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Carbon Market Oversight Primer

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Foreword

In October 2011, ICAP carried out a closed door workshop on market oversight. As workshop discussions revealed considerable interest in continuing work on this issue, ICAP members asked the Secretariat to draft a background market oversight “primer” to further explore the issue.

During a time of the emergence of new emission trading schemes in such jurisdictions as California and Chinese cities and provinces and a period of regulatory change in Europe among others, this paper seeks to provide a background and overview of market oversight including its basic goals, markets, and approaches of various jurisdictions.

The market oversight primer provides a brief overview on key elements for emissions trading market oversight, including various options that have been taken in different emissions trading systems with regard to institutional and legal requirements and standards. Five points have been selected as a focus for the primer: issues to consider in market oversight, the legal nature of allowances for various applications, the types of markets implicated, trading venues, and market security measures.



International Carbon Action Partnership

Table of Contents

1. Introduction: The Role of Market Oversight	4
2. Issues to Consider in Overseeing the Market.....	4
3. The Legal Nature of Emission Allowances	6
3.1 Emission Allowances for Trading Purposes	6
3.1.1 Emission Allowances and Commodities	6
3.1.2 Emissions Allowances and Financial Markets.....	8
3.2 Accounting treatment.....	10
4. Types of Markets	11
4.1 Primary Market Oversight.....	11
4.2 Secondary Market Oversight	13
5. Bilateral, Cleared, and Exchange trading.....	15
6. Measures to consider in promoting market security	16
6.1 Clearing and margin requirements	16
6.2 OTC vs. Exchange Trading	16
6.3 Reporting and Disclosure	17
6.4 Position limits	17
7. From Theory to Practice	19



1. Introduction: The Role of Market Oversight

Carbon markets are an environmental tool to reduce greenhouse gas emissions at the lowest possible cost to the economy as a whole (drawing on Crocker 1966; Dales 1968, Montgomery 1972, and many more). At the same time, the flexibility that a carbon market affords to regulated entities and that allows them to make their own mitigation decisions and improve efficiency, also poses certain regulatory challenges. In order to ensure that the market operates efficiently, it must be effectively regulated (Gensler 2009). Finding the right regulation framework and the right amount of regulation to address different aspects of the carbon market is a delicate process that involves balancing under-regulation that may allow for fraud and manipulation and over regulation that may be costly to comply with, stifle ingenuity, and eliminate many of the flexibilities that give carbon markets their efficiency (Pirrong 1995, 1996; Pew Center on Global Climate Change 2010).

In establishing the market oversight infrastructure for today's carbon markets, authorities were to some extent able to draw on experience from emissions trading systems developed to address acid rain and ozone depleting substances (Gehring and Streck 2005; Cutter et al 2011), though the carbon market is much larger, has many more emitters, and presents its own unique challenges (Parker and Jickling 2007). What the next steps are will depend on ongoing regulatory changes in international and national financial services and further developments in environmental policy making.

2. Issues to Consider in Overseeing the Market

There are several overarching issues to consider with regard to how a carbon market regulator should approach overseeing the market; many of these will be affected by various practical realities of the financial, environmental, and institutional context in which they operate. Such considerations however can generally be abstracted to the above mentioned point of departure: the objective of ensuring market efficiency in working towards the goal of lowering emissions. In this pursuit, three interrelated but individually relevant functional aspects are especially important: allowing adequate price discovery, ensuring market transparency, and the prevention of manipulation and fraud.¹

Functions of market oversight:

- **To allow adequate price discovery.** Enabling the market to give a proper price signal at which it is worth taking emission mitigating measures on one's own or rather buying allowances and thereby helping to finance the mitigating measures of others, is a central element in ensuring that the market is efficient. An efficient market will aggregate the diverse bits of information of market participants, moving towards a

¹ Variations of these functions of market oversight can be found in Jonas et al 2009; Pew Center on Global Climate Change 2010; Viswanathan 2010; and Schneck 2011.



International Carbon Action Partnership

Pareto optimal allocation of resources (Grossman and Stiglitz 1976). In order to determine or “discover” what that price is at any given time, there are a number of factors that come into play. Emitters need to know what their emissions are, the prices of the various mitigation measures that are available to them, and they need to then compare that to the price of mitigation options of other emitters. That price will be determined by a wide variety of factors including the overall cap (including future caps), the liquidity of the market, current price information of related commodities (e.g. energy sources), demand, and forecasting for how these prices will change in the future². Market liquidity is the ease of buying allowances when a buyer wants to buy and the ease of selling allowances when a seller wants to sell. A market is liquid when there are lots of buyers, lots of sellers, and any individual transaction will not have a large effect on the market price. Provisions for market oversight can have a large influence on how efficient and liquid a market is, importantly by establishing rules for who can participate in the market, what exactly can be traded on the market, where transactions may take place, and other rules that affect the vulnerability to fraud, safety and volatility of the market.

