Motu

Uncertainty, Risk and Investment and the NZ ETS

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Abstract

New Zealand is facing a challenging low-emission transition, and effective emission pricing needs to be part of the solution. In its pure form, an emissions trading system (ETS) fixes the quantity of emissions in regulated sectors and the market sets the emission price. In New Zealand's current policy and market context, there is value in managing both unit supply and emission prices under the NZ ETS. While emission price changes in response to policy and market conditions are desirable to drive efficient abatement, excessive price instability can deter low-emission investment. This working paper, which evolved under Motu's ETS Dialogue process from 2016 to 2018, explores key considerations for emission price management in the context of a specific working model for unit supply in the NZ ETS. Emission price instability can be reduced at its source by reinforcing policy commitment and improving market regulation and development. Emission price instability can be mitigated by incorporating a price ceiling (cost containment reserve backed by a fixed-price option) and a price floor (auction reserve price) into the auction mechanism. Decisions on price management should be coordinated with other decisions affecting unit supply, guided by an indicative ten-year trajectory for both unit supply and emission prices, and informed by independent advice. Two companion working papers address interactions between ETS price management and the choice of cap and linking to overseas markets. The three working papers elaborate on an integrated proposal for managing unit supply, prices, and linking in the NZ ETS that was presented in Kerr et al. (2017).

JEL codes

Keywords

Emissions trading, New Zealand Emissions Trading Scheme, greenhouse gas, climate change mitigation, price ceiling, price floor

Summary haiku

An ETS price
is set by the market, but
price safeguards can help.

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1 Introduction

Emissions trading systems (ETSs) are an effective mechanism to assist jurisdictions to reduce their greenhouse gas (GHG) emissions and combat climate change. As of 2019, 27 jurisdictions, which account for 37% of global GDP, were implementing 20 ETSs covering about 8% of global emissions. Six further jurisdictions have an ETS under development (International Carbon Action Partnership, 2019). These systems all differ in their level of emission reduction and price ambition, the sectors and gases they cover, the activities that are covered within each sector, how emission units are allocated, and how they link with other sources of emission units.

Reflecting its national context, the New Zealand Emissions Trading Scheme (NZ ETS) was launched in 2008 with a number of innovative design features that differ markedly from many other ETSs under operation or consideration. Having evolved for a decade under the global carbon market framework and domestic mitigation objectives established pursuant to the 1997 Kyoto Protocol, the NZ ETS now requires reforms to operate in the new context created by the 2015 Paris Agreement.

This paper was developed over the course of Motu's 2016–18 ETS Dialogue, which brought together a group of cross-sector experts to discuss options for managing unit supply and prices under the NZ ETS. The focus of this paper is on ETS design to reduce and manage emission price instability, which can derail low-emission investment. First, the paper outlines a working model for unit supply in the NZ ETS to enable discussion of price management in a concrete and focused way. We then consider the New Zealand-specific sources of emission price instability within this model. We move on to discuss solutions for reducing emission price instability at their source as well as ETS design features for mitigating their remaining impacts. We conclude with specific recommendations for reform to price management in the NZ ETS.

The operation of ETS price management mechanisms is interdependent on other design features affecting unit supply. Two companion working papers (Leining and Kerr, 2019; Kerr and Leining, 2019) address management of domestic unit supply under an ETS cap and linking to overseas markets. The three papers elaborate on the summary proposal for managing unit supply, prices, and linking in the NZ ETS that was presented in Kerr et al. (2017).

2 Working Model for Managing Unit Supply in the NZ ETS

2.1 Overview of the Working Model

In this section, we propose a working model for managing unit supply in the NZ ETS that provides a basis for considering the management of emission price instability. This model has three components:

- assuming no buy-and-sell linking to another ETS for now
- limiting any imports of international offset units
- establishing an absolute cap on auctioning (and predetermined rules around free-allocation) that is set in advance, fixed for the near term, and guided by a longer-term trajectory.

Under this model, the New Zealand market would set the domestic emission price and the government could consider a range of options for managing domestic prices. At this stage our model addresses only the ETS architecture, not factors relevant for the political decisions around future ambition for domestic emissions and emission prices.

2.1.1 Assume No Buy-and-sell Linking to Other ETS for Now

For the purpose of this model, we assume that New Zealand would choose not to link its ETS directly to other ETSs for the foreseeable future. As a result of the 2015 Paris Agreement, the international carbon market is in a transitional stage. Rules are being negotiated for internationally transferred mitigation options and a new market mechanism under Article 6, and countries are adjusting their policies to meet more ambitious mitigation targets. In this uncertain and evolving context, creating a bilateral buy-and-sell linkage with the NZ ETS would add uncertainties over unit supply and price and would impinge on sovereignty over domestic policy settings. New Zealand could consider a buy-only linkage that would not require harmonisation of settings for the cap, imports of offset units, and price management. This could operate similarly to managing imports of international offset units, which is addressed next.

2.1.2 Limit Imports of International Offset Units

The model assumes that any future imports of international offset units would be quantitatively (as well as qualitatively) limited and potentially handled entirely by government. Any international units entering the NZ ETS market could be associated with an offsetting reduction in government issuance of NZUs, thus avoiding impacts on total unit supply. Alternatively, as New Zealand created or used new mechanisms to fund international mitigation and received units, it would learn about the ease and cost of this type of mitigation and could choose to alter the stringency of the NZ ETS. If international mitigation could be done credibly and cheaply, New Zealand could loosen the NZ ETS cap and slow its domestic decarbonisation. If international mitigation was difficult and costly, New Zealand would need to rely more on domestic decarbonisation to meet its international commitments and would want to signal that clearly through a tighter NZ ETS cap.

