To Wait or Not to Wait:

Swiss EU-Membership as an Investment under Uncertainty*

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September 2004

Abstract: Why do some countries join the EU earlier than others, why do others wait? In order to answer this question we apply the theory of investment under uncertainty (Dixit and Pindyck, 1994) to the decision on EU-membership. We develop a simplified model of two periods to study how the value of waiting depends among other things on the degree of uncertainty. The results give rise to a country's position to deliberately postpone a membership in order to keep the option to join later if this is desirable. After interpreting the results we apply the findings to the EU. We argue that the approach provides interesting insights regarding EU-membership, in general, and the Swiss position, in particular.

Keywords: European integration, investment under uncertainty, EU-membership

JEL-Classification: D81, F02

* We would like to thank Hans Genberg, Matthias Hagmann, Carsten Hefeker, Daniel Hoechle as well as the participants at the Annual Meeting of the Swiss Society of Economics and Statistics in March 2004 for helpful comments. Beat Spirig acknowledges financial support from the WWZ-Forum.

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1. Introduction

Many countries are faced with the decision of whether to become part of a regional supranational institution, be it in Europe, the Americas or in Asia. In many cases countries join if they are offered the opportunity, but some do not. With respect to Europe it may be quite surprising that a small, economically highly developed and, with the rest of Europe, culturally deeply enrooted state in the centre of Europe is not a member of the European Union (EU). The question arises how to evaluate the Swiss strategy toward European integration: "Should the country join the EU immediately, given that it is likely to join the EU some time in future?" Or put in a slightly different way: "Should a country join the EU immediately if it is believed that the expected net benefits are currently greater than the expected costs of accession?" This is the main question we would like to address in this paper. Our answer will be: "not necessarily". The aim of this paper is thus to introduce a, to some extent, new perspective on the question of accession to the EU by applying the so-called "theory of investment under uncertainty" to this problem and discussing it on the background of the Swiss case. Thereby, we believe it is quite remarkable how much we can get out of a simplified model of this otherwise very demanding and complex theory.

In Switzerland there exist basically two opinions on the question of entry in the EU. On the one hand, there are the advocates of an accession to the EU. These exponents tend to ask for an immediate entry, or at least for immediate negotiations about an accession to the EU. On the other side, there are exponents who request to pull back the membership application that the government has deposited in Brussels in 1992. They are convinced that Switzerland should not--probably never--join the EU. The main argument of the "fast-accession fraction" is that the interests of Switzerland in Europe and vis-à-vis third countries can be much better pursued as a member of the EU than as an outsider. The "never-accession fraction" argues the exact opposite that the Swiss interests are much better served

not being a member of the EU. The situation seems to be deadlocked. "Are you in favour or against an entry in the EU" has become *the* crucial question.

To get an answer to the question many studies have been published throughout the last 10 to 15 years. These include the "Hauser-Report" for Switzerland (Hauser and Bradke, 1992) which, similar to the Cecchini-Report for the European Community (EC), projected an increase of the Swiss GDP by 4 to 6% in case of a Swiss membership to the European Economic Area (EEA) or EC. Other studies include Bundesrat (1999), Hauser and Zimmermann (1999), Koellreuter (1999), Economiesuisse (2000), UBS (2000) and Hauser and Roitinger (2001) which, in principle, all try to simulate and approximate the net effects of various integration scenarios on the Swiss GDP. Interpreted from the perspective of an investment decision for a whole country, these studies take an approach which fits the traditional investment theory that basically compares the discounted expected net benefits with the accession costs for different scenarios.

We argue that this approach has four major shortcomings. First, this decision rule does not explicitly take into account that if a country once has joined the EU, the decision is, de facto, irreversible. Note that irreversibility does not require that leaving the EU at a later point in time is impossible. It rather assumes that entry is costly and that these costs are sunk as will be shown later. Second, the decision rule does not fully and explicitly take into account that the future development of the benefits and costs is uncertain and that the degree of uncertainty may change over time. Third, it ignores the possibility to join the EU at a later point in time which, in principle, has a value and thus should be considered. Finally, both the economic and political costs and benefits should certainly be taken into account when considering an accession to an institution such as the EU.

We believe a unified framework is currently lacking that eliminates the shortcomings of existing discussions and thus allows capturing the opportunities and risks of a

membership in one setting. The theory of investment under uncertainty (Dixit and Pindyck, 1994) applied to a whole country is, in our view, able to exactly offer this framework. It provides the rationale for a possible third position about Swiss EU-membership which proposes to wait in order to keep the option to join at a later stage if conditions turn out to be advantageous. Waiting thus incorporates a value, in principle, if the benefits and costs of EU-membership are characterized by uncertainty. The value of this flexibility option may, however, become negative if, for example, an immediate accession is likely to provide considerable benefits that are foregone by a waiting country.

Thus, the goal of this paper is to analyse how the so-called value of waiting depends on determinants which are of crucial importance in the decision to join an economic and political union such as the EU. We believe that our two-period model, based on Dixit and Pindyck (1994, p. 26-30), provides interesting insights to the question with respect to an accession to a supranational institution. The model, for example, predicts that the higher the uncertainty associated with the net political and economic benefits of an accession, the higher is the value of waiting. We argue that uncertainty has increased for Switzerland since the Maastricht agreement. The model's predictions seem also to be in line with both the behaviour of Switzerland as well as the ten countries which recently joined the EU in 2004. For example, we argue that the EU-specific accession costs are much higher for Switzerland, whereas the net benefits seem to be relatively smaller, in part because of the existence of the Bilateral Agreements I and II that have recently been negotiated between the EU and Switzerland.

