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How Carbon Credits are Certified Could Change the Market Structure

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Executive Summary
While there is much discussion about the need for viable carbon credit markets with well-defined credible certification, there is also a need to consider the impacts of the costs of certification on the structure of those markets. This policy brief provides background to the consideration of how certification costs might influence the industrial structure of the certification industry and how firms compete with each other.

Background

Farm soils, animal production systems, and forestry products can be adapted to sequester carbon and carbon equivalent gasses, with a great deal of heterogeneity across geographies and practices. Farmers face various possibilities to decrease emissions by choosing no-till practices, adopting longer crop rotations, using compost, reducing both fossil fuels and chemical fertilizers, using prairie strips and digesters, collecting effluent, capturing methane, and the development of carbon negative bioenergy and other practices (Plastina 2021a; Brown 2021). Converting those varied practices into measurable, tradable carbon credits requires precise estimation of the carbon capture. Overcoming that difficulty may be high, but many believe it to be surmountable. If so, carbon credits do hold the potential for additional income to farmers.

While much literature about the practices exists,[1] there is less discussion about how the certification process may lead to unintended consequences on the structure of the marketplace. On the one hand, lax certification could lead to green washing (companies claiming environmental benefits despite the lack of any significant change) and carbon markets unable to reduce emissions effectively. On the other hand, credible but stringent certification could be very costly and deter farmers from entering into practices or could cause them to use them only for short periods of time (some programs have high registry and annual fees, for example). The tradeoff between these two possibilities depends on the profits of certifiers and the competition between these certifiers. This policy brief is concerned with the impact of certification on the industrial structure of a carbon credit market.

Industrial Structure and Certification

Industrial structure ranges from that of perfect competition (where firms compete aggressively in a marketplace with full information so that firm market power is low and consumer benefits or "welfare" are high) to monopoly (where a single firm emerges with full market power and consumer welfare is lowest). Producers in both cases are the sellers of carbon credits and consumers are the buyers. In between these two extremes of perfect competition and monopoly are various forms of industrial structure from several firms to just a few, all with various degrees of market power and consumer welfare.

The question of certification is at the core of the Growing Climate Solutions Act of 2021, a bill that, as of this date, has passed the United States Senate with wide bipartisan support and now rests before the US House of Representatives (see CARD Policy Brief 21-PB 33 by Crespi and Tidgren). A major part of that legislation, if passed, will set the stage for the US Department of Agriculture (USDA) to set up a certification system for agricultural and forestry carbon credits, something Crespi and Tidgren (2021) argue is a necessary legal step for a fully functioning agricultural carbon market.

A stakeholder-agreed-upon regulatory certification system is necessary for a carbon market to flourish. Such certification systems are common in many industries where credence goods exist, and the industry itself typically welcomes such certification systems. A credence good is one where consumers cannot readily assess some valuable aspect of a good.[2] Certification backed by a credible government agency or a credible third-party verifier is common in many industries. US consumers are familiar with certification labels or processes, even if they may give them little thought. Organic labels, HACCP, Underwriters Laboratories, ISO standards, food grades, and

[1] See, for example, Iowa State University research at CARD's Carbon and Greenhouse Gas webpage and the Bioeconomy Institute's research webpage.

[2] "Credence qualities are those which, although worthwhile, cannot be evaluated in normal use. Instead the assessment of their value requires additional costly information" (Darby and Karni 1973: 68-69.)

various inspection labels are commonplace around the world, in fact. If the final consumer has faith in these labels, the market for the credence good or attribute can overcome adverse selection and moral hazard problems (Akerlof 1970; Crespi and Marette 2003; 2005) that would otherwise undermine a functioning market.[3]

Once a credible certification system emerges, how might the certification system *itself* impact the industrial structure of the carbon credit market?

Currently the Industry Structure of the Carbon Credit Market is Fluid

We focus on the particulars of the US market, but the debate is ubiquitous (see for instance, the Dutch example in the European context of the Green Deal as explained by Fransen 2021). In terms of its industrial market structure, we might best describe today's carbon credit market as competitive or monopolistically competitive with a great deal of uncertainty. Wongpiyabovorn, Plastina, and Crespi (2021) describe how the agricultural carbon markets in the United States have evolved and the current state of the carbon credit industry. "Fluid and changing" would be the correct modifiers for the current state of the market. Plastina (2021a) explains the current industry and how each firm conducts its business with certifiers working with producers to inventory carbon at the producer level. Numbering firms in the industry is difficult because each firm has different business plans and is addressing different parts of the market. The "industry" is vibrant and changing and its industrial structure will no doubt look differently a decade from now.