- **To ensure market transparency.** An important factor in all markets is the flow of information. There are some basic fundamentals to ensure that a market is a fair and equal playing field for all participants. For oversight of carbon markets, it is important to ensure that from a regulatory point of view, all market participants have equal access to information about future policy changes and a basic understanding of what is happening on the market including current prices and volumes. Other important issues include who gathers and reports information that will be made public, how fast such information is published, and how regulatory processes work. Transparency will further allow regulators and the public to evaluate the relationships between market participants which may play a role in collusion and between market participants and regulators that may result in a conflict of interest. Transparency in the market not only provides a more level playing field for market participants, but also works to build public confidence in the system. From the regulatory perspective, without transparency, effective oversight is difficult to impossible (Monast 2010).
- **To prevent manipulation and fraud.** In addition to general regulation of the everyday workings of the market there are further issues that must be addressed to ensure the safety and integrity of the system. One element is the infrastructure of the system, from basic provisions for identity checks, robust software interfaces, resistance to hacking and increasingly relevant cyber-attacks. Another element has a great deal to do with the legal infrastructure such as laws established to prevent collusion and insider trading and regulatory loopholes that may contradict the true intention of

² A discussion of these factors as illustrated in the EU ETS can be found in Coventry and Redmond 2007.



regulation. Both are individually relevant but have the same basic goal of having all market participants having an even fair playing field.

3. The Legal Nature of Emission Allowances

In considering carbon market oversight, it is relevant to examine the legal nature of the individual unit being traded on the market (Mace 2005). There are multiple legal regimes involved in regulating the emission allowances which raises a number of legal questions for not least property law, contract law, tax law, financial services law, and accounting standards (Gehring and Streck 2005). One can break the overarching market into two categories: the primary and secondary markets (CFTC 2011). Primary markets generally involve the distribution of allowances from the responsible agency or institution to parties that must comply with the emissions trading system and other potential intermediaries. The secondary market involves the buying and selling of the allowances and various contracts for future sales of allowances. Each market and market instrument class poses its own challenges for market oversight. The pursuit of the goals outlined in (2) is manifested in these different markets. Of particular interest may be a distinction between allowances held for compliance purposes and allowances for trading purposes and accounting treatment thereof (Haupt and Ismer 2011).

3.1 Emission Allowances for Trading Purposes

Emission allowances as a market for trading purposes have some similarities with commodities, some with financial markets, and some unique qualities unlike characteristics seen in either kind of market. The regulation and oversight of any particular carbon market will depend on the existing institutional infrastructure in each jurisdiction, which will have a large role in determining how different systems decide to approach market oversight more broadly.

3.1.1 Emission Allowances and Commodities

Carbon markets have some qualities of commodity markets in that, like energy, the traded good (in this case allowances) is a standardized, fungible product that then becomes a factor in production, the price of which must be taken into account in doing business. Because allowances in a cap-and-trade system have a fixed supply, the price of which is related to greenhouse gas emissions from fossil fuel use, the price of allowances is further closely related to energy commodity markets such as electricity, coal, gas, and petroleum (CFTC 2011). Emitters can then hedge fluctuations in the price of allowances as they do other commodities. In practice, the exchanges where allowances and their derivatives are traded are often the same as those that trade commodities such as electricity, oil, gas, etc. Notable examples of exchanges where energy commodities are traded that also trade emissions allowances include NASDAQ OMX Commodities Europe (formerly Nord Pool) in Oslo, Norway; the European Energy Exchange (EEX) in Leipzig, Germany; and the Intercontinental Exchange (ICE), which bought the London based European Climate Exchange in July 2010, and now operates an electronic platform that trades various commodities and commodity derivatives from electricity to emission allowances on a global level.