The idea is, of course, not entirely new. Dewatripont and Roland (1995) discuss the design of large-scale reform packages in transition economies that "involve great aggregate and individual uncertainty" (p. 1208). One of their conclusions is that under certain conditions a gradual approach to reform is preferred to a big-bang approach because it

"generates a higher investment response because of a lower option value of waiting" (p. 1207). In contrast to this paper, we completely focus on the timing aspect of one strategy (i.e. accession) and we regard the decision of the government itself as an investment with uncertain economic and political costs and benefits. Begg et al. (2003) discuss the economic consequences for U.K. of staying outside the Euro Zone. Interestingly, the comprehensive study describes this decision as a "temporary delay" which is "an option with a price" (p. 5) in the executive summary. However, this aspect is not fully developed in the study which mainly focuses on the benefits and costs of introducing the Euro (e.g. on interest rates) without referring to the uncertainty itself. This contrasts with our paper that puts the value of waiting and its determinants at the centre of the analysis.

The remainder of the paper is structured as follows. Section 2 presents a simplified two-period model to discuss the optimal timing of accession to a supranational institution. Section 3 derives and discusses the comparative statics of the model. Section 4 deepens the thoughts by decomposing the value of waiting into a benefit- and cost-element and by evaluating the results of the model from the perspective of three periods. Section 5 applies the results to a brief analysis of the Swiss case, also by comparing it with the accession of Eastern European countries to the EU. Section 6 concludes.

2. A Simple Two-Period Model of Accession

We interpret the accession of a country like Switzerland to a supranational institution such as the EU as (1) an irreversible investment that (2) provides net annual benefits which are uncertain.

The first aspect of this interpretation is supported by Haubrich and Ritter (1999, p. 1) who state that, in general, „the decision to commit to a policy is like the decision to make an irreversible investment; the policymaker and/or society bear some cost generated in the

political system or by the economic costs associated with the adjustment to the new policy, but once the policy is in place, this is a sunk cost, and reversal is also costly." In the case of the EU, for example, the costs of investment are associated with the adoption of the "acquis communautaire", a corpus of approximately 100'000 pages of guidelines, bye-laws and laws. Adjusting a country's legal, political and economic framework to the "aquis communautaire" has one-time costs -- administrative costs of changing and implementing the laws and decrees, economic costs of adjusting the economy's structure to a change in prices and political costs due to a change in the political system and its impact on the representation of people's preferences in politics. Note that the investment is irreversible or sunk because the investment costs incurred can not be recuperated if a country having joined the EU decides to pull out at a later stage.

The second aspect of this interpretation is obvious and hardly new: joining the EU leads to net annual benefits that are uncertain. Annual benefits may, for example, include economic gains from market integration (e.g. better accesss to the EU market) and political gains from a marginal effect on the decisions made in the EU institutions or from an image improvement to be part of the club. Annual costs arise because of yearly payments in the regional adjustment fund or the loss of seignorage as a consequence of joining the European Monetary Union (EMU). The important point we want to emphasize is that the degree of uncertainty regarding the net annual benefits is likely to change over time. For example, the political gains from affecting the decisions in EU institutions or the yearly payments to the regional adjustment fund depend on the voting schemes and power of the various EU institutions that are currently under review.

The joint existence of irreversibility and uncertainty implies that a country joining the EU today gives up the possibility of waiting for new information to arrive that could affect the desirability of joining the EU. Giving up this option is costly. This new

information covers aspects about the likely development of the supranational institution (number of members, economic policy) as well as of the outsider country in case of non-accession (likelihood of policy reforms).[1] We now move to the model that allows to study under which condition waiting is a preferred strategy. The model is based on Dixit and Pindyck (1994, p. 26-30).

Suppose a country that plans to join a supranational institution. There exists an expected net annual benefit, $E(V_t)$, which occurs for ever in each period, t, as soon as the country joins the institution.[2] There is an investment, I_t, which is a one-time cost that is required in period t when a country commits to join the supranational entity. Let us first assume that the country is faced with the decision "to join now or never" in period t_0. In this case, a social planner should compare the expected net annual benefit, $E(V_t)$, discounted at the time preference, i, with the investment costs, I_0, in period 0. Based on this (traditional) approach, the country should be recommended to join the supranational institution if the net present value (NPV) in period 0 is positive. Thus,

$$NPV = \left[-I_0 + \sum_{t=0}^{\infty} \frac{E(V_t)}{(1+i)^t} \right] = -I_0 + \frac{E(V_t)}{i} + E(V_t) > 0 \qquad (1)$$

As pointed out by McDonald and Siegel (1986) and developed by Dixit and Pindyck (1994) this decision rule is not sufficient if an investment can be postponed to period 1. Note that the decision in equation (1) is based on the expected values of V_t. In reality, however, V_t may turn out to be lower or higher as discussed above. This uncertainty can be most easily introduced by assuming that two states of the world are possible ("good" or "bad") associated with high (V_t^H) or low (V_t^L) net annual benefits where V_t^H realizes with

[1] An increase in the number of members raises the economic discrimination effects on outsiders as shown by Baldwin (1995) in his "domino theory". Furthermore, some of the advantages of integration could, in principle, be captured independently of the accession if the country, for example, managed to strengthen its competition policy and liberalize the internal market as argued in the above mentioned Hauser-Report (Hauser and Bradke (1992, p. 259) but questioned by Borner and Bodmer (2004, p. 223) in their analysis of the recent growth performance of Switzerland.

probability p and V_t^L with probability 1-p. In order to simplify and stress the point, we assume that the state of the world is fully revealed in period 1. Figure 1 gives an illustration of the pay-offs and the timing.

