Empirically testing the proposed theories will be a promising niche for further research. Particularly the identification of causal mechanisms that explain the divide between partial disintegration and full disintegration will be relevant, as well as works that focus on the efficacy of policy measures trying to reduce dissatisfaction with the course of the union or increase solidarity across European citizens.

APPENDIX

This section will outline a theoretical model with which disintegration can be explained. No empirical evidence is provided but it is argued that European disintegration can be interpreted as playing a "grim trigger" strategy as is theorized in game theory.

A typical application of this strategy is found in the industrial economics literature, where it serves as a benchmark model for the sustainability of collusive agreements. That is, in an oligopoly, individual firms can collectively agree to charge consumers the price that would result if the market was a monopoly. The resulting individual firm profits are higher than what the individual firm profits would be under competition. Yet, an incentive exists to deviate from the collectively agreed price by charging consumers a price just under the agreed price. This way the defecting firm is able to capture the entire market at almost the monopoly price. However, the betrayed firms will retaliate through defecting the next period as well, and the cartel ceases to exist. The market will be an oligopoly for all periods to come.

This strategic problem is similar to the one anti-European nations face in their decision to cooperate on the "European Project". That is collective benefits are expected from cooperation but large electoral gains can be obtained in the short run from defecting on this cooperation. This however comes at the price of foregoing all future benefits of European cooperation.

Geometric Series – Summing Infinite Streams

To effectively communicate the mechanism of this model, this appendix first devotes a subsection to deriving the convergence properties of geometric series. In the example series, x can take all values, but $(0, 1) \in \delta$

$$S = x + x\delta + x\delta^2 + x\delta^3 + ... + x\delta^{(N-1)}$$

$$\delta S = x\delta + x\delta^2 + x\delta^3 + ... + x\delta^N$$

$$S - \delta S = x - x\delta^N$$

$$S(1 - \delta) = x(1 - \delta^N)$$

$$S = \frac{x(1-\delta^N)}{1-\delta}$$

Then, if $N = \infty$, $\delta^N = 0$, yielding:

$$S = \frac{x}{1-\delta}$$

The Model

Now it is established that the sum of an infinitive series is equal to $\frac{x}{1-\delta}$, this property can be used to set up the model:

$$P + P\delta + P\delta^2 + ... + P\delta^\infty \geq W + D\delta + D\delta^2 + ... + D\delta^\infty$$

and which, as has been illustrated in the previous subsection, can be rewritten as:

$$\frac{P}{1-\delta} \geq W + \frac{D\delta}{1-\delta}$$

"P" is interpreted as the net benefit a government derives from sustaining its European Union membership, "D" is the net benefit a government derives from leaving the EU and "W" is the immediate but one-shot electoral gain resulting from the ascend of the union. The model explicitly focuses on countries where anti-European feelings are well-established such that the following assumption can be made: $W \geq P \geq D$. This assumption is important as it will guarantee that $(0, 1) \in \delta$.

δ represents a discount factor and ranges between 0 and 1. δ can be interpreted in two ways. On the one hand it can be interpreted as the patience a government has in waiting for the benefits of integration as $P \geq D$. With a larger value of δ being associated with a higher level of patience. On the other hand, δ can be interpreted as the probability that the government decides to stay in the union. A $\delta = 1$ would then mean that there is a zero percent probability of leaving the union.

To understand the importance of discounting future periods of cooperation, the continued EU-membership pay-offs, "P", should be regarded as investments. Because it is assumed that European integration is beneficial to a government in the long-run, that is $P \geq D$. Addressing state-transcending issues collectively, in the form of EU-membership, is then the more preferred the higher the value of δ is. A δ of 1 would imply that the government is perfectly patient and regards "P" and "D" for their absolute values as opposed to a by δ transformed one $(1^x = 1 \forall x)$. *See the initial specification of the model.*

The model is presented as to cover a governments strategic decision to stay in the EU, but can also be interpreted as a single policy area because a government's total benefit of integration is not more than the mere sum of the benefits in all policy areas.