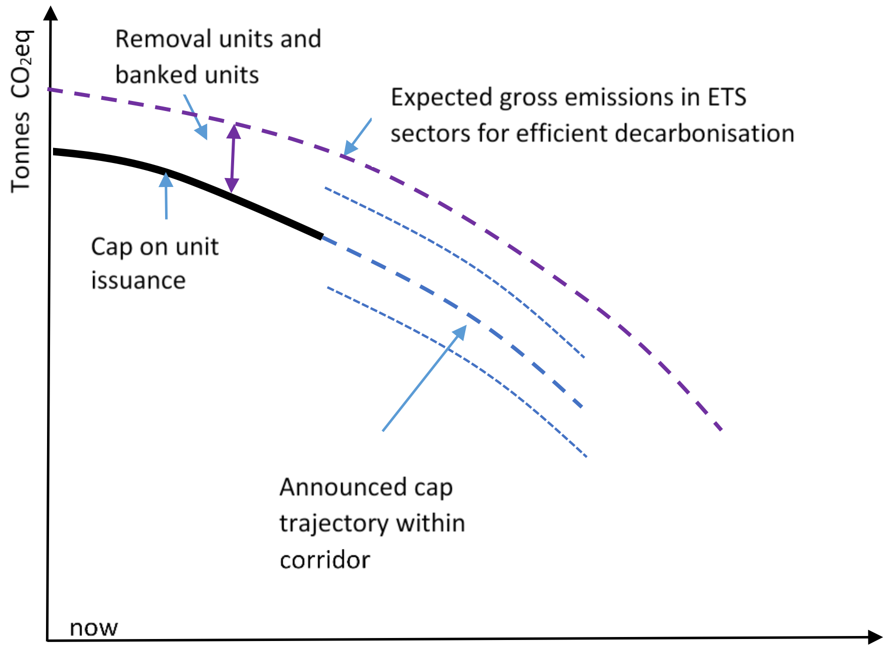
2.1.3 Set a Cap on Free Allocation and Auctioning

Following convention, the ETS cap is defined as the maximum number of emission units issued by the government for free allocation and/or auctioning over a given period of time. Under this model, the government would set an absolute cap for X (e.g. five) years in advance and define a longer-term (e.g. ten-year) trajectory for emissions in the form of a "corridor" to guide future cap setting. The government would define a predictable process for adjusting the fixed cap in response to specified triggers (e.g. the entry of new sectors/gases, the exit of major emitters, or *force majeure* events), and for setting future caps and extending the corridors. Both the cap and the corridor could be updated on a rolling basis (e.g. by one year each year), and/or on a period basis accompanied by a formal review of the NZ ETS.

Here is an example of how this could work in practice. An absolute cap on gross issuance of NZUs into the ETS (i.e. not limiting issuance for forestry and other removals) between 2020 and 2024 (or 2025) could be set in 2019. This cap could be fixed with limited, very clear exceptions. For example, if New Zealand's aluminium smelter closed before 2025, the cap could be adjusted. This would provide a limited policy adjustment mechanism that balanced the need for flexibility with the need for predictability of policy. NZUs generated through forestry and other removals would not be bound by the cap and would be treated as another form of mitigation; increased supply is economically equivalent to reduced demand.

For the period beyond 2025, rather than setting a fixed cap now, an anticipated "corridor" for the cap trajectory could be announced. It would need to be consistent with our 2030 target and our longer-term goals for reaching net-zero domestic emissions. Over time, we will learn more about domestic and international mitigation options and international cooperation will continue to evolve. We could either extend both the fixed cap and the cap trajectory by one year each year, or set a fixed cap for each subsequent period and update the longer-term cap trajectory, providing clear supply signals for at least 5 to 10 years. The figure below shows how this might work conceptually. The cap would be associated with expected prices – and the cap corridor with a price corridor. The dates chosen and the level and shape of the paths are all decisions to be made. For further discussion of cap setting in the NZ ETS, see Leining and Kerr (2019).

Figure 1: Model for managing unit supply with a cap and cap trajectory



Note: Not drawn to scale.

The level of the cap should be set to align domestic net emissions and emission prices with:

- The desired rate of domestic decarbonisation under a broader low-emission development strategy for New Zealand
- New Zealand's international targets and decisions on the extent to which capped versus uncapped sectors should bear the responsibility and cost for helping to achieve them.

Auctions and free allocation would then be used to adjust supply to the desired level of cap. From this conceptual foundation, the government could consider options for managing domestic emission prices to support price stability and predictability; these options are the focus of this paper.

2.2 Sources of Emission Price Instability within This Working Model

ETS prices balance unit supply, which is largely controlled by policy makers, and unit demand, which is driven by a complex interaction of economic and firm-level factors. Price changes transmit signals about overall costs of achieving the target to the market to help drive efficient abatement. This is desirable. Most ETSs include features that make it easier for participants to manage short-run price fluctuations, such as banking, regular auctioning, and participation of non-regulated entities in secondary-market trading. In addition, private financial markets can supply instruments for hedging risks, such as options, futures, and other derivatives. However, some changes in unit supply and demand can produce excessive emission price instability in the short term (referred to as volatility) or long term (referred to as variability). When they exceed the system's capacity to adjust appropriately, they can deter efficient investment in low-emission innovation[1] and damage popular support for the system (Partnership for Market Readiness and International Carbon Action Partnership, 2016).

Price instability comes from three fundamentally different sources: market imperfections (e.g. lack of liquidity or price discovery), external shocks (e.g. macroeconomic shocks, new technologies, changes in international commodity prices, or force majeure events), and regulatory uncertainty (e.g. future ETS design or ambition and interactions with other policies) (Partnership for Market Readiness and International Carbon Action Partnership, 2016). These different sources of instability suggest different responses.

When markets are operating effectively, ETS design features can facilitate adjustment to short-term shocks. Because banking allows units to be carried between periods, the cap constrains emissions over a long time period, not in each year. Prices depend on expectations of long-term demand and supply.[2] That means that short-term shocks should be absorbed over a long time period and anticipated future changes should have immediate effects on price.

However, short-term shocks to individual companies, or the market as a whole, may not be smoothly absorbed if ETS markets are not liquid and if there are not liquid NZUs available in the bank. Liquidity depends on low transaction costs, good information, and confidence in market operation. Those with banked units will be comfortable selling them if they are sure they will be able to buy them back at reasonable prices in future (or even have a forward contract now). This will smooth short-term fluctuations as long as markets are well informed.