Insert Figure 1

From the standpoint of the country deciding whether to join or not to join, these developments can become crucial. If, in period 1, V_t turns out to be low (V_t^L) permanently, the country may regret its decision in period 0. In other words, to wait until period 1 and to join only when V_t is high (V_t^H) may be the better decision to take in period 0. We, again, calculate the net present value in period 0 (NPV_H) of waiting until period 1 and only joining the supranational institution by investing in period 1, I_1, if the good state of the world, V_t^H, is revealed in period 1 and thereafter. Thus,

$$NPV_H = p\left[\frac{-I_1}{1+i} + \sum_{t=1}^{\infty}\frac{V_t^H}{(1+i)^t}\right] = p\left[\frac{-I_1}{1+i} + \frac{V_t^H}{i}\right]. \quad (2)$$

In order to decide whether "to wait or not to wait", we have to compare the two net present values. A positive difference between NPV_H and NPV implies that there is a value to wait (W) rather than to invest now. By subtracting (1) from (2) we find:

$$W = NPV_H - NPV = p\left[\frac{-I_1}{1+i} + \frac{V_t^H}{i}\right] - \left[-I_0 + \frac{E(V_t)}{i} + E(V_t)\right] \quad (3)$$

If W is positive waiting has a positive value which implies that the country should wait and join tomorrow if the good state of nature occurs.[3] W is the value of this "flexibility option". It can be optimal to wait for a country if the future development is uncertain and the investment irreversible. The intuition is that waiting to period 1 increases the information (in our simple case the uncertainty completely vanishes in period 1). By waiting the country

[2] We could also interpret $E(V_t)$ as the expected utility of a representative resident.
[3] If we interpret $E(V_t)$ as the expected utility, the decision rule in equation (3) implies that the representative resident is risk neutral as $E(V_t)$ is calculated as the weighted average of V_t^H and V_t^L.

gets the opportunity to join only if the good case realizes and to avoid becoming a member of the supranational institution in the bad case. Waiting incorporates this flexibility. As shown by equation (3) the value of waiting or enjoying this flexibility may also be negative which implies that the country should not wait and thus join in period 0.[4]

The sunkness of I_t is important because, otherwise, a country could join in period 0 based on its expectations and exit again in period 1 if the bad case unexpectedly occurs and recuperate the accession costs. If, however, I_t is sunk the country only faces this flexibility if it waits to join until period 1. In fact, with I_t being sunk the country would never exit in period 1, even in the bad case, as long as V_t^L is positive or if exit costs are high enough. Therefore, the key aspect of the assumption of the irreversibility of investment is not that the drop out of a supranational institution such as the EU is costly, but rather that entry is associated with costs that are sunk. Another interesting aspect that can be derived from equations (1) to (3) is that the value of waiting, W, may be positive despite of the fact that the cost of joining a supranational institution increases over time. This increase of the accession costs over time is illustrated in Figure 1 by the bigger dotted bar representing I_1 ($I_0<I_1$). This is a point we will come back to below. In the next Section, we want to discuss the determinants of the value of waiting.

3. The Determinants of the Value of Waiting

We first concentrate on how the degree of uncertainty affects the value of waiting, W, and then derive how W depends on changes in the costs of accesssion (I_t), the probability of the good state of nature to occur (p) and the time preference (i).

[4] Note that we disregard the possibility that the annual benefits depend on whether the country waits until period 1 or not. An argument in favour of taking this aspect into account would be firms that increase their private investment if the country commits to enter the supranational institution.

3.1. Uncertainty

In the model, an increase in the degree of uncertainty can be studied by a mean-preserving increase of the spread of the net annual benefits, i.e. by an increase of V_t^H and a decrease of V_t^L, assuming that the expected net annual benefit, $E(V_t)$, stays the same. This exercise is described in Figure 1 by the dotted lines that lead to the net annual benefits $V_t^{H'}$ or $V_t^{L'}$, respectively. We take equation (3) and assume that the costs of entry do not change over time, i.e. $I=I_0=I_1$. Thus,

$$\begin{aligned} W &= p\left[\frac{-I}{1+i}+\frac{V_t^H}{i}\right]-\left[-I+\frac{E(V_t)}{i}+E(V_t)\right] \\ &= \frac{-pI}{1+i}+I+\frac{pV_t^H}{i}-\frac{E(V_t)}{i}-E(V_t) \\ &= I(1-\frac{p}{1+i})+V_t^H\ \frac{p}{i}+E(V_t)(\frac{-i-1}{i}) \end{aligned} \tag{4}$$

Given the unchanged expected stream of net annual benefits, $E(V_t)$, equation (4) implies that the value of waiting increases with an increase in the degree of uncertainty: $\frac{\partial W}{\partial V_t^H}=\frac{p}{i}>0$.

This implies that for each unit of additional net annual benefits in the good case (∂V_t^H) NPV_H and thus W rises by the expected value (p) of the annuity (1/i) of this event, whereas NPV remains unaffected. The rationale for this result is that an increase in uncertainty makes it more valuable for a country to wait and only to join if, in period 1, the good case occurs, thereby preventing of being "captured" if the bad case occurs.

