. The condition is more likely satisfied, if

1. the future is relatively important (large discount rate, δ),

2. the firm is initially pessimistic about the entry (low p_1), and

3. the government is weak (low relative bargaining power, α).

The first two results are straightforward. To determine the effect of the relative power $(1-\alpha)/\alpha$ on the left side of Eq. (21), it is sufficient to use that for $k = k^*$, $\alpha S_k + (1-\alpha)L_k = 0$, and from the first-order condition:

$$L(\bar{k}) - L(k^*) + \frac{dp_2}{dp_1}K_\xi\left[S_k(k^*) - \frac{1-\alpha}{\alpha}L_k(k^*)\right] = L(\bar{k}) - L(k^*) > 0 \qquad (22)$$

Quite importantly, since the range of $(1-\alpha)/\alpha$ is $(1,+\infty) \subset \mathbb{R}^+$, the condition is always satisfied if the bargaining position of the government vis-a-vis the club is sufficiently weak, $\alpha \to 0$.

As an interesting implication, Proposition 3 claims that the hold-up problem in period 2 is not fully removed under strategic delay. Intuitively, by increasing the rate of entry e_1, and consequently decreasing k_2 to k^*, (i) some of the forgone profits in period 1 are restored, plus (ii) the signal in period 2 is stronger (i.e. hold-up problem in the next period is better addressed). The cost is nevertheless that (iii) the government faces a less desirable mix of actions, with an increased share of entry, where entry gives less than no entry ($\pi_E^G < \pi_N^G$). This tension between improving payoffs under actions versus having a better mix of actions leads to a tradeoff with an incompletely removed hold-up.

Proposition 3 (Non-eliminated hold-up) *If strategic delay is in the equilibrium profile, $e_1 < 1$, then $k_2 > k^*$, and $e_1 < E^*(p_1)$.*

To conclude, the perfect Bayesian optimum is characterized by four interesting effects:

1. Bluffing in period 1 is *incomplete*, $e_1 < E^*(p_1)$. In other words, the firm is allowed to instal excessive investments in period 2, $k_2 > k^*$, i.e. hold-up problem is not fully eliminated in the equilibrium.

2. In the last period, the types of the government *separate completely*: the autonomist type does not enter, and the neutral type enters with certainty.

3. We may observe strategic delay *even if the hold-up problem is absent* in period 1, $p_1 < \alpha$ (i.e., if the prior belief of the firm is too low to generate a conflict between the government and the club in period 1).

4. In spite of strategic delay, the amount of capital may *grow* over time, $k_2 > k_1$. This holds whenever $k_1 = K(\xi_1) = K(p_1 e_1) < K(p_1 E^*(p_1)) < K(\alpha) < K(\xi_2) = k_2$, i.e. if

$$p_1 E^*(p_1) = p_1 - \frac{\alpha}{1-\alpha}(1-p_1) < \alpha \Longleftrightarrow p_1 < \alpha(2-\alpha). \qquad (23)$$

5. The Czech Republic as a euro laggard

The key features of the model are a sufficiently large positive prior belief on the autonomistic type of government, and a mixed strategy of the incumbent government. The case study of the Czech Republic in 2008 in this section confirms both features. We proceed as follows: First, we discuss the existence of multiply types of valuations of the ongoing integration. Second, by means of content analysis, we measure the policy positions to show an intentional delay, with mixing of pro-entry

and pro-delay messages. Third, we illustrate that the policy uncertainty is made possible by relative polarization of the public opinion on the Eurozone entry. We do not cover details on the macroeconomic context of the EMU accession for the Czech Republic; an interested reader is referred to an excellent survey by Bönker (2006) written an from international perspective.

To approach the decision-making purely game-theoretically, note that in determination of the euro strategy, the two key players are the government and the Bank Board of the Czech National Bank. The Bank Board is composed of seven Members (including the governor), who are appointed by the President of the Republic. Currently, six members out of seven are new appointees of the ruling President, Vaclav Klaus.[3]

The coalitional center-right government of PM Mirek Topolanek is in power since January 9, 2007. There is a link between euro laggards in the National Bank and the government, not only through joint fiscal and monetary policy coordination, but also due to the fact that the President is a long-lasting ex-chairman and currently Honorary Chairman of the main cabinet party, Civic Democratic Party.

