Peer review of Study: 'Assessing design options for a Market Stability Reserve in the EU ETS'[1] –

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This study assesses both quantitatively and qualitatively the European Commission's proposal for a Market Stability Reserve (MSR) for the European Union Emission Trading System (EU ETS) with different types of trigger mechanisms and parameters (starting year and strength of response). First, the justification for the introduction of a MSR is assessed. Second, the role of a MSR in the EU ETS is assessed, drawing lessons from other commodity markets. Third, a multi-criteria evaluation framework is developed and applied to different MSR trigger options. Fourth, economic modelling is used to simulate market outcomes in response to potential demand shocks, comparing different design options of the MSR. From the analysis, a number of policy conclusions are derived which are discussed in this brief comment.

Qualitative Analysis pursued in the study

The study provides a very valuable and comprehensive discussion on the MSR. First, assessing the rationale for reform, the report moves through the issues which have been critical to the debate. The approach of combining a comprehensive literature review with expert consultations offers a balanced and well- rounded discussion. A significant contribution is the analysis of stability reserves in other commodity markets, namely the oil, food and currency markets. One interesting result is that oil and food markets demonstrate how such reserves can help in sustaining a price floor, whilst these reserves have been less successful in delivering price ceilings. This is largely due to the high storage costs of reserves for fuel or food that limit their scale. With a limited scale, the reserve can then not contain commodity prices under all scenarios. Interestingly, such issues would not apply to an emission permit reserve, since they can be stored at zero cost and releasing permits to respond to undersupply generates government revenues. In this way, a permit reserve may be more successful in also containing price than reserves in other commodity markets.

Quantitative Analysis pursued in the study

The quantitative analysis is conducted using the Kollenberg and Taschini (2014) Model (KT Model). The KT Model characterizes an emissions trading system where price taking entities must comply with regulations by offsetting their emissions within the compliance period. In doing so, firms decide whether to abate emissions or hold emission permits. Companies adapt their abatement and their trading behaviour, depending on the expectations about the level of market imbalance and the resulting relative cost difference between abatement and acquiring CO2 allowances.

[1] This comment was based on the version May 20th 2014 of the study by Alyssa Gilbert, Long Lam, Cathrine Sachweh, Matthew Smith Luca Taschini and Sascha Kollenberg.

The KT Model has been developed so as to represent different assumptions regarding the foresight of market participants, being:

- **no market failure condition -** perfect foresight with unlimited banking (out to 2050); and
- **market failure condition -** myopic foresight where firms consider only banking of allowances for five years and thus do not consider the impact of long-term scarcity on price or for abatement decisions.

In terms of outputs the model provides abatement levels, reserve levels, and carbon prices. Agents are assumed to be risk neutral and there is no policy uncertainty.

The model allows the comparison of MSR designs considering different triggers levels and states of the world. Three types of MSRs are considered in the quantitative analysis including: quantity based mechanisms, price based mechanisms and hybrid mechanisms. These different types of MSR are then calibrated to different withdrawal and injection conditions as well as different implementation dates (2017 versus 2021). Surplus based triggers, price level based triggers and price trend based triggers are all included in the analysis. In total, an impressive number of scenarios are modelled.

The quantitative analysis is structured in the following steps.

- First assuming perfect foresight with banking and borrowing an optimal abatement pathway is simulated to 2050. This can be considered the **Benchmark Optimal Outcome.**
- Second simulation of the EC MSR proposal in the case of perfect foresight until 2050 (i.e., no market failure) is demonstrated not to be effective. This should not be surprising. Without market failure intervention designed to correct for a market failure cannot improve the optimal abatement pathway but risks introducing inefficiencies.
- Third market failure is introduced through constrained inter-temporal optimisation. Agents with limited foresight assume at any point that there is no banking for more than five years ahead. If over this five year horizon allowances are not scarce, then prices are assumed to be zero and mitigation is not incentivised. This can be considered the **Benchmark Market Failure Outcome.**
- Fourth a **Reference Case** is constructed based on the European Commission's proposal for a MSR.
- Finally, through the introduction of positive and negative economic shocks, the Benchmark Market Failure and Reference Case are tested against a comprehensive set of MSR policy scenarios.