International Carbon Action Partnership

There are however also differences between other commodity markets and allowances. One difference is that the market for allowances is artificial, the limited supply of which is created by a scarcity resulting from regulation (CFTC 2011), not by the cost of exploration and exploitation of a natural resource. This means that market supply is determined by the policy decision of cap setting, rather than price signals in the market. The fixed supply of carbon allowances and the carbon market administrator's introduction of the supply either through free allocation or auctioning, is a phenomenon not seen in other, conventional commodity markets. Depending on barriers to entry, generally, when the price of a good goes up, more firms will be interested in creating supply to meet demand. With the supply fixed in a cap-and-trade system, prices are particularly sensitive to demand, which may potentially make it easier for any individual market participant, especially large emitters such as electric utilities, to affect the market. For this reason, vigilant market oversight in considering market power is of particular importance.

A second difference is that one quality of normal commodities is their physical mass which entails storage and transportation, especially in the context of trading (CFTC 2011). Contracts for sales of a commodity typically include a delivery place and time and the cost of storage and transport is a factor in determining the price paid for the commodity. The price of storing a commodity acts as a disincentive or at least a somewhat limiting factor in amassing large quantities of many commodities, though this will vary with regard to the commodity (pork bellies, corn, wheat, coffee, petroleum, etc.). In contrast, because allowances are basically serial numbers, there is a lack of a similar disincentive to accumulate large quantities for later dates.

Table 1: Emission Allowances and Commodities

	Characteristics	Supply	Disincentives to acquisition	Where traded (Major Examples)
(Standard) Commodities	Standardized, fungible, cost of which to be considered in production	Determined by factors of production	Generally physical mass, contracts for which have a delivery time and place, storage and transportation costs	NASDAQ OMX Commodities Europe (formerly Nord Pool); the European Energy Exchange (EEX); the Intercontinental Exchange (ICE); Chicago Mercantile Exchange
Emission Allowances	Standardized, fungible within jurisdiction, cost of which to be considered in production	Determined by policy decision	Intangible, no storage costs	NASDAQ OMX Commodities Europe (formerly Nord Pool); the European Energy Exchange (EEX); the Intercontinental Exchange (ICE); BlueNext; GreenX (Chicago Mercantile Exchange)

The similarities between emission allowances and commodities have led some jurisdictions such to include their regulation in with the regulation of commodity trading. Factors influencing this regulatory decision have also had to do with the powers and mandates of preexisting regulatory institutions. The differences between commodities and emission allowances however may lead other jurisdictions to regulate them differently, for example, as financial instruments.

3.1.2 Emissions Allowances and Financial Markets

Emission allowances also have many similarities with financial markets. Because allowances have a financial value, they constitute an investment opportunity which means that in many cases, market participants are not limited to compliance entities, but also may include many financial intermediaries such as investment firms, banks, brokerages, and possibly even



International Carbon Action Partnership

individuals that/who are otherwise involved in financial markets (Monast 2010; Haupt and Ismer 2011). These intermediaries may offer important services, such as increased market liquidity and financial market expertise from which, especially smaller firms, may be able to benefit. In some carbon markets, because compliance (i.e. the surrendering of allowances) is only carried out once a year, some entities may decide to not hold allowances for the whole year, but rather buy outright, or enter into contracts to buy or have the option to buy allowances just before they need to submit allowances to account for their emissions. Such contracts have their own monetary value, which is derived from the value of the underlying asset, giving them their name: derivatives. Similar contracts exist as financial instruments for a number of different kinds of assets and thus the derivative market can be considered, from a regulatory point of view, to have much in common with other kinds of financial markets.

Factors that influence the size and activity of the derivative market include price volatility and the legal definition of allowances. Price volatility is an important factor because, as the price of allowances goes up and down, firms have an interest in hedging price risk, especially close to the time when they will need allowances for compliance (Schopp & Neuhoff, 2013). Derivatives allow firms to guarantee the ability to buy allowances at a certain price at or shortly before compliance. If, however, there is little price volatility in the price of allowances, there is little incentive to hedge, and likely a small derivative market. The legal definition of the allowances (further explored in the next section) also may be variable in the size of a derivative market for allowances. Depending on how they are accounted for, allowances as an asset class may have to be marked to market affecting the value of a company. Derivatives contracts can in some cases allow a firm to forgo such volatility.

There are also some notable features of carbon markets that make them differ from other financial markets. The International Accounting Standards Committee (IASC) defined financial instruments, which are traded on financial markets as “any contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity”.³ Typical examples of financial instruments include equities (shares of stock), debt (bonds and bills), currencies, and derivative contracts abstracting from these underlying assets. Allowances however are an instrument created by a policy measure. They do not give one the right of ownership of property, a company or voting shares for its leadership, nor do they represent debt of a country or company to be paid back with interest, nor are they legal tender. Emissions allowances can be seen as either a right to emit a certain amount of greenhouse gas, or a liability in that there is a fee that one has to pay when one emits a certain amount of greenhouse gas, unless of course the company got the allowance for free. Further, such allowances are a creation of government and expire, ceasing to be of financial value after they have been surrendered in a way that typical financial instruments do not. Depending on provisions for the banking of allowances, they may cease to be of value even if they are not surrendered in a way that other assets do not.