To understand multiple types of membership valuation in the Czech political setting, I have classified policy positions of the key political players using a content analysis of messages in the leading business daily, *Hospodářské noviny* (affiliated with the *Wall Street Journal* and *Handelsblatt*), in a period from 9 January 2007 to 9 August 2008 (exactly 19 months). Only signed articles, interviews, or direct quotes qualified for a message.[4] I define a *positive* message to be any message that suggests no extra condition beyond Maastricht criteria, or requires only minor fiscal adjustments. Among positive messages, I also include recommendations to commit to timing, or maintain commitment of the previous cabinet. *Negative* messages explicitly condition the entry upon real convergence, or major reforms towards public finance sustainability. Any message that suggests to leave euro to the experts is also qualified as negative.

Table 1 shows the distribution of overall 93 messages across each of the relevant groups, with the explanation of coding and data. We may summarize as follows:

1. The President is a strong and committed laggard (100 % negative messages). The President even argues that 'European monetary unification is the Trojan horse for overall harmonization of economic rules, policies and laws in EU' (Klaus, 2003). This exactly captures the way we model negative continuation value of ongoing membership, $v < 0$.

2. The Bank Board, with all members appointed or re-appointed by the ruling President, is pre-dominantly composed of laggards (95 % negative messages).

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[3]Three members came in office on 11 February 2005, two on 1 December 2006 and the last one on 1 August 2008. Only the governor's mandate (as of 13 February 1999) lasts from the ex-President, Vaclav Havel.

[4]The database of 93 messages including brief English-language summaries can be provided upon request.

3. The government is a laggard (70 % negative messages), whereas the opposition is strongly in favor of euro adoption (0 % negative messages).

4. Commercial unions representing producers and exporters request early entrance (10 % negative messages), whereas financial industry is more hesitant on unconditional entry (43 % negative messages).

Table 1: Distribution of messages per groups

Group/Message content	− −	−	+	++	Obs.
President, Advisors	4 (80 %)	1 (20 %)	-	-	5
National Central Bank	10 (45 %)	11 (50 %)	1 (5 %)	-	22
Ministers, Senior Officials	9 (40 %)	7 (30 %)	7 (30 %)	-	23
Financial/Bank Analysts	6 (43 %)	-	3 (21 %)	5 (36 %)	14
Commercial Unions	-	1 (10 %)	4 (49 %)	5 (50 %)	10
Opposition	-	-	4 (21 %)	15 (79 %)	19
Total	29	20	19	25	93

Notes: − − Strong conditionality. An explicit precondition to the entry is either real convergence, or major reforms towards public finance sustainability. − Delay. Entry is not topic of the day. Only implicit about conditionality. Leave the issue to experts. + Weak pro-entry. Only minor fiscal adjustments desirable, no explicit link to the long-term sustainability. Commit to timing or maintain commitment of the previous cabinet. ++ Strong pro-entry. No extra conditions beyond Maastricht criteria. Entry on 2011–2012.
Data: Signed articles, interviews, or direct quotes in *Hospodářské noviny* (www.ihned.cz). Period: 9 January 2007 to 9 August 2008. Keywords: euro adoption, Eurozone entry, EMU entry, euro acceptance. Accessed 10–28 August 2008.

Is there a binding constraint on the government imposed by public opinion? To address this point, we look into Eurobarometer Flash (2008) survey data on the assessment of the consequences of the euro for one's own country and for oneself. Table 2 shows a relatively high share of negative attitudes in the Czech Republic, especially when it comes to personal cost/benefit analysis. Nonetheless, the share of positive attitudes is also relatively large, in both cases exactly the median value (although less than mean value). This shows a relatively polarized country, as compared to NMS-9.

On top of that, a *rank of euro optimism* has been constructed as a position among NMS-9 countries where we sort from top for positive attitudes, and from the bottom for negative attitudes. The rank shows that the Czech public opinion is not constraining the government to behave as an outstanding laggard (scoring 4th to 8th position). If fact, the country consistently ranks ahead of Latvia and Lithuania, although Baltic states are considered pace-setters rather than euro laggards. To show how close to the bottomline is the Czech Republic in absolute terms, minimal and maximal values that are relevant to assess pessimism about the euro adoption are listed in the table. By inspection, the Czech Republic is well above bottomline

in two out of four variables: total positive attitudes (by 14 percentage points), and total negative attitudes (by 7.9 percentage points), both regarding the country's benefits.