Equation (4) also shows that an increase in the expected net annual benefits ($E(V_t)$), leaving V_t^H constant, reduces the value of waiting as $\frac{\partial W}{\partial E(V_t)}<0$. Note that this situation occurs if, e.g., V_t^L increases. The bad case becomes less bad, or, in other words, the

"downward uncertainty" is reduced. Inspection of equation (4) shows the reason for this result: NPV rises, whereas NPV_H stays the same. The option to wait and only to join in the good case becomes relatively less attractive. This result is, of course, consistent with the comparative statics regarding a change of the mean-preserving spread. We basically reduce the spread and thus the degree of uncertainty which should, as derived above, reduce the value of waiting. Proposition 1 summarizes our findings:

Proposition 1*: The value of waiting (W) rises if the uncertainty regarding the future net annual benefits of accession -- interpreted as the spread between the benefits in the good and the bad state of nature -- increases.*

3.2. Comparative Statics Regarding the other Determinants

We now want to discuss how the value of waiting depends on changes in the other variables and parameters, i.e. the costs of accession (I_t), the probability (p) of the two states of nature and the time preference (i). In order to do so, we derive the comparative statics for the value of waiting by replacing $E(V_t)$ in equation (4) with its determinants, still assuming that $I=I_0=I_1$. Thus,

$$\begin{aligned} W &= p\left[\frac{-I}{1+i}+\frac{V_t^H}{i}\right]-\left[-I+\frac{pV_t^H+(1-p)V_t^L}{i}+pV_t^H+(1-p)V_t^L\right]= \\ &= I(1-\frac{p}{1+i})+V_t^H\frac{p}{i}+\left[pV_t^H+(1-p)V_t^L\right](\frac{-i-1}{i})= \\ &= I(1-\frac{p}{1+i})-pV_t^H-\frac{(1-p)(i+1)}{i}V_t^L. \end{aligned} \tag{5}$$

Equation (5) predicts that higher costs, I, of joining the supranational institution in period 0 and period 1 raise the value of waiting as $\frac{\partial W}{\partial I}>0$. The reason is that this makes the accession less beneficial and thus lowers the value of both strategies, immediate accession and possible accession in period 1. However, as can be seen by inspection of the first

bracket term of equation (5) NPV_H decreases by a smaller extent because, first, the increase in I is discounted and, second, enters only with the probability of the good case to occur. Therefore, it becomes more attractive to wait and, thus, only to commit to these higher investment costs if the good state of nature occurs.[5]

We also derive equation (5) with respect to V_t^H and V_t^L, respectively. Thus,

$$\frac{\partial W}{\partial V_t^H} = -p < 0 \ , \ \frac{\partial W}{\partial V_t^L} = -\frac{(1-p)(i+1)}{i} < 0 \qquad (6)$$

An increase in V_t^H leads to a lower value to wait. This may come as a surprise, given the discussion in Section 3.1. Note, however, that we do not preserve the mean in this exercise. The cause for the result above can be seen by inspection of equation (5): NPV_H, i.e. the first bracket term, increases which for itself should lead to an increase in the value of waiting. However, this effect is overcompensated by an increase in NPV as the second bracket term is raised twice. The reason is that the increase in V_t^H raises $E(V_t)$ already in period 0 and not only with probability, p, and discounted as in the case of NPV_H. Thus, NPV rises by more than NPV_H. Intuitively, the good case becomes better which increases the expected net annual benefits and thus makes it more attractive for a country to join in period 0. To wait would imply that the country foregoes a higher expected net annual benefit of accession in period 0. An analogous reasoning applies to an increase in V_t^L. It reduces the "downside uncertainty" which makes an immediate accession more attractive. If both occur, i.e. an increase in V_t^H and V_t^L, the value of waiting also decreases with an increase in $E(V_t)$.

Proposition 2: *The value of waiting (W) is greater, the higher are the costs of accession (I_t) to the supranational institution in period 0 and in per iod 1 and the lower are the net annual benefits in the good case (V_t^H) and/or in the bad case (V_t^L).*

[5] Note that we are considering a level effect here where both I_0 and I_1 increase by the same amount. We will

Let us finally determine how the value of waiting depends on the probability of the good state of nature to occur, p, and the time preference, i. Based on equation (5) we find the following result for the first derivative of W with respect to the probability, p:

$$\frac{\partial W}{\partial p} = -\frac{I}{i+1} - V_t^H + V_t^L\left(\frac{i+1}{i}\right) \tag{7}$$

Equation (7) reveals that we cannot sign the first derivative. However, it can be shown that $\frac{\partial W}{\partial p} < 0$ if W>0. In other words, the value of waiting decreases with an increase of p if a country's value of waiting is currently positive. The reason for this result can again be understood by inspection of equation (5): an increase of p implies that NPV increases by more than NPV_H due to the increased expected net annual benefits in period 0 in case of an immediate accession. In addition, NPV_H falls due to an increase in the expected accession costs (pI) in period 1. Intuitively, a higher probability of the good state of nature to occur makes it more attractive to join the supranational institution, in general, and thus reduces the value of the flexibility option not to join if the bad state of nature should realize in period 1.

Taking the first derivative of equation (5) with respect to i allows us to discuss how the value of waiting depends on the time preference. We find that it is positive:

$$\frac{\partial W}{\partial i} = \frac{Ip}{(1+i)^2} + V_t^L\frac{(1-p)}{i^2} > 0 \tag{8}$$

This implies that the value of waiting increases if people become impatient which, again, may sound surprising. An inspection of equation (3) and (5) helps to explain the result. If i rises, both NPV and NPV_H fall because of a decrease of the net present value of the stream of future benefits from accession. An accession becomes generally less attractive. Note, however, that NPV_H decreases by less than NPV because of two reasons. First, an increase of the time preference has a greater negative effect on NPV than on NPV_H, because the

consider a dynamic effect where I may increase over time in Section 4.

value to be discounted is larger in case of immediate accession.[6] Second, the negative effect on NPV_H is partly compensated by a reduction of the discounted value of the accession costs, I, in period 1. Both effects thus increase the value of waiting. The intuition is as follows: if people become impatient their opportunity costs of current consumption are high. This implies that they are more reluctant to give up current consumption. Therefore, they would rather wait to join the supranational institution because, in this case, the investment costs can be postponed into the future. Furthermore, the stream of expected future benefits of an immediate accession falls relative to that of an accession in period 1 in the good case.

Proposition 3: *The value of waiting (W) decreases with an increase in the probability of the good state of nature to occur, given that W>0, and it increases if people become impatient.*

4. Interpretation of our Findings

Let us first focus on the costs of waiting and discuss to which extent and whether they are included in our framework. We then interpret our findings from the perspective of three periods.