Price expectations driven by macroeconomic changes, new technologies, or *force majeure* events may be less easily smoothed both because the effects of new information on long-term prices may be harder to estimate and because the amount of adjustment needed in banked units and in real activity are larger. Furthermore, some types of changes in external conditions (e.g. an earthquake that disables a hydroelectricity dam, a great recession, or new technology allowing widespread use of carbon capture and storage or second-generation biofuel) could radically alter the cost of meeting a given cap and lead to fundamental reassessment of ETS settings.

Regulatory uncertainty can have both international and domestic drivers. For example, international policy developments might offer new linking or offset opportunities. A stringent national-scale ETS in China could have implications for leakage and competitiveness concerns among trade competitors, so could affect both caps and distribution of allowances in other systems. Changes to domestic ETS design could result from cumulative lessons learned since

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[1] For a general discussion of how firms' investment decisions are impacted by uncertainty, see Dixit and Pindyck (1994). Wood and Jotzo (2011) address how price floor mechanisms can help to reduce investment uncertainty. Martin, Muuls, and Wagner (2011) find a positive association between firms' expectations for the future stringency of the EU ETS cap and their investment in "clean" research and development.

[2] This holds as long as the unit bank is large enough to absorb period-to-period variability in net supply – which is the case for New Zealand.

implementation, revised domestic mitigation goals, and shifts in political priorities. While changes in ETS policy could lead to constructive changes in emission prices to deliver desired outcomes, they could also affect the distribution of costs, asset values, perceptions, and attitudes and lead to policy instability. The process of change is political. ETS design changes could strengthen or undermine policy predictability, depending on their drivers and on how they are decided and implemented. These implications need to be factored into the decision-making calculus when considering whether and how to change an ETS.

3 Addressing Root Causes of Emission Price Instability

This section focuses on options for addressing root causes of emission price instability. Key causes include the time-inconsistency of government policy and the need for better ETS market regulation and development.

3.1 Time-inconsistency of Government Policy

Internationally, both empirical research and practical experience show that uncertainty about government commitment to climate change policy over time can be a major deterrent to low-emission investment (e.g. see Koch et al. [2015] and Gilbert et al. [2014]). This effect is even more marked for strategic investments in the energy, industrial, and land-use sectors, which have long payback periods and depend on emission pricing or regulatory drivers to be viable.

Market-driven price uncertainty in an ETS can be mitigated by a range of policy design options, as will be addressed later in this paper. But what if a future government decides to change the policy to address shifting priorities – or fails to change the policy in response to evolving circumstances that render it ineffective? When lacking confidence in the policy settings critical to the business case for low-emission investment, businesses face strong incentives to defer their investment decisions and keep their options open, limit investments to those with short payback periods or less specific applicability, or apply a high-risk premium. Deferring efficient low-emission investment increases climate change impacts, locks in high-emission development pathways, and raises the future risk of stranded assets, all at a cost to society.

Policy rigidity is not the answer; in some circumstances, policy flexibility is essential to achieving desired outcomes. Attempting to bind policy making by future governments runs counter to democratic processes and shuts the door to learning, strategic adjustments, and new opportunities. Both the broader public and businesses can benefit from government flexibility to adjust climate change policy in response to changing technological, environmental, economic, social, and political circumstances. As new information becomes available about climate change science, global mitigation ambition, international rules for cooperative effort, and the costs and benefits of domestic mitigation, the government may wish to adjust the ambition of its ETS accordingly and take advantage of new opportunities for linking or other forms of international cooperation to reduce emissions.

Striking a strategic balance between policy commitment and policy flexibility is a key challenge in climate policy design. Possible solutions arise from offering “predictable flexibility”, which allows “for timely revision when the underlying social and political circumstances have changed” while being “explicit in defining the conditions under which its terms should be revised” (World Bank Institute, 2011, p. 3). When there is credible commitment to longer-term policy outcomes, adjusting policy settings to deliver those outcomes reinforces certainty rather than undermining it.

This section identifies key policy commitments that drive ETS emission prices and assesses the sources and remedies for problematic policy uncertainty.

3.1.1 Policy Commitments Driving ETS Emission Prices

The foundation for policy certainty on emission pricing is set by the government’s commitment to overarching mitigation targets, the choice of an ETS as a policy instrument, the principles for free allocation, and market oversight and enforcement.

- If the government’s longer-term mitigation targets lack credibility, this can generate significant uncertainty about the future ambition of an ETS (i.e. the supply of units). Government decisions outside the ETS, particularly relating to energy and infrastructure, also affect emissions and demand for units within the ETS. Joining international agreements or committing to targets in domestic legislation can reinforce policy commitment to meeting targets. Uncertainty about the government’s long-term commitment to ambitious domestic mitigation could be a greater deterrent to low-emission investment than that surrounding the design of specific mitigation policies.
- The potential for a future government to replace the ETS with an alternative policy instrument, such as a carbon tax or sector regulations, can undermine market confidence in the value of emission units and discourage efficient use of banking.
- The potential for changes to government policy for free allocation can contribute to uncertainty about ETS costs, affect popular support for the system, and encourage strategic behaviour by potential recipients.[3]
- If the government fails to safeguard the registry, ensure the integrity of market transactions, and detect non-compliance and uphold non-compliance measures, unit supply and demand may be disrupted and emission units may be devalued.

[3] A study on the EU ETS by Gilbert et al. (2014) found that industrial participants receiving high levels of free allocation were much more sensitive to government policy uncertainty on future allocation, when making investment decisions, than they were to price volatility driven by market dynamics.

Uncertainty about policy commitment in these areas can flow through to uncertainty about government decisions on ETS unit supply and price management.

3.1.2 Sources of Problematic Policy Uncertainty

The principal sources of problematic policy uncertainty result from strategic interactions between the government and businesses, and from political volatility (Brunner, Flaschland, and Marschinski, 2012).