Table 2: Consequences of the euro for one's own country and for oneself in NMS-9

Country (%)	++	+	all +	−	−−	all −
CZ	6.5	38.4	44.9	33.7	9.8	43.5
min	2.4	20.3	30.9			
max				43.7	11.2	51.4
NMS9	13.1	36.8	49.9	27.7	8.5	36.2
Rank of CZ optimism	(7.)	(5.)	(**5.**)	(6.)	(7.)	(**7.**)

Oneself (%)	++	+	all +	−	−−	all −
CZ	6.8	34.7	41.5	36.2	11.4	47.6
min	3.4	20.3	37.6			
max				37.5	12.7	48
NMS9	14.2	33	47.2	28.9	10	38.9
Rank of CZ optimism	(5.)	(4.)	(**5.**)	(8.)	(6.)	(**8.**)

Note: ++ very positive; + positive; - negative; – very negative
Source: Flash Eurobarometer Series #237, The Gallup Organization, July 2008, p. 36, 38, 86, 87 (Q13: Do you think the introduction of the euro would have positive or negative consequences for your country/yourself?, Q14: And for you personally, do you think that it would be positive or negative if the euro would be introduced?). Sample size: $N = 1000$–1020.

Table 3, using a recent large online poll of the daily *Hospodářské noviny*, provides further piecemeal evidence on the tie in terms of accepting euro early or after some time. The large dispersion (40 % wants euro as soon as possible, while 35 % never) only confirms that the executive is not bound by the preelectoral expectations measured by the polls. More technically, in the case of large polarization, probabilistic voting models yield a relatively flat probability density on a policy space (Persson and Tabellini, 2000). Also, median voter is a fragile predictive heuristics. This uncertainty opens a window of opportunity for a strategic delay.

Table 3: When do you prefer the Czech Republic to adopt euro?

	before 2011	2011–2012	after 2012	never	Total
Votes	860	209	316	743	2128
Share	40 %	10 %	15 %	35 %	100 %

Data source: Online poll of the daily *Hospodářské noviny* (http://www.ihned.cz), 28/07/2008–28/08/2008. Accessed 28 August, 2008. Sample size: $N = 2128$.

This section is not to argue that an exclusive motivation for delay is strategic, related to the hold-up problem. The macroeconomic cost-benefit analysis is still an issue, and the country is not fully complying with the Maastricht criteria. In fact, the negative recommendation on ERM II entry already by the 2006 Convergence Report had to shift the euro adoption date from the very initial plan of 2009–2010 till 2012. The case study only shows that exactly as the model predicts, in the case of uncertainty over multiple types and unbinding public opinion, a government that is known to be Euroskeptic has an incentive to use manoeuvering space against too eager private sector. As a matter of fact, since November 2007 update of the Converge Report, the government ceased to be explicit about timing of entry, and as Table 1 shows, has provided a mix of 70% negative messages and 30% positive messages. The anecdotic evidence suggests that the government might be aware of the strategic advantages of the mixed strategy involving delay.

6. Conclusion

This paper argues that delayed entry into a monetary union might be a bargaining leverage aimed at increasing benefits from entry. A pro-entry government tends to strategically delay the EMU entry in order to bluff domestic firms and pretend to be a government that is principally opposed to the ongoing EU integration. This remedies the hold-up problem, yet also brings an economy-wide cost of the absence of entry in earlier periods.

The key comparative statics condition states that this effect is more likely if (i) the government puts large emphasis on the future (e.g., facing a good electoral prospect), (ii) is relatively weak in bargaining (e.g., a small country), and (iii) is initially expected to be relatively pessimistic about the prospects of entry (a Euroskeptic government). In the perfect Bayesian equilibrium, we also find that the hold-up problem is not entirely eliminated, and the neutral government after a delay eventually enters.