4.1. The Costs of Waiting as a Component in the Value of Waiting

Suppose the costs of accession rise from I_0 to I_1. In this case, waiting is "costly" in the sense that a country has to pay more to join the supranational institution if it delays accession. As stated above, this does not inevitably mean that the value of waiting becomes zero or negative. The potential for an upward movement from I_0 to I_1, which makes a country indifferent between joining in period 0 or in period 1, can be calculated.[7] I_1^* has to take the value which equates NPV_H and NPV:

[6] $E(V_t)$, is greater than pV_t as long as $0<p<1$ and $V_t^1>0$.
[7] This is also shown in Dixit and Pindyck (1994, p. 28).

$$NPV_H = p\left[\frac{-I_1^*}{1+i} + \frac{V_t^H}{i}\right] = NPV\ . \tag{9}$$

If I_t reaches I_1^* the value of waiting, W, becomes zero. Note that a country may wait to enter a supranational institution despite of the fact that I_0 rises considerably to I_1 as long as $I_1<I_1^*$.This occurs if the flexibility of the country to join later has got a high value. On the other hand, if I is likely to rise considerably between period 0 und period 1, then the value of waiting might become negative which favours an immediate accession.[8]

When discussing the determinants of the value of waiting we usually faced a trade-off between some benefits and costs. Note that we can explicitly decompose the value of waiting (W) into a benefit- as well as a cost-component. This can be shown by slightly reformulating the first line of equation (5) and setting it smaller than zero:

$$W < 0 \quad iff \quad I(1-\frac{p}{1+i}) < E(V_t) + (1-p)\frac{V_t^L}{i}\ . \tag{10}$$

The value of waiting (W) is negative if the benefit-component of waiting on the left side is smaller than the cost-component on the right side. Note that the benefit-component captures the reduced accession costs due to postponing them (discounting with i) to period 1 and the possibility of only joining in the good state of nature (p). The cost-component of waiting is composed of the unrealized expected net annual benefits in period 0, $E(V_t)$, and the expected value of the annuity of the net benefits in the bad case, $(1-p)V_t^L/i$.

Equation (10) increases our understanding of the comparative statics results derived in Section 3. Note that a higher degree of uncertainty reduces the cost-component of waiting (V_t^L gets smaller) while the benefit-component stays the same. This is the basis for the result that higher uncertainty raises the value of waiting; it reduces the cost-component of

[8] Note that the difference between I_0 and I_1* is greater than W. As can be seen from equation (3), I_1 has to increase by more than W in order to reduce W to zero and thus make the country to join the supranational institution. This is due to the fact that I_1 is discounted and multiplied by the probability of the good state of nature to occur.

postponing the accession. If the reduction of V_t^L is not mean-preserving the effect is even stronger as $E(V_t)$ also decreases. Vice versa, higher expected benefits, $E(V_t)$, increase the cost-component of waiting. Also note that higher accession costs, I, raise the benefit component of waiting in equation (10) which is, again, in line with our findings in Section 3. We now can see more precisely that the value of waiting does take into account the costs associated with postponing an accession to the supranational institution. It is only positive if the benefit-component is greater than the cost-component.

4.2. Towards a Three-Period Model

So far, a country has basically the choice between entering the supranational institution in period 0 or waiting, and the uncertainty about the state of nature completely vanishes in period 1. Let us know think about an extension of the model by introducing a third period and by assuming that the uncertainty may not be completely reduced in period 1. Suppose that it is only known whether the net annual benefits are likely to be in the upper half of the spread or, alternatively, in the lower half as illustrated in Figure 2. In this case, it can be shown that a country may decide to wait until period 1 and to join the supranational institution even though it has the option to wait until period 2. Figure 2 demonstrates the idea which is related to Dixit and Pindyck (1994, p. 42).

Insert Figure 2

Note that, in period 1, some information is revealed about the net annual benefits in period 1 and in the future. For the very same reason that NPV_H can be smaller than NPV and, therefore, W is negative in the two-period model, it is possible for NPV_{HH} to be smaller than NPV_H in this extended version where NPV_{HH} reflects the net present value in period 0 of an accession that takes place in period 2, subject to V_t^{HH} being revealed. Note that the investment strategy is always set in period 0. Delaying the costs of entry, I_t, to period 2

increases the benefit-component in the calculation of W as shown in Section 4.1. However, the cost-component of waiting may increase by even more. The reason is that the possibility of getting V_t^{HH} also increases $E(V_t^H)$ if we enter the "high-return" path which raises NPV_H (i.e. NPV in period 0 of waiting to period 1 and investing if V_t^H occurs) and thus makes accession in period 1 relatively more attractive.

Thus, we can easily construct an example where, even though $E(V_t^H)$ has to be discounted to period 0, the value of waiting between period 0 and 1 is positive, but the value of waiting from period 1 to 2 is negative. In other words, $NPV_{HH}<NPV_H>NPV$. To get this result the cost-component has to rise by more than the benefit-component of delaying I_t in period 1 by one more period. One could calculate this possibility but the procedure would be the same as discussed in Section 3. The key point we want to make here is that it is possible that a country may find it optimal to wait from period 0 to period 1 and to enter in period 1 even though it could wait and thus further postpone a possible accession to period 2.

Another interesting point is to consider an increase of the degree of uncertainty over time. In Figure 2, this would mean that the spread between V_t^{HH} and V_t^{HL} as well as between V_t^{LH} and V_t^{LL} is bigger than the one between V_t^H and V_t^L. Based on the insight from the two-period model, it is straight-forward to show that the value of waiting from period 1 to 2 is high , whereas the value of waiting between period 0 and 1 may be rather small. This implies that the value of waiting may fluctuate over periods and might increase based on changes in the degree of uncertainty over time. In more advanced models with a continuous time treatment the value of waiting W smoothly fluctuates in time. The basic idea and conclusions are the same as in the simple model. The trade-off between the gains and the costs of waiting determines the "optimal" point of accession.