Strategic Interactions between the Government and Businesses

Strategic interactions between the government and businesses when there is policy uncertainty can contribute to a range of negative outcomes. The government and businesses can have different priorities, and the costs and benefits from changing policies can be distributed unevenly between government and businesses. The anticipation of potential policy changes that pose a risk to investments can incentivise businesses to make decisions that ultimately may not be optimal to either society or businesses once the final policy decisions have been made. Knowing that policy can change, businesses can lobby the government to gain advantage or engage in manipulative behaviour to change emission baselines or projections used for setting the cap or free allocation.

Political Volatility

Mitigating climate change is only one of many government policy objectives, some of which may run counter to reducing absolute greenhouse gas emissions (e.g. making energy more affordable and increasing exports of emission-intensive commodities). As parties with different political ideologies move in and out of power, the standing government's commitment to mitigation ambition may fluctuate. Similarly, popular support for mitigation policy may change in response to other pressing economic or social concerns. Attempting to bind future governments when social commitment to ambitious mitigation is high can impinge on the rights of future voters to change their mind.

3.1.3 Remedies for Managing Policy Uncertainty

Many options are available for enabling the benefits of policy flexibility while mitigating the drawbacks. Objectives could include the strategic sharing of downside risks from policy flexibility between the government and businesses and insulation of ETS operation from political volatility. Brunner, Flaschland, and Marschinski (2012) identify three "commitment devices" that can provide greater assurance to businesses over when and how policy changes will be made: legislation, delegation, and securitisation. A further – and in some respects the overarching – remedy for policy uncertainty is to build durable constituencies supportive of policy continuity and effectiveness to achieve agreed goals.

Legislation

Making ETS policy settings a matter of legislation rather than regulation or executive order increases the effort required for policy change by the standing government and increases policy certainty for businesses. However, legislative processes lack agility and can impede the effective operation of an ETS when more rapid changes are needed (e.g. to respond to shocks). Legislating for adjustment rules rather than fixed rates (Jakob and Brunner, 2014) and signalling narrow parameters for future amendment can support a balance of policy commitment and flexibility. Defining clear triggers and processes in legislation to adjust ETS operational parameters can help to make policy change more flexible and outcomes more predictable for both businesses and policy makers.

Legislation could provide for both “automatic stabilisers”, such as adjustments to auctioning of reserve units in the near term when price thresholds are triggered, and agile review processes to fast-track amendments in response to more significant and lasting system shocks. Scheduling periodic formal reviews can provide assurance about when more substantial changes to policy may occur on a routine basis and create opportunities for rigorous evaluation and public consultation prior to such changes. Market confidence in the government’s commitment to legislation will be enhanced by making information on system operation and compliance publicly available and signalling policy changes well in advance when possible.

Delegation

To shield ETS operation from political volatility, the government could choose to delegate some functions to an independent body tasked with providing expert advice or implementing specific functions. Such bodies would operate under clearly defined parameters. For example, the New Zealand Government could appoint an independent entity (e.g. the proposed Climate Change Commission to be implemented under forthcoming legislation[4]) to provide advice on setting the ETS cap and price management thresholds or to hold actual responsibility for setting the level of the cap and price thresholds using legislated criteria. The potential benefits of delegation could include better informed and more objective decisions, greater transparency, and more efficient ETS administration. For both types of bodies, there is a risk of losing independence or credibility (actual or perceived). An advisory body could lose its influence and fail to secure government or public acceptance of its advice. A decision-making body could fail to achieve public support for its decisions, creating political problems for the government. It could also assume undue influence over decisions that should be subject to democratic approval or could have important implications for other areas of government policy beyond its mandate.

[4] See Ministry for the Environment (2018b).

Securitisation

Brunner, Flaschland, and Marschinski (2012) use the term “securitisation” to refer to “entrenching commitments in private property rights and contracts”. The government could enter into contractual arrangements with ETS participants that shift a portion of the price risk from policy uncertainty to the government. As well as reducing the price risk to ETS participants, such arrangements could create an incentive for the government to deliver policy with anticipated price outcomes. Examples of such mechanisms are discussed below.

Building Durable Constituencies

Perhaps the best safeguard against policy uncertainty is building and maintaining constituencies that agree with the goals of the policy and support policy continuity with enough flexibility to achieve those goals under changing circumstances. Such constituencies could include those who are directly concerned with climate change (e.g. ENGOs[5]) as well as entities with vested interests in the policy, such as those who receive free allocation, benefit from revenue recycling (either directly or indirectly), enter into contracts with the government, or commit to strategic investments that are dependent on the policy. An ETS is more likely to have such vested interests across the market than a carbon tax. Constituencies could be broadened by enabling more participatory consultative and decision-making processes. This could include creating a cross-sector leaders’ group or “climate forum” tasked with providing advice, achieving consensus on mitigation policy goals and strategies, and helping to extend that consensus across key sector stakeholders and the general public. Constituencies could be reinforced by achieving formal cross-party political commitment to long-term goals and a common policy instrument and direction of change.

The best-designed policies will have no impact if people lack confidence that they will endure and adapt to changing circumstances. There are workable solutions to the challenge of time-inconsistent policy for ETS design and operation.

3.2 Need for Better ETS Market Regulation and Development

Three issues are particularly important for ensuring effective ETS market regulation and development: the security of registries, the legal status of emission units, and the quality of information available to the market and potential asymmetry in access to that information (e.g. due to processes for announcing new market-relevant policy).

Recent NZ ETS reviews and consultation have not revealed significant concerns about the integrity of the New Zealand Emissions Trading Register (NZETR), although some concerns have been expressed about the difficulty of using it (Ministry for the Environment, 2016; Ministry for

[5] Environmental non-governmental organisations

the Environment and Ministry for Primary Industries, 2018). Other systems have experienced fraud and other problems,[6] so this requires ongoing vigilance.