³ International Accounting Standard 32

Table 2: Emission Allowances and Financial Instruments

	Asset	Market Players	Market	Instruments
(Standard) Financial Instruments	Asset that gives rise to a financial asset of one party and a liability of another	Investors, financial intermediaries	Market exists independent of government policy	Underlying Assets which also give rise to derivative contracts
Emission Allowances	Only an asset for market players, ceases to be an asset once submitted for compliance	Compliance parties, investors, financial intermediaries	Artificial, created by Government Policy	Underlying Assets which also give rise to derivative contracts

These features and various decisions about how to classify allowances will affect policy maker's decisions with regard to how they approach market oversight within their own existing institutional infrastructure.

3.2 Accounting treatment

Aside from the questions of how allowances are classified and regulated for trading purposes (e.g. as commodities or financial instruments), there is currently no single legal definition of how they should be treated with regard to accounting (FASB 2007, MacKenzie 2008; Elfrink, et al 2009, Haupt and Ismer 2011). In general, consistent accounting rules enhance protection against money laundering and fraud, but the hybrid character of allowances as a regulatory instrument to meet compliance obligations and their very nature as a tradable instrument, makes it difficult to develop a single recognized accounting standard.

Several proposed approaches to the classification of allowances include as a 'rights', intangible assets, obligations/liabilities, and/or financial instruments. If allowances are held for compliance purposes, they could be seen as conferring a 'right' to emit. An intangible asset is defined as 'an identifiable non-monetary asset without physical substance'⁴ One could also say they represent an obligation/liability to the government when one has emitted; but in the event they are used for trading purposes, they are more of the nature of intangible assets or financial instruments. While such distinction seems theoretically plausible, many practical issues arise from the fact that individual allowances are not linked to a specific use. To give an example: a company with compliance obligations may initially attribute an allowance to production and account for it accordingly as a liability, and later decide to trade it, making it an asset (e.g. due to changes in production patterns or with the aim to regulate its cash-flow).

⁴ International Accounting Standards (IAS 38)



International Carbon Action Partnership

Several attempts by the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) have not led to a consensus on accounting standards for emission allowances (Fornaro et al. 2009). In 2007, the IASB and the FASB decided to coordinate their work on an accounting framework for emission allowances, and launched a joint “Emissions Trading Scheme Project” to resolve a number of issues (see FASB 2007). Among them are the questions of what is the nature of allowances (assets/liabilities), how should they be measured initially and subsequently (at fair value or historical cost), and how to treat free allowances (e.g. do they represent a liability when received free of charge?). The boards tentatively decided that allocated and purchased allowances should be initially and subsequently measured at fair value (current market price). But some observers noted that this approach, also known as mark-to-market accounting, may increase asset/liability volatility, and thus may provide companies a disincentive to purchase allowances themselves, opting for derivatives that may not be reflected on their balance sheets in the same way. Most other issues remain unresolved. In November 2010, discussions on the emissions trading scheme project were deferred and the project has been put on hold.

Because of the ongoing lack of an agreed international consensus, various companies both within the EU and elsewhere have taken very diverse approaches to the issue. Notable examples of this diversity include some companies recording freely allocated allowances at zero basis, some at fair value, some as revenue. Further, some classified purchased allowances as intangible assets, some as inventory, some as current assets, others as deferred expenses, some elsewhere on their balance sheet. Most did not amortize or depreciate their allowances.⁵ Due to the diversity of applied accounting approaches, comparison between individual companies is difficult and the lack of common accounting standards undermines the accuracy and comparability of public financial statements (Monast et al 2009) and more generally increases market opacity, perhaps pushing trading activity to less regulated markets.

4. Types of Markets

4.1 Primary Market Oversight

The primary market is the market where allowances, created by the market authority (usually the state) enter the system. Allocation decisions made by the regulating authority shape the primary market. If allowances are given away for free or for a fixed price, there is no opportunity for price or market manipulation, but this allocation method fails to give a primary price discovery opportunity. However, if allowances are auctioned, which not only gives the market an early price discovery mechanism, but also reduces the danger of windfall profits, auction design and market oversight will play an important role in ensuring fair price discovery and should be robust to guard against collusion and market manipulation (Klemperer 2002).

