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The effect of EU derogation strategies on the compliance costs of the nitrate directive

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ABSTRACT

Within the framework of the nitrate directive, member states have the opportunity to apply for derogation, i.e. increasing fertilisation standards under certain conditions. Several EU regions have utilised this opportunity, but each in a different way, resulting in six very different derogation policies within the EU in 2009. This paper focuses on the differences between the policies applied and makes an assessment with regard to the impact of these differences on the application rate for derogation, the manure surplus and the cost of allocating manure. Based on the MP-MAS model described by Van der Straeten et al. (2010) the different scenarios are applied on a single case area (Flanders) and the economic effects have been simulated. Results show considerable differences between the policy alternatives, leading to the conclusion that member states not only have to focus on whether or not to allow derogation, but also on the actual details of the derogation policy. Granting derogation at parcel level (plot of land), instead of farm level, increases the potential effect of derogation; the level of increase in fertilisation standards under derogation determines the application rate for derogation: a higher increase leads to a higher application rate.

1. Introduction

Fertiliser use is a major source of nitrate leaching into ground and surface water (Fuller et al., 2010), and constitutes an important problem in many European Union (EU) member states. To reduce leaching, the EU Nitrate directive (91/676/EC) focuses on pollution by nitrates from agriculture. Member states are obliged to identify waters in which nitrate concentration is above, or at risk of exceeding the 50 mg/l NO_3 norm. Agricultural areas within the catchment area for these waters are then designated as a nitrate vulnerable zone (Karaczun, 2005), in which member states are obliged to draw up an action programme and a code for good agricultural practise, involving, for example, fertilisation standards (Goodchild, 1998). The Nitrate directive concentrates primarily on the use of animal manure as fertiliser, because this practise is difficult to manage. Difficulties in predicting the exact nutrient availability and uptake led to the imposition of a precautionary fertilisation standard for nitrate vulnerable zones of 170 kg manure-N ha^{-1} $year^{-1}$ (Schroder, 2005).

Although the Nitrate directive has been in existence now for 20 years, many EU member states still experience difficulty in complying with its requirements and achieving environmentally beneficial outcomes. For example, according to Lassaletta et al. (2009), in some European catchment areas the nitrate concentrations are still increasing. The difficulties in managing manure use can also lead to nutrient losses in the environment (Schroder, 2005; Schroder et al., 2004). For some crops, the standard for manure use is too stringent and chemical fertiliser use increases (Schroder et al., 2007b). In the light of these difficulties, and because some crops benefit from higher manure use without causing problematic nitrate leaching (OnderSteijn et al., 2002; Schroder et al., 2007a), the European Commission anticipates derogation for some crops. This would generally apply to crops with a long growing season and a high nutrient uptake. Derogation permits deviation from the Nitrate directive standards and requires a formal request by a member state to the European Commission to deviate from this obligation under certain conditions, based on monitoring programmes and experiments (Fraters et al., 2007).

A key issue regarding derogation is that no generic guidelines exist for establishing the rules to grant or apply it. Instead, member states take their own initiatives, and negotiate them with the European Commission before implementation. As a result, derogation differs considerably between the member states. Thus derogation is a bottom-up policy in terms of its approach; a feature that is common to other policies that have recently gained importance in EU decision making: rural development programmes, decoupled payment schemes, LEADER subsidies. All of these policies rely on an EU framework where the member states have a great deal of freedom as regards implementation. The fact that all affected economic agents still have to compete within one common EU market, requires a systematic comparison of the policies across member states.

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The derogation option is used by several governments (Flemish, Walloon, Dutch, Danish, German, Irish, Northern Irish and Austrian governments VLM, 2009). The Austrian government did not continue with the derogation option because of its limited success (VLM, 2009), and in the other regions the application rate for derogation differs greatly (from 0.24% in Germany to 33% in The Netherlands). Differences in application rate may be due to the policy variant, the local conditions or the application behaviour of the farmers. Much research has been done on the manure problem (e.g. Cardenas et al., 2011; Kruitwagen et al., 2009; Lauwers et al., 1998; Schroder and Neeteson, 2008; Van der Veeren and Tol, 2001; van Engelen et al., 2008; Withers and Haygarth, 2007), both within and outside the context of the Nitrate directive, although cross-country comparisons are lacking.

The objective of the current paper is to compare the variants of derogation as they have emerged in eight EU regions. Their distinguishing features are first analysed, and then the impact of the variants is simulated using a single dataset with a multi-agent model. Impact analysis is focused on economic compliance, in particular the cost of allocating manure from manure-producing to manure-accepting farms. The single dataset comes from Flanders, one of the regions that applies derogation; the simulations are done with a mathematical programming multi-agent model developed by Van der Straeten et al. (2010) and enlarged with an econometric device simulating application behaviour.

The paper is organised as follows. Firstly in Section 2, the different sets of derogation rules, as they have emerged in the different EU regions, are described, followed by the manure allocation model and the data description in Section 3. In the results Section 4, first the potential effect of derogation for the different scenarios is given, followed by an assessment of the derogation behaviour, based on data for the Flemish region. This estimated behaviour is then used to assess the willingness to apply for derogation under each policy scenario. The discussion and conclusion in Section 5 places the research within the policy debate on manure.