More concerns have been expressed in New Zealand about financial risks that traders (and particularly small traders) may be exposed to when making decisions about trading NZUs. Initially NZUs were explicitly not defined as securities. Some market participants wanted them treated as a commodity to reduce the administrative costs of trading. However, this potentially exposes "Mum and Dad" investors who are involved in the forestry component of the NZ ETS to unscrupulous or simply poorly informed advisors and traders. In the Financial Markets Conduct Act 2013, NZUs were not included on the list of financial assets that were covered, but they could be brought in at the discretion of the Financial Management Authority. If NZU futures are traded, retail transactions are legally protected. With the recovery in value of NZUs, and considering the risk to credibility of the NZ ETS from even a small number of publicly visible bad experiences, the regulatory status of NZUs as a financial instrument seems worth revisiting.

Markets depend on good-quality, timely information to work well and find the prices that balance expected supply and demand over time. A key benefit of an ETS is that markets can reveal the efficient price needed to reach an expected target but they can only do this if market participants have good information on supply and demand. In New Zealand, the information on demand comes from modelling that is only partially available and not well understood by market participants. An important part of net demand is forestry sequestration and harvest. These depend on data on the areas and age classes of forests registered in the ETS, and in the past public reporting of these data by government has been limited. The government will introduce new "averaging" accounting rules for afforestation from 2021, with the option to apply from 2019, and this will also have demand implications (Jones and Shaw, 2019). Supply is currently well known, but it is still unclear how it will evolve in future. Information about new policy is not yet released through predictable processes, and more sophisticated market players may be aware of it earlier. They can then benefit from this information.

Price data is available only from individual traders who voluntarily release it. No trade price or volume data is available in real time. This could lead to price dispersion and large, knowledgeable traders may be likely to get better prices than small traders. This could lower market confidence as well as raising efficiency issues.

Markets will tend to improve as they evolve, and they are likely to evolve faster with the impetus of higher prices. Regular auctions will help price discovery and provide liquidity and a source of units to small buyers. Stronger financial regulation of ETS markets may also improve their functioning. Regular predictable release of information from markets and from government would increase market efficiency and resilience.

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[6] For example, see European Court of Auditors (2015).

4 Reducing the Impacts of Emission Price Instability

Three main approaches can reduce the impacts of the price instability that remain: the design of the cap and compliance periods (including banking), direct price management mechanisms, and development of financial instruments that enable private risk management and can protect investors against some forms of policy uncertainty. The first two mechanisms involve adjustments to the ETS. If these are based on predetermined rules, they do not lead to volatility driven by policy uncertainty. However, if they are at the discretion of policy makers, they can exacerbate the problems they aim to address. The extent to which price stabilisation measures compound regulatory uncertainty may be limited if the measures are well designed and operate in a predictable manner. At a minimum, they should be transparent, have a long-time horizon, and have a clear and targeted remit. To the extent that they obviate the need for additional future regulatory changes to achieve policy objectives, they may reduce regulatory uncertainty compared to a counterfactual scenario.

4.1 Caps, Compliance Periods and Banking

The NZ ETS allows non-time-limited banking of NZUs. A sizeable bank provides a buffer against short-term volatility and will smooth long-term shocks, the impacts of which will be spread over several years. As long as participants perceive no threat to the security of banked units, banking will be a useful feature of the NZ ETS. The level of the bank may be high currently, but that can be addressed through future cap stringency. Maintaining a significant bank, while matching it with clear future stringency for the NZ ETS cap so it does not depress prices, will continue to make the market resilient.

A similar option, not currently used in New Zealand, is to auction future vintages of units in advance. This allows participants to hedge against future price risk. Trades of these units also provide the market (and government) with information about expectations of future prices. Auctioning vintage units creates another group with a vested interest in higher prices – the owners of those units.

Adjustments to the cap can moderate medium-term price variability. Significant economic shocks should be passed through to markets, but governments may wish to moderate the effect and adjust their own targets in response. For example, in a recession the demand for units will fall and prices should also, but given lower emissions and hence lower mitigation costs, governments may wish to make their targets more stringent in the long term. To signal this likely tightening response, the government could set a minimum ETS emission price.

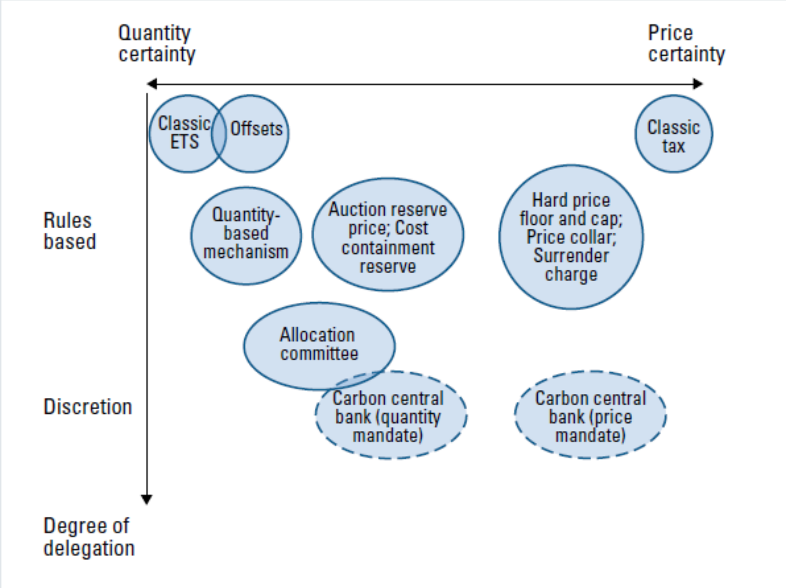
In contrast, if mitigation is harder than expected (at least in the medium term), the government might want the flexibility to respond to this with looser medium-term targets. This could be achieved through adjustments in the cap as announcements are made for future years (e.g. in a rolling cap design). It may be difficult for markets to anticipate the government’s supply response. While the government is making a decision, regulatory uncertainty could arise. Use of ETS price corridors may provide more certainty to investors as markets respond to significant new information.