This model with delay as a domestic signal complements the established political economy of exchange rate where the adoption of a different exchange rate regime reflects shares of interest groups in the economy. Here, we obtain a delay even with a single representative firm, irrespective of lobbying efforts. Our approach also enriches the literature on the allocation of the EU expenditures, where voting weights seem to well correspond with the expenditure shares of the old members (Kauppi and Widgren, 2004), but less indicate net gains of the new members (Kauppi and Widgren, 2007): Our model suggests that an entry bonus or fee should be included among determinants of the budget, which may capture the unexplained differential. It also contributes to the classic tradeoff on the cost and benefits of policy surprises; here, a policy surprise in terms of an unexpected club entry gives a strategic advantage to the government.

Appendix

Proof of Proposition 1. Due to concavity of $s(k)$ and convexity of $l(k)$, we have also concave $S(k)$ and convex $L(k)$. Examine the second order condition for the payoff of the government, π^G:

$$\frac{d^2\pi^G}{dk^2} = \alpha S_{kk}(k) - (1-\alpha)L_{kk}(k) = \frac{\tau}{1-\tau}[\alpha s_{kk}(k) - (1-\alpha)l_{kk}(k)] < 0 \quad (24)$$

This reveals that the extremum characterized by the respective first order condition, $\alpha S_k(k) - (1-\alpha)L_k(k) = 0$, or equivalently $S_k(k)/L_k(k) = s_k(k)/l_k(k) = (1-\alpha)/\alpha$, is unique, and it is maximum. To show that it is an interior solution on $k \in [\underline{k}, \bar{k}]$, notice that for $k = \underline{k}$, $l_k = 0$, and for $k = \bar{k}$, $s_k = 0$. As a result, the range of function $s_k(k)/l_k(k)$ on the domain $k \in [\underline{k}, \bar{k}]$ is $[0, +\infty]$. To yield a positive finite value $(1-\alpha)/\alpha$, the function must be evaluated at an interior point, i.e. $\underline{k} < k^* < \bar{k}$.

To derive the value explicitly, we use that for any expectations, the firm's profit maximization reduces the expected marginal profit of capital to zero, $(1-\tau)[\xi\bar{a} + (1-\xi)\underline{a}]f_k(K(\xi)) - r = 0$. Here we enter $(1-\tau)\bar{a}f_k(K(\xi)) = s_k(K(\xi)) + r$ and $(1-\tau)\underline{a}f_k(K(\xi)) = -l_k(K(\xi)) + r$ to get $\xi s_k(K(\xi)) - (1-\xi)l_k(K(\xi)) = 0$. Equivalently, the firm's profit-maximization yields $\xi S_k(K(\xi)) = (1-\xi)L_k(K(\xi))$, or equivalently $S_k(K(\xi))/L_k(K(\xi)) = (1-\xi)/\xi$. Denote the government-payoff maximizing expectations as ξ^*. Then, the equation rewrites into $S_k(K(\xi))/L_k(K(\xi)) = (1-\xi^*)/\xi^*$, and combining with the government's payoff-maximization condition above yields $(1-\alpha)/\alpha = (1-\xi^*)/\xi^*$. Clearly, $\xi^* = \alpha$. $\square$

Proof of Lemma 1. No-entry in period 2 stems from subgame perfection and the negative value of the bargaining prize in period 2, $S(k_2) + L(k_2) + \underline{v} < 0$. To establish $\underline{e}_1 = 0$, suppose that the autonomist government plays a mixed strategy. The action of entry implies bargaining, but the bargaining prize is negative for any pair (k_1, k_2): $S(k_1) + L(k_1) + \underline{v} + \delta[S(k_2) + L(k_2) + \underline{v}] < 0$. Hence, the action of entry brings the same disagreement point as no entry. The action of entry however delivers another effect: the amount of capital in period 2 grows, because entry weakens no-entry signal of the neutral type. Specifically, by Bayes rule,

$$p_2 = \frac{p_1(1-\bar{e}_1)}{1 - p_1(1-\underline{e}_1) + p_1(1-\bar{e}_1)}. \quad (25)$$

Thus, $dp_2/d\underline{e}_1 > 0$. The firm in period 2 sets best response by $k_2 = K(\xi_2) = K(p_2)$, so $dk_2/d\underline{e}_1 = K_\xi(p_2)dp_2/d\underline{e}_1 > 0$. Since the autonomist government knows that any overinvestment only brings a loss $-L(k_2)$, its objective is to minimize the loss, hence needs as low k as possible, at best $k = \underline{k}$. This means to decrease probability of entry down to zero. $\square$