⁵ An overview of the various approaches taken can be found in PwC and IETA 2007.



Auctioning formats can be grouped according to certain characteristics, each of which has its own implications for oversight (Lopomo & Marx, 2009). The bidding process can be either dynamic or sealed/blind. The Pricing process can be with uniform or discriminatory. Dynamic bidding takes place in rounds. In each round, bidders indicate the quantity they want to purchase at the given price, rounds then repeat with progressively lower prices until demand meets supply. In a sealed or “blind” bid procedure, bidders submit a quantity they are willing to purchase and the price they are willing to pay. The bids are then ranked by price and the clearing price is determined by setting total demand equal to available supply. Anyone willing to pay the clearing price or above will receive the allowances they bid for. With uniform pricing, which is possible with both dynamic and sealed bidding, all auction participants pay the same price at which total demand meets total supply. With discriminatory pricing, which is also an option in both dynamic and sealed auctions, each auction participant pays the maximum price they are willing to pay for a given amount. An auction with dynamic bidding and discriminatory pricing is referred to as a descending clock auction because the auction will start at a high price and will continue to fall until all allowances are sold, when the clock stops. An auction with dynamic bidding and uniform pricing is referred to as an ascending clock auction because the auction will last as long as there are still allowances available, with the one single price for allowances (that everyone will pay) rising until all the allowances are sold.

Table 3: Typology of Different Auction Formats

		Bidding	
		Dynamic (multiple rounds)	Sealed/Blind (single round)
Pricing	Discriminatory	Descending clock “Dutch”	Discriminatory sealed bid
	Uniform	Ascending clock “English”	Uniform-Price, Sealed Bid

Source: Lopomo & Marx 2009 (adapted).

In practice, only two formats are currently used for the auctioning of emission allowances: uniform-price, sealed-bid auctions (e.g. in the EU ETS) and ascending clock auctions (e.g. as planned in Australia). While both auctioning formats involve uniform pricing, ascending clock auctions involve dynamic bidding.

Outright fraud can occur when participants form prior agreements with regard to their bidding strategy, for example, two parties with sizeable market presence agreeing to not mutually compete to drive prices up. But even without prior agreements, collusion is possible. With regard to the ability to manipulate prices in each format, economic literature suggests a trade-



International Carbon Action Partnership

off between robustness to collusion and price discovery. Burtraw et al (2008) find that collusion is more likely in clock auctions than in discriminatory and uniform price auctions. Mougeot et al 2009 recommend a uniform-price, sealed bid auction open to non-compliance entities for the EU ETS. Cramton and Kerr 2002; Evans & Peck 2007; Betz et al. 2009 argue for an ascending clock auction noting price discovery (especially with allowances of different vintages). Lopomo & Marx (2009) explore the trade-off noting that on one hand, multiple round bidding in ascending clock auctions may enhance price discovery by providing additional information about others behavior; on the other, additional information means more opportunities for signaling during the auction and thereby may potentially facilitate collusion.

As price discovery in the primary market crucially depends on the transparency and competitiveness of the auctioning mechanism, it is affected by almost all design choices. For example, the lot size or minimum bid, defined as the smallest quantity that a participant can bid for, determines a barrier to entry to the primary market. A high minimum bid may prevent small bidders from participating in the auction, thereby reducing competition, facilitating collusion, and impeding price discovery.

There are a variety of other design details that may have an effect on the ability of players to game the system: reserve price provisions, rules on participant qualification, required guarantees to help ensure that bidders can actually pay for their bids, procedures to determine winning bids in the event of a tie, privacy/limited disclosure measures for participants, anti-collusion rules, market power/purchase limits, and transparency with regard to information and insider trading from the authorities perspective (ibid). Some systems have proposed limiting auction participation to compliance entities though this limits competition to a smaller number of actors, which may increase the danger of collusion and will have a similar effect to limiting market participants in the overall market.

In order to ensure that auctions are carried out free from manipulation, some jurisdictions involve (independent) market monitor authorities to oversee the market conduct of participants in the auction and identify indications of market manipulation and collusion.

Primary markets depend on allocation decisions and the various market oversight structures associated with them including the auction format. Various formats have their own advantages and disadvantages and may have different optimal solutions in different jurisdictions. Depending on these decisions and structures, a regulator then has different policy options available to guard against manipulation, collusion, and fraud.