There are a half-dozen to a dozen firms involved in various aspects of the US agricultural carbon credit markets, from data collection to monitoring to soil sampling to verifying to the brokering of producers with the ultimate buyers of the credits. Some firms perform all of the measurement, reporting and verification (MRV) functions. Others only do parts of MRV. Furthermore, no firm does things the same way, as can be seen in the firm-level flowcharts prepared by Plastina (2021b). Plastina (2021b) traces what he terms the "Traditional Carbon Offset Generation" as in figure 1 below.

[3] Adverse selection occurs when the lack of credible information causes low quality goods to crowd out higher quality goods because consumers cannot tell the difference between the goods, and the higher quality goods are more costly. Consumers are unwilling to pay for something for which they are unsure. In this context, moral hazard extends adverse selection by introducing sellers who label their product as having the desired attribute when it does not. The result is the same in both cases with consumers becoming unwilling to accept a higher price. Lower quality, lower cost goods crowd out higher quality, higher cost goods. Saitone and Sexton 2010 model this generally and sum up their model succinctly with, "For issues of food quality, certification, and labeling, what happens if consumers cannot tell the H[igh quality] product from the L[ow quality] product is critical. They will then have no choice but to ascribe an average quality to any product on the market on the basis of their knowledge of the probabilities of each type being on the market" (p. 346).

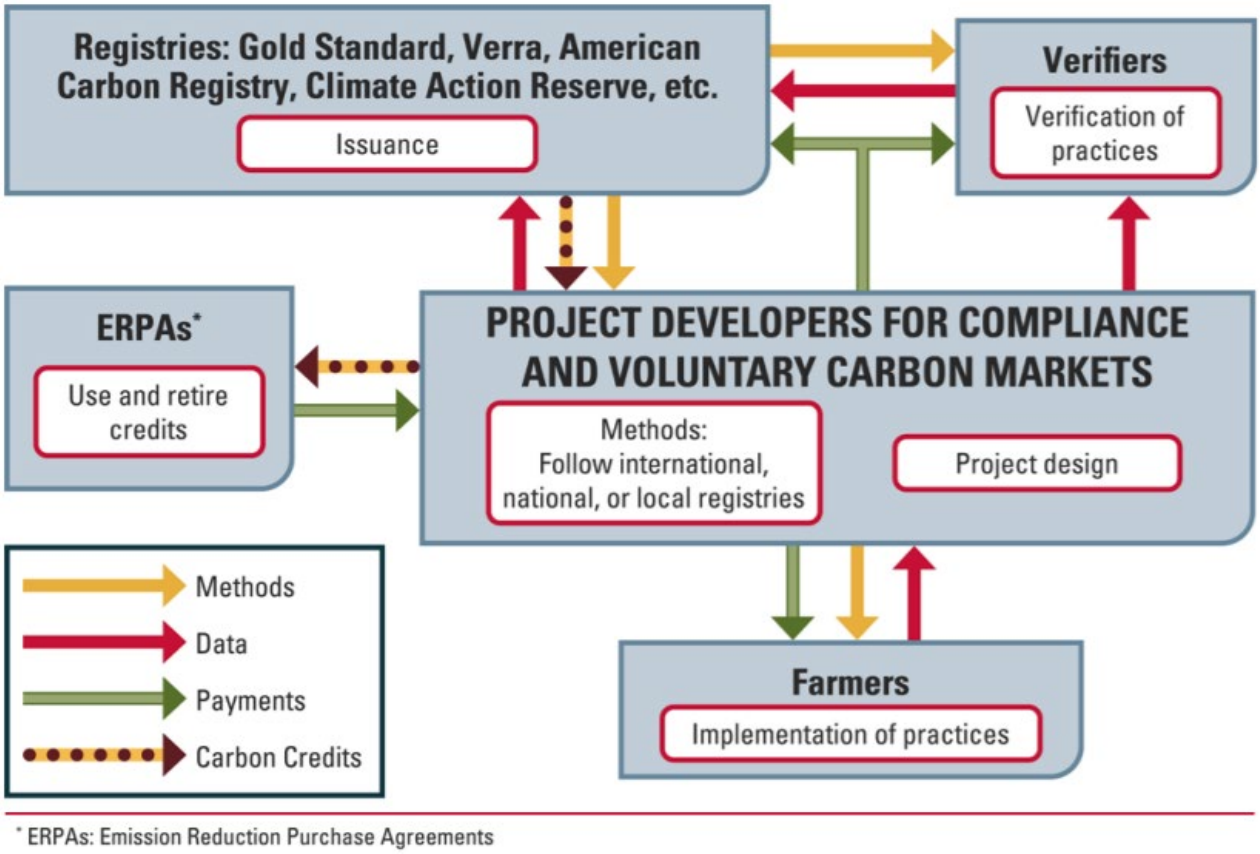

Figure 1. Traditional Carbon Offset Generation (Plastina 2021b).