This is in principle a very well structured approach. Simulating a market failure through limited foresight delays abatement, resulting in a socially inefficient abatement pathway as measured by the deviation from the Benchmark Optimal Outcome. This motivates market intervention and the design of different policies, which can be compared against the degree to which they reinstate the optimal abatement schedule.

The market failure resulted in a dramatic deviation of the abatement pathway from the optimal outcome. The optimal outcome given the assumptions regarding discounting and the mitigation cost curve would be constant mitigation volume across all years, while in the market failure scenario almost no mitigation is pursued before 2025, resulting in the need for a rapid ramp up of abatement toward the end of the modelling period. In the model, this increases the total (discounted) cost of

emission abatement. In practice it could also imply that the very high abatement volumes to be delivered in the later years are not achieved, and therefore the emission mitigation target is not reached. We will discuss the policy implications bellow.

Policy Implications and key findings

The report combines the qualitative and quantitative analysis to arrive at a number of important policy implications. In this brief comment we will discuss four of these recommendations being:

- The earlier the MSR is implemented, the better;
- The effect of varying the volume trigger variables is negligible;
- Price based MSRs are least cost effective; and
- The EC's proposal is a sensible starting point.

These are discussed in the points that follow.

The earlier the MSR is implemented, the better

An earlier implementation of the MSR is the only policy design option simulated in the study that delivers a significant reduction of mitigation costs. This occurs as positive carbon prices arise earlier, stimulating earlier abatement and reducing aggregate compliance costs. In addition, early implementation scenarios better reflect both the carbon price path and abatement profile of the Benchmark Optimum Outcome and therefore should be considered desirable.

However, it is important to also note that the mitigation cost, carbon price trajectory and mitigation time profile is still very different from the Benchmark Optimal Outcome. This suggests that further analysis is necessary to understand how – assuming an earlier implementation of the MSR – the trigger mechanism and parameterization could be designed to better reflect the Benchmark Optimal Outcome.

That said, subject to the model assumption that market participants do not have perfect foresight and thus are reluctant to bank allowances beyond five year time horizons, the result that earlier implementation reduces aggregate compliance costs appears to be a sensible conclusion that policy makers should give serious attention.

The effect of varying the volume trigger variables is negligible

The authors infer from the quantitative analysis that, while different reserve approaches incur different cost changes in the system, the choice of threshold (within those tested) had only a minor impact on aggregate compliance costs. The result stems from sensitivity analysis that was conducted on a range of MSR policy scenarios, which are then compared against the Benchmark Market Failure (projected surplus depletion under no intervention).

The policy proposal of the European Commission (Reference Case) only delivers, according to the model, a small shift of the abatement schedule and compliance costs from the 'Benchmark Market Failure Outcome' towards the 'Benchmark Optimal Outcome'. The MSR proposal is with the proposed design and timing of implementation therefore not very effective in addressing the market failure. Small variations in the thresholds and injection levels may have impacts at the margin, but do not address the needs identified above: the MSR starts earlier and fill up faster. With fundamentally

different parameters for time of implementation and strength of response, the MSR could well be sensitive to variations in the parameterization.

For example, most scenarios simulated follow that of the European Commission's proposal where an empty MSR is implemented in 2021 and fills according to the various triggers and injection quantities assumed. Under such assumptions, for most of the years in the decade to 2030 the surplus remains above the trigger level and the stability reserve will be filled. Changes of economic developments will only have a limited impact on the speed of filling the reserve. Therefore, the MSR can in this period only provide limited flexibility to respond to unforeseen events and thus has only a limited stabilizing effect.

Price triggered mechanisms are least cost effective

The authors conclude that based on aggregate compliance costs, price based MSR mechanisms are more costly than hybrid and quantity based mechanisms. This result is largely driven by the behaviour of the MSR late in the 2040th decade– the last years of the modelling period. The price based triggers do not necessarily result in a complete disbursement of all allowances while quantity based mechanisms can facilitate such disbursement.