4.2 Secondary Market Oversight

The secondary market is a large umbrella category with a variety of participants trading a variety of instruments in a number of different ways. Participants include market players that have to comply with the emissions trading scheme by submitting allowances according to how much they emit and other intermediaries that may participate in the market to provide expertise to other market participants and provide liquidity. As previously touched on, the



International Carbon Action Partnership

instruments that these market players trade can be broken down in to two smaller categories: the allowances themselves (and perhaps offset credits that may be at least to some extent substituted for allowances) and allowance derivatives.

The trading of allowances themselves is referred to as the spot market, which corresponds to the spot price. People and firms can trade directly with each other (also known as Over the Counter or OTC), through a broker, or on an exchange. As previously mentioned, derivatives are financial products that “derive” their value from an agreement to buy or sell an underlying asset or commodity for a certain price in the future. How standardized or common a contract is will be a factor in whether or not it is or can be traded on an exchange.

Box 1: Derivatives in the context of emissions trading (adapted from Monast 2009; Pew Center 2010)

Derivatives are financial products that derive their value from changes in the price of an underlying asset or commodity. In the context of emissions trading, derivatives include futures, forwards, options, swaps, and other contracts “deriving” their value from emission allowances or offsets.

- **Future contracts** are standardized agreements to buy or sell allowances or offsets in the future for a certain price. A future contract does not necessarily result in physical delivery, but could be satisfied by a payment based on the current market price at the agreed time of maturity.
- **Forward contracts** are similar to futures, but are non-standardized agreement to buy allowances or offsets in the future for a certain amount. A forward contract usually results in physical delivery or settlement of the underlying asset. There may be details in the forward contract that fit the exact needs of the buyer or seller which are not going to be common in the market and are therefore comparatively less commonly traded.
- **Options** entail the right, but not the obligation, to buy (“call option”) or sell (“put option”) a certain quantity of allowances at a particular price at a future date, regardless of the spot market price at that time.
- **Swaps** are a non-standardized exchange or series of exchanges (allowances, offsets, cash-flows) at a given time or for a set period of time. Common examples are offset-allowance-swaps. For example, in some trading systems, there is a limit placed upon the percentage of offsets installations can use for compliance. Since there is often a difference in the price between offsets and allowances themselves, it may be the case that companies that have not yet reached their quota of allowed offsets will sell their allowances and buy offsets and take advantage of the price difference vis-à-vis companies that may have more offsets than allowances and are already over their quota. Swaps are usually settled by payment rather than physical delivery, and traded OTC.



5. Bilateral, Cleared, and Exchange trading

A transaction between a buyer and seller of an allowance or allowance derivative can occur either directly where the two parties conduct the trade bilaterally (OTC); directly, but having the transaction cleared through a third party (cleared OTC); or on an exchange, where transactions are also cleared (Daskalakis et al 2011).

When two transacting parties reach agreement OTC, they generally do not publish the details of their contract. OTC transactions are therefore comparatively opaque, not necessarily publishing price and volume information, which can be important for other market players and regulators (UNCTD 2011). OTC contracts are generally less standardized and can be customized to accommodate the individual needs of a buyer or seller and therefore not be standardized enough to find enough of a market to warrant exchange trading. One example of a company that may want to have such individualized contracts is an electric utility (Pew Center on Global Climate Change 2010). Since electricity is often sold through longer term Purchase Power Agreements (PPAs), utilities may be interested in hedging their risk exposure to fluctuations in other factors in production such as energy sources (gas, coal, oil) and emissions allowances. OTC contracts may be adapted to fit the exact timeframe needs of such companies, which they may not find in markets that trade more standardized contracts.

With OTC transactions, because one party to a transaction may not know and be familiar with the other party, direct trading involves a certain amount of counter party risk that the other party to the transaction does not have what they claim to or intend to fulfill their side of the bargain. By having a transaction cleared through a third party, known as a clearing house, this risk can be mitigated. Conducting a transaction through a clearing house means that the clearing house essentially becomes the counterparty to each transaction, and if it is the single, central clearing party (CCP), it will further have an agglomerated picture of the market and individual market participant positions going through the clearing house. This service of the clearing house comes with a fee for its services and with a required margin that acts as a guarantee, usually in cash, that at least a certain portion of positions taken in trading can be covered. In the event that one counter party is unable to fulfill its part of a contract, that counter party's margin along with the mutual guarantee of the other market participants will help ensure that the other side of the contract will not suffer from a default in the trade. While this margin posted to the clearinghouse is being held as a guarantee, it cannot be put to other potential use such as investment, which can be significant for smaller firms.