Caps could also be altered directly in response to demand shocks (e.g. the closing of the Huntly Power Station). Under our working model, with a fixed absolute cap that is set in advance, such changes could be accommodated in the next year's rolling update. Under an alternative hypothetical cap model, total supply could be allowed to vary as a factor of output. This could be accomplished automatically through the use of an intensity-based cap or output-based free allocation. Under that model, as emissions rose and fell, the cap would also rise or fall as output adjusts.

4.2 Price Management Mechanisms

Price management mechanisms vary by the extent to which they provide price versus emissions certainty (both cannot be protected) and the extent to which they are based on rules versus discretion (see Figure 2). A "classic" ETS is at one end of the price–emissions spectrum and a tax is at the other. The distance between the price floor and ceiling, the size of the allowance reserve, or the sensitivity of quantity changes in response to price determines this balance. Within our working model, three basic types of price management are possible: upper price limits, lower price limits, and quantity-triggered adjustments to supply. These can be implemented in a variety of ways.

Figure 2: Different types of price predictability and cost containment measures



Source: Based on Grosjean et al., 2014.
Note: A circle with a solid line denotes a governance model that has already been implemented. A dashed circle denotes a governance model that has been proposed but not yet been implemented.

Source: Partnership for Market Readiness and International Carbon Action Partnership (2016), p. 111

Upper Price Limits

Providing an upper price limit can provide assurance to NZ ETS participants and help to build political comfort around implementing a more stringent cap. Any upper price limit should be set at a sufficiently stringent and increasing level consistent with pathways toward domestic decarbonisation. Two mechanisms are a fixed-price option (a hard price cap) or a price ceiling implemented through an auctioning mechanism (a soft price cap).

A fixed-price option provides absolute price protection to ETS participants but shifts emissions liability (and costs) from ETS sectors to the government (and taxpayers or non-ETS sectors). Under the current NZ ETS design, fixed-price units cannot be traded or banked, and the fixed-price option is intended to operate separately from the auction mechanism. Adding a limit on fixed-price units to this design could avoid the risk of the overall cap blowing out by a year's emissions or more if prices rise fast in response to fundamental changes in ETS conditions. A limit on the number of units released through the fixed-price option (possibly implemented as a share of surrenders) would allow time for a change in policy in response. Not all surrenders could be met through the fixed-price option; some freely allocated and banked units would also be used.

Implementing a price ceiling at auction would increase the supply of units available to ease prices. If the price ceiling mechanism was limited, the mechanism would provide greater certainty about emission outcomes but would not provide full price protection to ETS participants. Presumably all units purchased at auction would be eligible for trading and banking.

An interesting example of a price ceiling at auction within a cap is offered by the California Cap-and-Trade Program (CA CATP), which operates an Allowance Price Containment Reserve (APCR). Once a trigger price is reached, a fixed number of allowances can be sold at three increasing price levels until the supply is exhausted. In 2015, mechanisms were added to increase the potential supply of units to the APCR by transferring 10% of future allowance budgets and 10% of unallocated allowances from each vintage year into the reserves. The trigger price for each tier increases 5% per year plus the rate of inflation. At commencement in 2013, the trigger prices were US$40, $45, and $50. This mechanism has not yet been tested; prices are still well below these levels. At some level of demand pressure, the supply would be exhausted and the price would be allowed to rise. In 2021, the APCR will add a fixed-price mechanism that sets a maximum price after two tiers of reserve units are exhausted (Environmental Defense Fund, CDC Climat Research, and International Emissions Trading Association 2015; Environmental Defense Fund and International Emissions Trading Association, 2018; California Air Resources Board, 2018).

Lower Price Limits

Providing a price floor can help to incentivise low-emission investment. To support domestic decarbonisation, the price floor should rise over time. Three options for achieving a price floor are:

- imposing an auction reserve price
- imposing a fee on unit surrenders to ensure a minimum price paid for all units, whether auctioned, imported, or banked
- providing for the government to buy back units at a fixed price either with or without a quantity limit.[7]

The CA CATP offers a successful example of a price floor through an auction reserve price. Allowances sold at auction (referred to as the primary market) must clear the price floor. At commencement in 2013, the auction reserve price was set at US$10. It increases annually by 5% plus the rate of inflation. If prices are lower on the secondary market, where allowances are traded between companies, fewer allowances will be sold at auction. When some allowances are not sold at auction, they are held in a state reserve and cannot be sold until at least two subsequent quarterly auctions clear above the regulator's price floor (Environmental Defense Fund, CDC Climat Research, and International Emissions Trading Association, 2015; California

[7] For further discussion, see Partnership for Market Readiness and International Carbon Action Partnership (2016).

Air Resources Board, 2017; Environmental Defense Fund and International Emissions Trading Association, 2018).

A price floor can also be implemented by imposing a tax as well as the ETS surrender requirement.[8] This "tax" could vary with the ETS price[9] (although it can be complex to define that for regular updating) or could be fixed. In a stand-alone system such as we propose, the ETS price would fall by the amount of the tax (or in some cases, emissions would fall below the cap).

If the government agrees to buy back units at a fixed price, providing for a limit on the number of units that will be bought by government at a minimum price can help to avoid fiscal risk and allow time for other policy adjustments if there is a fundamental shift in ETS conditions.

Quantity-triggered Adjustments to Supply

A "quantity collar" mechanism allows units to be added to or removed from the market when triggered by shocks to the system. Triggers could include the number of surplus or banked units or changes in production or economic conditions. This mechanism can help to contain prices but does not provide hard price protection.[10]

The Market Stability Reserve (MSR) under the EU ETS provides an example of this mechanism. It reduces auction volumes when triggered by a surplus number of units in circulation and increases auction volumes when triggered by sustained high prices (European Commission, 2019). A challenge in this system is defining how many units "should" be in circulation – for example, when they are "surplus" and not simply legitimately banked. The value of the instrument for increasing price stability depends on its own predictability. The MSR is offering pretty mixed experience so far. Economists generally support the use of mechanisms triggered by price rather than quantity because of their clarity. In New Zealand, given our poor ability to model demand and supply (even if we had the data) and the predominance of forestry units in the bank, quantity instruments seem a poor option.