As it is assumed that any permits left in the reserve at 2050 are permanently retired, scenarios that do not completely disburse all permits reduce the number of permits available and therefore result in addition mitigation effort that increases the compliance costs over the modelling horizon (co-benefits of mitigation are not represented in the model). Hence policies which result in reserves at the end of the modelling period are automatically penalised. However, we hope that the world will not end in 2050, and equally anticipate that the value of an effective EU ETS is its inter-temporal stability suggesting that it will not be abandoned in 2050. Therefore we would argue that MSR performance should not be judged based on an end-of modelling period effect.

The EC's Proposal is a Sensible Starting point

Reflecting on the qualitative and quantitative analysis, the authors suggest that the quantity based trigger appears to be a sensible reform option. According to the authors, the proposed EC MSR can be considered a 'patch', which will fix the market imbalance over the medium term and put the system back on the cost optimum pathway. This conclusion is cautioned by experience in other commodity markets and the identified risk of unintended consequences. However, based on the current evidence, for a number of reasons, we would be more cautious in supporting the EC MSR proposal as it parameterised. Firstly, across all MSR types, the modelling revealed strong benefits from early implementation. Such analysis suggests that implementation before 2021 could result in earlier abatement, lower compliance costs and increased certainty to investors. Secondly, given the parameterization of the EC MSR proposal, the reform only delivers a small shift of the abatement schedule and compliance costs towards what would be the optimal outcome without market failures (optimal benchmark). Hence, we would be interested in an assessment of policy scenarios which became effective earlier and therefore potentially shift the abatement schedule closer to the optimum.

Such caution appears to be warranted also according to the qualitative analysis. For example, as stated in the report, many interviewees commented that that the parameterization of the European Commission's proposal would not erode the surplus fast enough to be considered effective.

Furthermore, concerns were raised regarding the timing of the intervention. As the EC MSR is triggered by observed data, this delay could reduce the effectiveness of the instrument in stabilizing the EU ETS market.

Further considerations

According to the proposal of the European Commission the MSR is calibrated to reduce the surplus of allowances in circulation to a volume that matches the hedging demand. Thus, the quantity-based triggers to inject or withheld CO2 allowances would allow surplus levels that can be used by the power and industry sectors to hedge emissions linked to production that has been sold forward. This idea is reflected in the qualitative assessment of the report, where the authors discuss the role of different actors in banking permits:

- Power firms who use physical allowances (or forward contracts provided by banks owing the physical allowances) to hedge forward sale;
- Industry who bank CO2 allowances to hedge future production; and
- Market participants or financial actors that bank permits as speculative investment and therefore then carry the full price risk.

In our paper – that was quoted as reference for this approach - we argue that as the hedging demand is exceeded, speculative investors are required to hold the remaining surplus allowances. Their high return requirements result in a high discounting of longer-term price expectations. (This is effectively represented in a stylised form in the KT model with a myopic perspective that translates to very high discounting of longer-term scarcity levels.)

The significant difference between the use of surplus allowances for hedging and as speculative investment points to the importance of an improved understanding of the scale of the hedging demand and market participants' potential adjustments to the hedging demand. The study reviews some material to this extent, but further discussion seems necessary to inform the design of the quantity-based threshold levels of the MSR.

In the KT model the hedging demand for allowances has so far not been reflected. Inclusion of such hedging demand would reduce the effective surplus, and would thus have impacts on the assessment of parameters in the model. However, given the large scale surplus (more than two billion) allowances across most scenarios, in the current setting the effect may be marginal.

The qualitative part of the report also raises questions on potential strategic behaviour of actors. For example, compliance entities may not want to sell excess allowances they may have received beyond their hedging demand. This is obviously a concern for any ETS system – but it will be important to assess how the mechanisms implemented with a MSR impact the effect. Both to monitor potential strategic behaviour and to assess other effects the authors recommend the development and implementation of indicators to track progress of the MSR and the EU ETS more widely. A recommendation we would like to strongly support.

To conclude, this study contributes to the ongoing debate on the MSR in a very effective and timely manner. Both the qualitative and quantitative assessments provide useful insights into potential impacts of the MSR on the EU ETS. However, as outlined above, some of the policy conclusions from the modelling must be considered in the context of the modelling assumptions and scenario parameterization.