In contrast to OTC transactions, exchanges provide a central meeting place for buyers and sellers to meet and buy and sell. Exchanges are useful because the identities of market participants are confirmed to become a member of, and trade on the exchange, their transactions are cleared, and they regularly report price and volume information that gives the market transparency. Being a member of an exchange, or paying a broker to buy or sell on an exchange on one's behalf can have a number of benefits including the increased liquidity of



International Carbon Action Partnership

the market compared with more customized contracts, but can also lead to additional transaction costs.

6. Measures to consider in promoting market security

As in the case of markets dealing in commodities and financial instruments, several measures can be taken by regulators at various levels to minimize the risk of marked misconduct and safeguard against manipulation. These include measures that specify if transactions must be cleared, what kind of margins must be posted to trade, where transactions can take place, what additional requirements exchanges may require, what kinds of reporting provisions there may be, overall limits on positions on an exchange or in the overall market, and what kind of licenses/training one may need in order to trade in such markets. Some of these measures are explored here.

6.1 Clearing and margin requirements

Clearing requirements vary across traded instruments, venues and jurisdictions. While trading on exchanges is always cleared, this is not necessarily the case with OTC trading. In recent years and in light of the financial crisis, regulators increasingly became concerned with regulating the OTC market by requiring mandatory OTC clearing of standardized contracts. In 2009, the G20 states set out a commitment to clear all OTC derivative contracts through a central counterparty (CCP) by 2013, in order to enhance transparency and reduce the amount of systemic risk (G20 Leader Statement 2009). Centralized clearing is different from general cleared OTC in that all transactions must go through a single CCP. This avoids a considerable amount of systemic risk in that, provided with the price and volume information, a regulator would be able to see what kind of risk positions market participants are exposed to and what kind of market power any one participant may have. By requiring a margin to be deposited as collateral to cover the credit risk until a position is closed, clearing greatly reduces not only systemic but also counter party risk (Hull 2010). A higher margin will reduce more risk, but will be a hardship especially for smaller firms which then cannot use that margin capital elsewhere and others which must then raise short term capital to cover the margin (Heller and Vause 2012). The relative amount of the guarantee that must be posted in order to have transactions cleared may be an important policy tool to ensure safety in the market.

6.2 OTC vs. Exchange Trading

As mentioned, OTC trading can allow market players to better adapt financial contracts to their specific needs such as contracts for long period of time into the future, but provides less information to the public, other market participants, and regulators as to the positions and what obligations various market participants have to each other. This general lack of transparency however can lead to a certain amount of systemic risk (Darby 1994). In an opaque OTC market, there is a possibility that one player has the potential to amass such a large position in the market, and that such a player would be such an important counterparty, that if that player were not able to meet its obligations it could cause a chain reaction with other



International Carbon Action Partnership

market players so as to cause complete market failure. Even if the system overall were not in danger, such lack of an understanding of an overall position of market players may enable one player or a group of players to corner or squeeze the market (further explored under “Position Limits”) (Pirrong 1996).

Requiring allowances and standardized forms of derivatives to be traded on an exchange can give increased transparency to the market and regulators, provide a pricing service, and give another level of market oversight: that of the exchange itself. Exchanges have requirements for potential traders to become a member of the exchange and make use of their services, enabling them to some extent to police their own trading operations. Many functions of market oversight can be carried out on the level of the exchange, though this will only be effective if all or at least a significant portion of all trades are carried out on that particular exchange. The regulatory role of exchanges, the extent to which government is actively involved, and penalties for not adhering to exchange trading rules may vary, and various exchanges will develop their own procedures for violations. Generally, if an exchange represents an important trading platform, then penalties such as membership suspension may serve as an important deterrent from manipulative or fraudulent behavior (Pritchard 2003, Gadinis and Jackson 2007). Exchanges may further be useful for the information services that they provide on such issues as settlement prices, volume, open interests, and opening and closing ranges.

6.3 Reporting and Disclosure

Even in the absence of mandatory clearing or exchange trading, some measures may be able to facilitate increased transparency in the market. Trade repositories or a “Central Limit Order Book” (CLOB) can help asset classes as a kind of registry or central repository for market orders and archive of trades that have taken place to give regulators an idea of what is going on in the market (Monast et al 2009). Since emission allowances do not have a physical mass and rather rely on a registry of serial numbers to show and keep track of ownership, a registry could further take on the role of a trade repository to which various counterparties would report their outstanding positions not only with regard to currently owned allowances, but also with regard to future obligations through derivative contracts.