2. Derogation rules within the EU

By 2009, eight regions had already applied for derogation. This has resulted in policy variants, specifically tailored to regional needs. Although the policy in almost every region differs, two types of derogation can be distinguished. The first type applies a fertilisation standard of 230 kg manure-N ha^{-1} $year^{-1}$ at farm level when at least 2/3 of N-manure originates from cattle. Under the second type, the new fertilisation standard at farm level for N-manure is 250 kg manure-N ha^{-1} $year^{-1}$ with the restriction that only farms with grassland can apply for derogation. The minimum percentage of grassland varies from 48% to 80% between the different policies.

The first two member states making use of the derogation option were Denmark (since 2002) and Austria (since 2004). Farms with a minimum proportion of grassland of 70% and a minimum proportion of cattle manure of 2/3 can apply for derogation. The derogation standard is 230 kg manure-N ha^{-1} $year^{-1}$ imposed at farm level. Austria did not continue with the derogation option beyond 2008. Since 2006, The Netherlands has become the third region with derogation. Their derogation policy was less stringent: only the grassland criteria was imposed: farms with at least 70% grassland are able to apply for derogation. The new fertilisation norm is 250 kg manure-N ha^{-1} $year^{-1}$. In Germany, since 2006, derogation can be applied on farms where at least 2/3 of the total manure production originates from cattle. The new fertilisation standard under derogation is 230 kg manure-N ha^{-1} $year^{-1}$. In 2007, Wallonia, Ireland, Northern Ireland and Flanders were the last four regions to make use of the opportunity to apply for derogation. Northern Ireland and Ireland both have the same derogation policy. Derogation is applied at farm level, where farms can obtain a new fertilisation standard of 230 kg manure-N ha^{-1} $year^{-1}$, when more than 80% of the area is cultivated with grassland.

Derogation in the two Belgian regions differs from the other regions. Wallonia uses both derogation criteria (66.7% cattle manure and 48% grassland), but distinguishes between fertilisation standards for grassland (230 kg manure-N ha^{-1} $year^{-1}$) and arable crops (115 kg manure-N ha^{-1} $year^{-1}$). In Flanders, the derogation policy is unique for two reasons. First, derogation is granted at parcel instead of farm level and, second, the fertilisation standard depends on crop type. In principle, all farmers with land in Flanders can apply for derogation, but some restrictions apply. Firstly, when the parcel lies in a phosphate-saturated area, a groundwater collection area or an area with a high nature value, the parcel is excluded from derogation. Furthermore, derogation depends on crop type: only crops or crop combinations where the extra manure rate would not lead to the 50 mg nitrate norm being exceeded are specified as derogation crops. Five groups of derogation crops are distinguished: grassland, maize preceded by one cut of grass, sugar beet, fodder beet and wheat followed by a cover crop. The derogation standards are 250 kg manure-N ha^{-1} for grassland and maize preceded by one cut of grass and 200 manure-N ha^{-1} for the rest. Finally, the type of manure that can be applied on parcels under derogation is also restricted. The types eligible for derogation are cattle manure, manure from horses, sheep and goats.

The policy variants are synthesised in Table 1, together with their application rates for various regions. Austria has not continued with derogation because of the very poor uptake by farmers. In most other member states the success of the derogation option has been rather low, with an application rate between 0.24% in Germany and 3.9% in Denmark. Only two areas, Flanders and The Netherlands, have experienced a high application rate. In these two regions more than 30% of the farms complying with the derogation criteria, will apply for derogation.

The challenge now is to unravel the potential reasons for these differences in application rate. Until now, very little research has been done with respect to the derogation option in the Nitrate directive. Buysse et al. (2005) concluded that, for regions with high manure supply, derogation according to crop type would stimulate farmers to increase the cultivation of those crops that permit derogation. According to Kruitwagen et al. (2009) the economic effects of derogation are twofold. First, less mineral fertilisers should be used to achieve the same level of fertilisation, thereby reducing costs. Second, derogation provides cost savings for dairy farmers, because less manure has to be disposed of away from the farm (usually at high cost). A positive side effect of derogation is a reduction in the national manure surplus because of the higher average manure rate on grassland (Kruitwagen et al., 2009). On the other hand, Claeys et al. (2008) has found that, in the Flemish case, the impact of derogation on the manure surplus is limited, especially when phosphorus is the limiting nutrient.

Table 1
The imposed derogation criteria and the corresponding derogation application rate per member state in 2007 (VLM, 2009).

Regions	Cattle criteria (%)	Grassland criteria (%)	Application rate (%)
Flanders	/	/	30
Wallonia[a]	66.7	48	/
Denmark	66.7	70	3.9
The Netherlands	0	70	33
Austria	66.7	70	0.005
Germany	66.7	0	0.24
Ireland[a]	0	80	/
North-Ireland	0	80	2.8

[a] No data available for application rate.