Suppose, as a special case and final thought about a changing degree of uncertainty, that the uncertainty regarding the net annual benefits is not reduced in period 1 at all. There

is no additional information that is revealed in period 1. In this case, a country that decided to wait in period 0 because of a positive value to wait would continue to wait. If nothing changes, the country may wait "forever". The question arises what the country will do if, already in period 0, it is expected that the degree of uncertainty will never change. One might argue that, in this case, the country may never join the supranational institution. However, this seems only to be the case if the country considers the decision to join after each period as time evolves. Given the insight that accession will never happen in case of great unchanging uncertainty, we are left with a choice between joining in period 0 or not to join at all. Thus, in this special case, we seem to be back to the orthodox decision rule: a country should join the supranational institution if the net present value of an immediate accession is greater than zero. Section 5 now applies our findings to the Swiss case and its relationship to, for example, the recent accession of the Eastern European countries.

5. Application: The Swiss Case in the Light of the Recent EU-Enlargement

In May 2004, another major EU-enlargement has officially been settled. The number of members increased from 15 to 25 countries including the new members Poland, Czech Republic, Hungary, Slowakia, Slovenia, Latvia, Lithuania, Estonia, Cyprus and Malta. There are more candidates in the waiting queue. The framework described in this paper should help to explain why some countries join the EU faster than others and, in particular, why a country like Switzerland seems to observe a higher value of waiting than others. In the following we assess the Swiss case based on the comparative statics results of the model derived above.

First, let us consider the *costs of accession or investment (I)*. Proposition 2 states that countries with lower administrative, economic and political costs of accession should join earlier. We argue that the specific accession costs due to the EU-membership are higher for

Switzerland than, for example, for the new member countries of the Eastern European enlargement. Certainly, the new member countries have had and have big adjustment costs to bear in order to converge to the economic and political requirements established by the EU: (i) adoption of the "aquis communautaire" with implications regarding the rule of law, the property rights and the state's interference in the market economies, (ii) implementation of institutional stability, human rights and protection for minorities, as well as (iii) acceptance of the market forces with all their short-term negative effects on some industries and employees. The challenges from these reforms are huge. The point is, however, that most of these changes were due regardless of becoming a member of the EU and are thus "normal" adjustments in the development process of those countries. In other words, the incremental investment costs of EU-membership may be quite small for these countries.

In contrast, Switzerland faces substantial accession costs in a number of areas which are specific to the accession, i.e. they would not arise if the country decided to stay outside of the EU. There is, for example, the cost of reorganizing the political system due to the unique form of semi-direct democracy: "One persistently special thing about Switzerland, however, is its political system. Its mix of federalism and direct democracy makes it different from any other country in the world, and affects every other aspect of life".[9] An EU membership would require substantial adjustments in the area of allocation of executive power or limitation of the public rights as, for example, shown by Freiburghaus (2003, pp. 13). Another important adjustment cost can be seen in the real interest rate shock associated with an EMU-membership. Real Swiss interest rates are about 1 to 2% lower than those in the EMU and there is some debate about the causes and desirability of this situation.[10] The important point to make is that a jump of the real interest rate will have considerable distributive effects (e.g. an increase of mortgages and rents), even though, for the exporting

[9] "Switzerland: A special case", *The Economist*, 2004, February 14th-20th, p. 18.

industry, some of the increase is likely to be "neutralized" by a real depreciation of the Swiss Franc.

Second, we look at the *net annual benefits in the good and the bad case (V_t^H and V_t^L, respectively)*. Proposition 2 states that a higher potential good case (or bad case) reduces the value to wait as both raise the expected net annual benefits. We argue that, from this perspective, the value of waiting is lower for the new members of the EU than for Switzerland. Note that how good the good case is (V_t^H), depends on where you stand. A rough measure for the upside potential of an EU-membership is the difference between a new member's GDP per capita and the average income of the current EU-members. This implies that the upside potential of one of the 10 countries that joined the EU in May 2004 is about 100%, whereas in case of Switzerland the GDP per capita is about 150% of the EU-average and is only exceeded by the EU-member Luxembourg. Of course, also Switzerland has an upside potential because of the effects from better market integration which are likely to increase with the EU-enlargement as stated in Baldwin's (1995) "domino theory" and empirically supported by Sapir's (2001) analysis of the exports of the members of the European Free Trade Association (EFTA) in the 1990s. However, the Bilateral Agreements I and II--the first of which was definitely agreed and implemented in 2002--considerably reduce the additional benefits from an economic integration which are specific to an EU-membership. Also, it seems that the annual costs of, for example, giving up the right to issue an own currency are substantial. "Our results indicate that Switzerland would be the third largest contributor of seigniorage within the EMU in absolute terms after Germany and Spain. In relative terms, the Swiss per capita contribution would be more than four times as high as the German contribution."[11]

[10] See, for example, Brunetti and Hefeker (1998), UBS (2000).
[11] Fischer, Jordan and Lack (2002), p. 79