4.3 Financial Instruments to Reduce Risk to Investors

We defined "securitisation" above as contractual arrangements with ETS participants that shift a portion of the price risk from policy uncertainty to the government. The Afforestation Grant Scheme is a simple example of this. Foresters receive a fixed payment when they establish a forest and give up the right to register in the NZ ETS and receive credits for the first ten years. Ten years is the "safe" level of credits that will never need to be repaid on harvest as long as the forest is not deforested. Thus, the government was exposed to very little risk of loss of credits

[8] If the ETS was linked to another system (as a buyer), this would raise the domestic unit cost above the international cost. As of mid-2015, the NZ ETS has not been linked to other markets.

[9] The UK does this in the electricity sector with annual updating (Partnership for Market Readiness and International Carbon Action Partnership, 2016). Interestingly the UK did not stick with the initial target price when EU ETS prices fell further than expected. This may have generated less investment certainty than hoped for (HM Revenue and Customs, 2017).

[10] For further discussion, see Partnership for Market Readiness and International Carbon Action Partnership (2016).

when they bought these credits. In the first incarnation of this policy, the total amount given was roughly equal to the present value of the credits given up at the current price. Thus, the AGS removed all price risk from participants. It can be thought of as a simple financial instrument – paying for future units now at a fixed price.

Alternatively, the government could create and offer futures contracts. Selling future vintages now is one approach. Buying futures contracts – an agreement to purchase units in the future at a predetermined price – is another. Government could also offer options to buy or sell units. Each of these alternatives, and the type of agents they are offered to, can protect against different parts of the risk distribution associated with low-emission investments. Each exposes the government to different types and levels of risk in terms of both price and "counterparty" risk and the risk that the agent does not live up to its contractual obligations.

The government has no comparative advantage (and some disadvantages) in offering standard financial instruments,[11] but where the risks it targets are related primarily to policy risk, such instruments could be useful. The government partly controls these risks and the financial instruments can give them a stronger incentive to make stable policy choices that will provide greater price stability. They also directly protect sensitive investors from the consequences of policy instability.

5 Recommendations for Price Management in the NZ ETS

Under our working model which limits unit supply, price stability and predictability will be critical in driving efficient low-emission investment in line with our mitigation targets. An integrated package of measures will be required to both address the underlying sources of price instability and reduce their impacts.

First, the government should help markets function well through effective market regulation and provision of information. The government consulted on improvements to market oversight and information sharing in 2018. Submissions reflected concerns about potential risks to market operation in the future, which have implications for the design of market oversight mechanisms. They showed mixed support for publishing individuals' emissions data and stronger (but qualified) support for publishing cases of noncompliance. No further policy decisions have been made to date (Ministry for the Environment, 2018a; Ministry for the Environment and Ministry for Primary Industries, 2018). A recent assessment of ETS information needs was conducted by Stevenson et al. (2017). Key recommendations include providing a centralised information portal, reporting more information on sector activity where possible, and increasing the frequency of reporting.

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[11] Some governments do provide government guarantees to enable certain highly risky but socially valuable investments – a form of subsidy,

Second, policy instability, a key source of price instability, can be addressed through changes in the governance processes through which New Zealand makes short-term decisions with implications for long-term ambition in the NZ ETS. A broad social mandate for action and cross-party agreement to de-politicise the issue and commit to long-term domestic decarbonisation would help. Specific stable governance mechanisms, such as the independent Climate Change Commission currently under development, could play an important role in this regard.

Third, the government should safeguard the role of unit banking. Maintaining the currently unlimited ability to bank units and protecting banked units from risk of devaluation or confiscation also help with price management. These practices encourage participants to bank units when prices are surprisingly low (thus raising them) and to hold liquid units[12] in the bank that can be released to smooth unexpectedly high prices in the short to medium term.

Fourth, the government should adjust the design of the NZ ETS to improve emission price predictability and incorporate safeguards against price extremes. A strategic balance needs to be struck around how much flexibility the government has to intervene in price setting by the market and how predictable price intervention will be. We believe that for New Zealand, price-based triggers for market intervention would be more effective than quantity-based. Providing an indicative long-term corridor for intended emissions and emission prices, consistent with a broader strategy for domestic decarbonisation, would help to provide greater certainty to both market participants and regulators about price management. This corridor would be defined by a price ceiling and a price floor.

Model for a Price ceiling in the NZ ETS

Under our preferred approach, a price ceiling would take the form of a volume-limited cost containment reserve (CCR)[13] set as part of the overall cap and released through the auction mechanism. The level of the CCR would take into account the government's emission budget and emission price pathway for NZ ETS sectors, in relation to its international target as well as actual and intended purchasing of international mitigation. A tiered approach would apply as follows (see Figure 3):

a) If the auction price rose to hit a first trigger price, units would be released from the CCR for auctioning. The auction would continue to set the price.

[12] The current NZU bank includes a significant number of units that are dedicated to meeting later harvest liabilities and are unlikely to be sold. This could change over time with the introduction of averaging accounting for afforestation.

[13] In its 2018 consultation on NZ ETS reform, the government proposed a CCR as a replacement for the current fixed-price option (Ministry for the Environment, 2018a). Under the government's in-principle decisions announced in December 2018, once implemented, the CCR will operate within the NZ ETS cap and will be backed by removals. Regulations will set the trigger prices and size of the reserve. No further details are available (Ministry for the Environment 2018c). The model presented in this paper is similar but with some key distinctions, notably no requirement to back CCR units with removals and the inclusion of a tiered process for releasing reserve units which includes triggering a review of ETS settings and applying a hard price ceiling as a backstop once the CCR has been exhausted.

b) If the auction price continued to rise and hit a second trigger price, the government would initiate a review of the settings for unit supply and price management and their interactions with other non-ETS policies. Market dysfunction may not be the only driver of high prices; companion policies could also play a role. This review could either be conducted by, or informed by independent advice from, the Climate Change Commission.

c) If the CCR volume was exhausted before new unit supply settings were in place, the government would offer an unlimited number of fixed-price units for purchase and immediate surrender by participants. Fixed-price units could not be traded or banked. To maintain environmental integrity, the government would need to compensate for emissions enabled by the fixed-price option (FPO) at the level of its international targets (e.g. through additional international purchasing).