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Proof of Lemma 2. If there is no $e_1 \in [0,1]$ such that the no-entry action provides a larger payoff, then any mix $e_1 < 1$ is strictly dominated by playing pure entry, $e_1 = 1$. Thus, for no-entry to be played, it must be $\pi_N^G(e_1, k_1) \geq \pi_E^G(e_1, k_1)$. The validity of the condition can be evaluated at the maximum of $\pi_N^G(e_1, k_1)$ on domain $e_1 \in [0,1]$. That is, at $e = E^*(p_1) > 0$ if p_1 is large, and $e = 0 > E^*(p_1)$ if p_1 is low enough. This yields the specific necessary conditions. □

Proof of Lemma 3. Part 1, $k < \tilde{k}$: If condition in Lemma 2 is satisfied, we characterize $e_1 = E(k_1)$ as an implicit form solution,

$$F(e_1, k_1) := \frac{d}{de_1}\left[e_1 \pi_E^G + (1 - e_1)\pi_N^G\right] = \pi_E^G - \pi_N^G + (1 - e_1)\frac{d\pi_N^G}{de_1} = 0, \quad (26)$$

$$\frac{d\pi_N^G}{de_1} = -\frac{p_1(1 - p_1)}{(1 - e_1 p_1)^2}\delta K_\xi[\alpha S_k(k_2) - (1 - \alpha)L_k(k_2)] < 0. \quad (27)$$

By using the implicit function theorem and tediously rearranging, one gets $E_{k_1} = -F_{e_1}/F_{k_1} > 0$. Intuition is straightforward: Since more capital makes entry relatively more beneficial, the rate of entry must not decrease. The implicit solution in the term above satisfies continuity as long as the condition in Lemma 2 holds. This is preserved up to $k_1 = \tilde{k}$, where the government turns to be indifferent between delay with $e_1 = \max\{0, E^*(p_1)\}$ and full entry, $e_1 = 1$. By continuity of the best response, $\lim_{k_1 \to \tilde{k}^-} E(k_1) = \max\{0, E^*(p_1)\}$.

Part 2, $k \in (\tilde{k}, \tilde{k} + \epsilon)$: Here, condition in Lemma 2 is violated. From monotonicity of the payoff differential in (16), $d(\pi_E^G - \pi_N^G)/dk_1 > 0$, we have $\exists \epsilon > 0 : \forall k \in (\tilde{k}, \tilde{k} + \epsilon), \forall e_1 \in [0,1], \pi_E^G(e_1, \tilde{k}) > \pi_N^G(e_1, \tilde{k})$. As a result, $E(k_1) = 1$ and $E_{k_1}(k_1) = 0$. To sum up, $E(k_1)$ is step-wise increasing at $k_1 = \tilde{k}$. □

Proof of Proposition 2. The best response of the firm goes from $\underline{k}$ (for $e_1 = 0$) to $K(p_1)$ (for $e_1 = 1$). The best response of the government is by Lemma 3 step-wise increasing around $\tilde{k}$. If $\tilde{k} > K(p_1)$, we avoid the possibility of multiple equilibria caused by the discrete increase in the government's best response. Specifically, we avoid the equilibrium with $e_1 = 1$ and $k = K(p_1)$. The condition $\tilde{k} > K(p_1)$ is equivalent to $\pi_N^G(E^*(p_1), K(p_1)) > \pi_E^G(E^*(p_1), K(p_1))$. This is exactly in Eq. (21). The existence is secured by the fact that $E(\underline{k}) \in [0, E^*(p_1))$ and $E(K(p_1)) < E^*(p_1) < 1$, i.e. there is an intersection of the best responses. □

Proof of Proposition 3. The expected payoff of the government is $e_1 \pi_E^G + (1 - e_1)\pi_N^G$. From the first order condition, in the interior equilibrium, $\pi_E^G - \pi_N^G + (1 - e_1)\partial\pi_N^G/\partial e_1 = 0$. By Lemma 2, we know that if $e_1 < 0$ holds in equilibrium, then $\pi_E^G - \pi_N^G < 0$. Hence, we need $\partial\pi_N^G/\partial e_1 > 0$. From the u-shape of no-entry payoff π_N^G, it implies $p_2 > \alpha$, i.e. $k_2 > k^*$, or equivalently $e_1 < E^*(p_1)$. □

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