How about the net annual benefits in the bad case (V_t^L)? In our view, the "acquis communautaire" and the currently proposed new European Constitutional Treaty are important in this respect. From an economic or an efficiency point of view, it is clear that not all tasks of the public authority should be executed at the same governmental level. The key determinants are "externalities" and "economies of scale". Centralization in the wrong areas leads to inefficient regulations and reduces the net annual benefits from membership. In their recent analysis "Is Europe going too far?" Alesina and Wacziarg (1999, p. 35) argue: "At the European level, there exists only a weak system of checks and balances, few clear texts providing legal guidance on the attributions of various institutions, and only weak protections for the rights of decentralized entities – nation-states or regions. As a result, Europe has acquired responsibilities in areas that should remain national or local." The problem of this observed tendency is particularly large if it is combined with a simultaneous deepening and enlargement of the EU as emphasized by Alesina, Angeloni and Schuknecht (2001, p. 4): "(...) for given distribution of preferences by potential union members and over a diverse range of policies, in equilibrium one should observe either small unions that centralize many prerogatives, or large unions in which few prerogatives are delegated above national governments. This trade off is particularly important when the union is considering enlargement. According to this reasoning, enlargement of the union and a deepening of coordination of policies are contradictory if the new members and the incumbents are heterogeneous." The point of this is that the net annual benefits in the bad case could be quite low for a country like Switzerland which, with its strongly pronounced federalistic structure, is much more restrictive regarding power to be given to the federal level. For example, tax competition between the 26 cantons is high and important. Also, people can take direct influence on major issues as the competences on the cantonal and community level are quite wide. Overall, there are good arguments that the net annual benefits which

are specific to an EU-accession are, from today's point of few, considerably lower for Switzerland than for the new EU-members--in the good as well as the bad case. This created a higher value of waiting for Switzerland in comparison with, for example, the recent new members of the European Union.

Third, let us discuss the degree and change of *uncertainty regarding the pay-offs of EU-accession (spread between V_t^H and V_t^L)*. Proposition 1 suggests that an increase in the spread (leaving the expected value constant) between the good and the bad case creates a higher value of waiting. We argue that this is a reason why Switzerland is less likely to join the EU today than this was the case in, for example, the beginning of the nineties. The argument is linked to the Constitutional Treaty proposed by the Convent. Whereas Tabellini (2003, p. 2) confirms what has been said above about the planned allocation of power--"(…) the convention missed a good opportunity to recommend that the EU actions be scaled back in some areas where they are unnecessary or harmful"--, Baldwin and Widgren (2003, p. 1) focus on the modus for qualified majority voting. They point out that the suggested modification will "(…) make it dramatically easier to pass EU legislation thus strongly improving the EU's 'ability to act', or what has been called 'decision-making efficiency'." They show (p. 7) that the „passage probability" of a legislation proposal increases to the same level as it was in the EU-6, even if Bulgaria and Romania are included in a EU-27. This implies that the EU-Commission, in its role as agenda setter, will gain power because it is much more probable that its proposals pass the Council (p. 16).[12]

Important for our argument is that the range of possible future developments in the EU is widened--or from the perspective of our model--the spread between the net annual

[12] Vaubel (2004) demonstrates that the proposed Constitutional Treaty would thus aggravate the problem of non-representation of voters in decisions by the Council of Ministers. The reason is that the voting in the Council is part of a two-stage decision making process (Vaubel (2004, p. 3): "Since the member governments, on average, tend to represent no more than, say, 55 per cent of the voters, a Council majority of 72 per cent is not likely to represent more than 72 x 0.55 = 40 per cent of the voters -- a minority. If the quorum is lowered to

benefits in the good and the bad case increases.[13] Of course, the increase of the power of the agenda setter institution may be for the good as well as for the bad. It crucially depends on the kind of the proposals that will be made by the Commission. The problem is that the Constitution leaves too much room for the EU-Commission as Alesina and Perrotti (2004, p. 17) point out: "(...) the ambiguous wording of Part 1 of the Constitution can be used to justify any *de facto* allocation of competences to EU institutions." Vaubel (2001) fears that a spiral of regulations might be initiated where highly regulated EU-members impose their regulation level on all members. Whatever will happen, the new decision rule bears the *potential to increase the range of possible future developments* and, therefore, increases uncertainty and the value of waiting for a country such as Switzerland. It seems that uncertainty has increased since 1990. The discussed sources of concern were less pronounced at the time when the EC was mainly focussing on economic integration, but started to arise with the Maastricht treaty (1991), followed by Amsterdam (1997), Nice (2000) and the Constitutional Treaty (2004) when political integration became a prominent point on the agenda. Also, following Baldwin and Widgren (2003, p. 7), the probability of any policy proposal made by the Commission being accepted by the Council will be twice as high in 2009 as it was in 1990 if the Constitutional Treaty is accepted.

Fourth, the question arises how *the costs of accession are likely to develop over time* (I_0 to I_1). This is a difficult question. On the one hand, Swiss legislation and policy seems to some extent and in some areas to follow the EU approach. This implies a reduction of the EU-specific accession costs in future periods which, interestingly, increases the value of waiting today (I_1 falls compared to I_0). From this perspective, one could argue--as some proponents of Swiss EU-membership do--that the Bilateral Agreements I and II reduce the

60 per cent, this share drops to one third (60 x 0.55 = 33 per cent)." This is another way of showing that the proposed Constitution would make it easier for any policy to be accepted in the Council of Ministers.

future accession costs for Switzerland which makes an accession some time in future less costly and therefore more likely. This does, of course, not take into account that the net benefits will also lower as discussed above. On the other hand, with the deepening of the economic integration and liberalization process in the EU, the adjustment costs for a country such as Switzerland may increase in a future EU-accession if this liberalization is not undertaken independently. Note that this reduces the value of waiting today ($I_1 > I_0$) and makes an immediate accession more likely.

Fifth, we showed in Proposition 3 that an *increase in the probability of the good state of nature to take place and/or a reduction of the impatience of people* reduces the value of waiting. From this perspective, one could argue that if the dispute over the Constitutional Treaty is settled and given a "positive twist", the good case can become more likely, which would reduce the value of waiting for Switzerland. Moreover, suppose it is true that people are more reluctant to take the burden of adjustment costs and to vote for a change if the standard of living is high in the current environment, we could argue that the Swiss might be more sceptical about an accession to the EU than people in Eastern European countries. In this case, the opportunity costs of joining the EU might be smaller for the latter countries than for Switzerland.