CCR units that were not auctioned would roll forward to the next period. In this way, the CCR would offer a form of unit banking for government. The government would need to monitor the accumulated volume in the CCR to ensure that it remained in line with the government's intentions for its targets and international purchasing.

Enabling the FPO after the CCR is exhausted would expose the government to target and fiscal risk. However, this option would be the final port of call, not the first port of call (as it is today). The FPO should be set at a level high enough to mitigate fiscal risk if additional international purchasing is required, and it would be triggered only if the government failed to adjust unit supply settings quickly enough following a review. To maintain the political viability of the system, we think it would be preferable for the government to provide the FPO as a final safety valve rather than enable the system prices to spike at a level beyond government control – and public acceptability – if the CCR is exhausted.

For this approach to operate, the formulation of government targets and emission budgets under the Zero Carbon Bill must not preclude the international purchasing that may be needed for price management in the NZ ETS. The government may wish to make a distinction between its intended level of international purchasing in line with domestic decarbonisation goals, and the potential for additional international purchasing as a contingency measure to prevent unacceptably high prices in the NZ ETS.

Model for a Price Floor in the NZ ETS

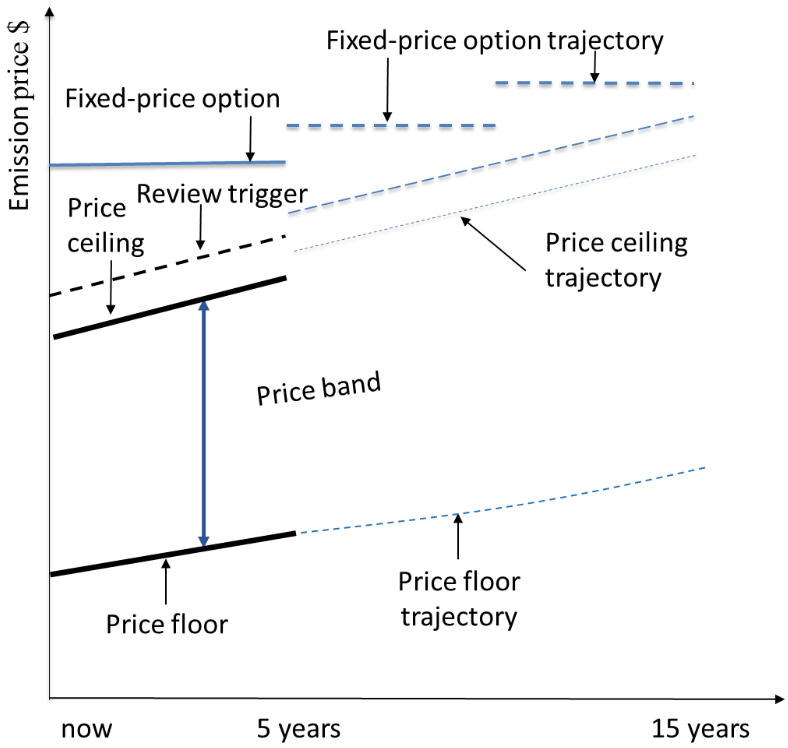
For managing downside price risk, we recommend the implementation of a reserve price at auction. This would be simple to implement and could help avoid very low prices. If private actors were not willing to pay at least the reserve price, the government would stop selling units and the supply to the market would automatically contract. An auction reserve price mechanism would not provide an investment guarantee. Units in the secondary market could still be traded below the auction reserve price.

There is a strong case to include a safeguard against low emission prices beyond a limit on participants' future purchase of international emission reductions. As has been demonstrated clearly in New Zealand and overseas, political risk could drive down emission prices while decarbonisation costs remain high, producing an inefficient outcome that derails valuable low-emission investments. With a reserve price, an ETS auction would respond quickly and predictably to unpredictable events that lower prices. A reserve price would signal the direction of travel for minimum emission prices and build confidence for low-emission investors and innovators. It would also provide greater assurance to government about the minimum level of auction revenue to expect.

Coordinated Decision Making on Unit Supply and Price Management

Under our preferred approach, the volume of the CCR, CCR trigger price, review trigger price, level of the fixed-price option, and level of the auction reserve price would be decided and fixed five years in advance, extended by one year each year, and guided by an indicative ten-year trajectory (see Figure 3). These decisions would be coordinated with other government decisions affecting unit supply and prices, including the size of the cap, limits on international emission reductions, and provision of free allocation. As with setting the cap, these are political decisions that belong with government and could be informed by independent advice from the Climate Change Commission.

Figure 3: Model for managing emission prices



Note: Not drawn to scale.

6 Conclusion

In its classic form, an ETS fixes the quantity of emissions in regulated sectors and the market sets the emission price. In New Zealand's current policy and market context, there is value in managing both unit supply and emission prices under the NZ ETS. No one knows the optimal value for either. While managing emission quantities in line with our targets and emission budgets, we can take advantage of mechanisms for guarding against unacceptable price extremes in both directions and improving price predictability. The current FPO of NZ$25 per tonne exposes the government to both target and fiscal risk and will not be effective for managing these risks in the NZ ETS in the future. A volume-limited CCR implemented through the auctioning mechanism would be a better approach for balancing costs and risks to the government and participants if it is implemented well. If the CCR was exhausted before new unit supply settings were in place, we propose that the government should be able to sell units at fixed price as a last resort. We also recommend the implementation of a reserve price at auction to guard against downside price risk that could derail low-emission investment. For both mechanisms, we recommend that decisions be made five years in advance, fixed for five years, and updated on a rolling basis with guidance from a further ten-year trajectory. We also recommend coordinated decision making on all design settings affecting unit supply and prices in the NZ ETS that is informed by independent advice by the Climate Change Commission.

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