Solving the Model

$$P \geq W(1 - \delta) + D\delta$$

$$P \geq W - W\delta + D\delta$$

$$P - W \geq D\delta - W\delta$$

$$P - W \geq \delta(D - W)$$

$$\delta \geq \frac{P-W}{D-W}$$

In order for a state to sustain its EU-membership it should be sufficiently patient, that is have a value of δ sufficiently high, such that it prefers having "P" indefinitely over having "W" once but "D" indefinitely there after. This holds for the calculated values $\delta \geq \frac{P-W}{D-W}$. As the formula illustrates: EU-membership is easier to sustain if the benefits of integration, "P", are high and the benefits of disintegration,"D", are low. The impact of the immediate electoral gain of leaving the union, "W", is heavily dependent on the ratio between "P" and "D". What the model indicates is that the risk of a country with a relatively anti-European electorate to leave the EU can thus be substantial.

The Long-Run Approach

Thusfar "P", "D" and "W" have been considered to be parameter values. This approach would capture a short-run scenario. However, a more realistic approach would be to write these as functions of for instance the level of integration, such that "P", "D" and "W" change over time and better capture long-run dynamics. The rest of the appendix will be devoted to this extension and the lessons that can be learned from it.

It is fair to assume that as the EU proceeds its integration process, the marginal benefits of this will diminish. For instance, the benefits from the introduction of "European Coal and Steel Community" were massive because it finally brought peace to the continent of Europe. The introduction of the Single Market decades later led to a somewhat smaller but still very large welfare gain. While current EU policy-making evolves around matters as pressing as for instance harmonising product standards. In sum: as the most pressing issues are being addressed, the EU is expected to shift its focus to ever less substantial matters. Simultaneously are the benefits of defecting, "D", increasing in the level of integration, and most likely at an increasing pace as autonomy losses are expected to be valued more the less autonomy is left to a government. Graph 1 depicts these relations between the level of respectively "P" and "D" and the level of integration.

Although the exact shape of the functions for "P" and "D" are unknown, it becomes clear that there are two points at which the government is indifferent between continuing EU-membership and defecting: $W \geq P = D = 0$ and $W \geq P = D \geq 0$. In each of these cases, the corresponding δ is 1 and the government will sustain its membership.

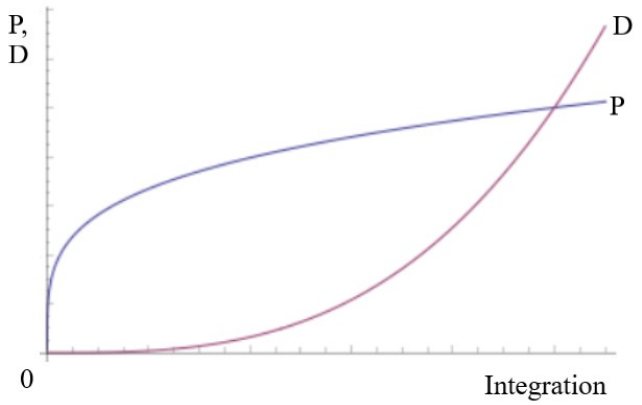
This illustrates that even governments subject to an anti-European voter base can be able to sustain some degree of integration. However, the practical question arises whether member-states will be allowed to partially disintegrate to the level they can maximally sustain *(assuming the by the other member-states desired level of integration lies past this maximally sustainable point)*.

At the same time it should be acknowledged that preferences are dynamic. Or alternatively phrased, this for a government maximally sustainable level of integration fluctuates over time, as the functions for "P" and "D" are expected to be dependent on more variables than just the level of integration. The political-colour of the government, the size of the union, or mass public opinion could for instance be examples of such factors. Changes in these do not cause shifts along the line, as a change in the level of integration would, but shifts of the lines and thus the intersection point.

The main implication of these dynamics in the the form of "P" and "D", is that a government has imperfect information about the future values of "P" and "D" at the moment it makes the decision whether to continue its EU-membership. Overvaluing of either the future levels of "P" or "D" will lead to inefficient outcomes. That is, governments leave the union because they think they are better off without the membership based on high expected future values of D, while ex-post these values of D may turn out to be lower than expected and the government had better stayed in the union. Similarly is the reverse possible, where a government decided to stick with its EU-membership while ex-post it turned out that it better left the union periods ago.

Moreover, if it is assumed that the government is able to postpone its decision whether or not to continue its EU-membership, it can speculate on the value of "W". Assuming the W is non-constant but a function of time, for instance through trends in mass opinion or the size of the majority a government coalition has.

What this extension to the initial model has introduced, is an analytical framework with which the analysis of the immediate decision to leave the EU can be extended to incorporate the long-term decision uncertainties accompanying such a decision.



Graph 1: *The relation between government's* $P = f(Integration, ...)$ *and* $D = f(Integration, ...)$ *against the level of integration.*

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