Conclusions

This paper interpreted the decision of a country, such as Switzerland, to join a supranational institution, such as the EU, as an irreversible investment under uncertainty. This implies that immediate accession may not be optimal despite of the fact that the net present value of accession is greater than zero, i.e. the discounted expected net economic and political benefits being greater than the discounted costs of accession. As the net benefits are subject

[13] In a more complex version of the model, this would be captured by different probability density functions

to uncertainty and thus may turn out to be high or low in a later period, waiting has a value because it allows staying outside of the supranational institution in case the net benefits are low. This value of waiting has to be taken into account in period 0 when a country makes the decision "to wait or not to wait".

The simplified two-period model showed a number of interesting comparative statics results that were then applied to the Swiss decision about EU-membership. In particular, we argued that uncertainty regarding the net annual benefits of an EU-membership increased over the last 10 to 15 years and seems quite high in the current environment with the pending new Constitutional Treaty. This raises the value of waiting. We then stated that the costs of accession seem to be high for Switzerland because of the necessity to change the political system to some extent, whereas the net annual benefits of accession are comparably low -- at least when compared to countries of Eastern Europe. Both aspects increase the value of waiting according to the model. Furthermore, the discussion by other economists about the intended level of regulations of various government tasks in the EU revealed that the lower bound of the net annual benefits might be low, should the bad case of nature occur. The model shows that this increases the value of waiting. An interesting aspect is also that exit is unlikely given that the costs of entry are sunk.

The analysis remains, at this stage, suggestive. The point we wanted to make is that the simplified model can help us to understand more precisely which factors determine the value of waiting of a country's accession to a supranational institution. Based on this background, one should be able to analyze and possibly better understand the Swiss and other countries' strategy regarding European integration. The approach could and should of course be extended. In particular, it is important to link the model more carefully with the Swiss case by using some quantitative analysis. Moreover, accession costs and net annual

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over the possible range of outcomes.

benefits might be influenced by the decision to join or not to join or used as a strategic variable by the countries that are part of the supranational institution. Also, the model is based on the idea that overall benefits and costs play an important role in the decision to join which, however, some people may debate emphasizing the role of special interest groups in the political process.

An element which we partially considered is the interdependency between a "bilateral" approach towards integration and a full EU-membership. In addition to our argument that the existence of the Bilateral Agreements I and II reduces the net benefits of Swiss-EU membership and thus raises the value of waiting, one could ask more generally whether the bilateral path and an EU-membership are independent, separate or complementary strategies. In this respect, learning is an important determinant of whether a gradual approach to integration dominates a "big bang reform" as shown by Dewatripont and Roland (1995, p. 1211): "Informativeness is the key necessary condition for gradualism to dominate the big-bang strategy in the sense that learning about the first reform tells whether to try the second reform or not (...)". This "learning"-aspect is also applicable to our approach. We could interpret the bilateral path as a learning step towards a closer integration in the EU that serves as a reduction of perceived uncertainty. This effect would, to some extent, compensate the increase in the value of waiting from reduced net benefits of EU-membership due to the existence of bilateral agreements. We could then argue that the bilateral path does not necessarily dominate an EU-membership, at least not forever, but it may be implemented much sooner due to a smaller value to wait.

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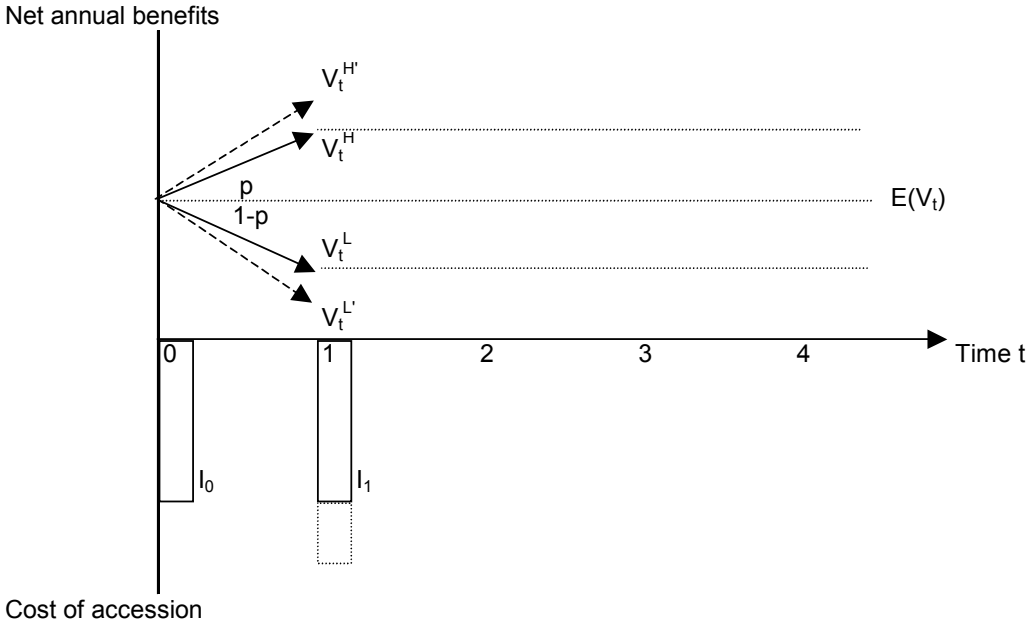
<u>Figure 1:</u> Structure of the Two-Period Model



<u>Figure 2:</u> Three-Period Model