6.4 Position limits

A position limit is a restriction on the total number of allowances or contracts to acquire allowances through derivatives held by a single market participant or related participants (through ownership or otherwise) in order to prevent that market participant or group of participants from exercising excessive market power (CME Group 2009). A large presence in a market, depending on the supply of allowances and size and liquidity of the market, could enable such market participants to cause unwarranted price fluctuations e.g. “corner” or “squeeze” of the market or “slamming the close”. Cornering or squeezing the market occurs when one market participant or group of colluding participants acquire such a long position, i.e. control over such a large number of the overall supply of allowances in the market, that firms that are short, i.e. that need to buy allowances, no longer have multiple competing offers



International Carbon Action Partnership

to sell and are forced to pay the price dictated by the participant or participants that are perpetrating the squeeze (Pirrong 2009). “Slamming the close” is done from a similar position of market power, but instead of squeezing, this involves flooding the market to reduce prices at a point in time advantageous to the company such as when particular futures prices come due or after a company or conspiring traders have shorted the asset (ibid). Such activity in either direction is undesirable because it inhibits price discovery based on actual supply and demand fundamentals. Because the supply of allowances is limited by policy, depending on their size and liquidity, carbon markets may be particularly vulnerable to such speculation. The risk of manipulation may increase especially towards the end of a compliance period, when covered entities need to purchase allowances from the market (Schatzki and Stavins 2013: 8). Position limits may be an effective method to limit market power and can be enforced, depending on the market, with transparency at the registry level, the central clearinghouse level, or by an exchange.

6.5 Participation, Registry Accounts and Licensing requirements

A further measure available to regulators is the option to impose restrictions on who can open an account with the registry, who can trade on what markets, and what licenses, if any, may be required to do so. While there are some proposals in some systems that seek to limit market participation to covered entities, such measures would limit the ability of market players to hedge price volatility and have a negative effect on the liquidity of the market: generally, the more market participants actively trading in the market, the larger the chance that a buyer or seller will find a counterparty to transact with (Pew Center on Global Climate Change 2010).

Though it is likely to be beneficial to have a large variety of market participants in the market, verifying the identity and previous records of market participants is an important prerequisite to opening an account with the registry to prevent manipulation and fraud (Cutter et al 2011). Regulators will need to develop their own verification procedure and criteria for allowing market participants to open a registry account and perform other transactions. In the event of fraudulent behavior or market manipulation, the regulator must be able to identify market players and take necessary action to prevent future misconduct. Carbon markets may further need special provisions for various kinds of market participants. Covered entities are simultaneously the primary target of an emissions trading policy tool, but will have different experience and expertise with markets. Financial intermediaries may be interested in participating in markets both as an investment opportunity and to offer brokerage and consultancy services to smaller market participants. As in the case of other financial markets, a regulator may have an interest in overseeing how such consultancy services are offered, what conflicts of interest may arise between consulting and trading on their own account. The line may blur however between financial intermediaries, consultancies, and covered entities requiring special attention for various licensing requirements for various market activities including clearing services and exchange membership.



7. From Theory to Practice

Carbon markets entail the creation of a new kind of asset class that poses new questions with regard to regulation of such new environmental markets. In the development of regulatory schemes, there are lessons from existing markets which can be drawn upon, but carbon markets also have some unique features which will require special attention for effective market oversight. Various jurisdictions will have various approaches based on their existing institutional settings and regulatory frameworks for financial markets, commodity trading, and environmental protection. While the abstract goal of ensuring efficiency of an environmental tool to reduce greenhouse gas emissions may seem straight forward, it confronts policy makers with a number of decisions with regard to regulation that will have important consequences for the energy sector, the financial services sector, and the authorities who are responsible for managing such markets. Primary markets, secondary markets, and the instruments traded all present their own challenges with regard to regulating a balance between enabling investment, speculation, and price volatility risk hedging on the part of emitters while avoiding fraud and manipulation. Finding this balance requires an investigation of pertinent issues from auctioning processes and design to financial and commodity trading. Various measures can be carried on a number of different levels including: general provisions controlling availability to registry accounts; promoting the transparency of trading to whether allowances and allowance derivatives can be traded OTC, be cleared, or through exchanges; and many others.



International Carbon Action Partnership

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