With the exception of the "Registries" and the "ERPAs" boxes, the arrows that divide the boxes do not necessarily mean that the boxes are separate entities. Any horizontal or vertical connection denoted by the arrows could be within one company. For example, "Verifiers" could be either within a carbon-credit issuing company or a third-party verifier used by the credit issuer, a "Farmer" could also become its own "Developer," and likewise, the "Project Developers" box could be split into multiple boxes, with each component acting as its own company. Plastina (2021b) provides specific flowcharts for nine such US companies: the Ecosystem Services Market Consortium, the Soil and Water Outcomes Fund, Indigo, Nori, Corteva, Agoro, CIBO, Gradable, and Bayer Carbon.

With nine companies existing in a market with similar but not homogeneous products and a high but surmountable fixed cost relative to variable cost (due to a likely high science threshold for monitoring and verification and relatively lower variable per-farm cost), the market today is likely somewhere in the spectrum of competitive or monopolistically competitive. Given world governments pressing ahead on carbon removal and sequestration with commitments from the Paris Agreement and the 2021 COP26 conferences, the expectation of profitability for carbon credit MRV firms is no doubt high, which is why so many investors are entering the market. Upon agreement to and adoption of a credible certification system, one should expect to find more standardization of techniques and regulatory structure imposed on the certification.

What is not yet clear is how exactly the cost of the certification will emerge when USDA sets the final certification guidelines. The cost of the certification has implications on market structure. What Crespi and Marette (2001) show in the case of food safety certification is apropos to the case of carbon credits. Crespi and Marette (2001) offer a purely theoretical model, but it has real-world implications. The paper considers the case of a regulatory requirement of food safety certification to overcome adverse selection—no different in theory from the requirements on organic labels or food grades or carbon sequestration. While it is not neglected in discussions of carbon MRV that certification can be costly, what is not examined to any great extent to date in discussion of carbon markets is whether the certification costs are mostly fixed or mostly variable? However, the type of cost matters a great deal to industry structure.

Costs of Certification Matter

If, in order to comply with the certification regulation, a certifier must use an expensive piece of testing equipment that is the same price regardless the number of acres or number of animals, then the certification cost is mostly a fixed cost. If, however, a certification test is per-acre or per-animal, then the certification cost is variable. Spreading the cost over farms with larger acreages can lower fixed costs. However, the same is not true for variable costs. How the certification regulation influences the certification cost is important and should be considered in the final ruling because it can impact not only the viability of carbon sequestration at the farm level, but also because it can impact the certification industry itself and, thus, impact the value of carbon credits.

The question Crespi and Marette (2001) answer in their theoretical model is, "What happens if the certification cost is fixed per unit of production or varies by the production output?"

Crespi and Marette (2001) consider four scenarios. "The regulator faces four decisions: (1) propose voluntary certification with a per-unit fee imposed on producers who choose to be certified, (2) propose voluntary certification with a fixed user fee paid by those producers who choose to be certified, (3) finance the voluntary certification program through general taxes, or (4) do nothing" (p. 855). The fourth scenario, "Do nothing," is the comparison used for all other scenarios.

They find that in scenario (1), where the certification fee is per-unit (variable), only those producers who want to be certified enter that market segment and the market is competitive with firms passing on the per-unit costs to the users of the product. There is no market distortion to the competitive structure of the market and consumer welfare is higher than in the case where there is no certification.

Under the flat or fixed fee certification scenario (2), only one firm eventually emerges in the certified sector of the marketplace; and, while consumer welfare is higher than in the case of no certification, the absence of a competitive market structure leads to lower welfare than in the first case. Under scenario (2), the fixed certification fee has changed the market structure. If the certification cost is variable (per-unit), there is no need to have a government subsidy of it, so the final scenario is devoted to the case where the certification cost is fixed, as in scenario (2), but is fully subsidized by the taxpayer.

Under scenario (3), public financing, the outcome is less clear because the regulator must weigh the market distortion that arises from the fixed certification cost against the benefit from increased food safety and the distortion that comes from taxes to pay for the certification. Governments have competing uses for tax revenue, after all. If the government deems the

certification necessary so that the opportunity cost of using subsidies to pay for the certification is low, then the authors find it optimal for the government to pay the certification cost. If the opportunity cost of public funds is high, then governments should not finance certification cost with tax dollars, but the users of the product or service should be compelled to pay the cost using per-unit fees. If a fixed fee that is the same across certifiers finances certification cost, then industry market structure distortions should be expected and may warrant further regulatory action to maintain competition.

The current structure of the carbon credit markets is one where third party, private sector, "middlemen" perform the certification, much like the organics market in the United States. Crespi and Marette (2001) also examine the impact of this form of market structure and conclude (p. 860): "If there is only a single private agency (e.g., if the government grants an exclusive license) then a monopoly allocation by this agent results in the imposition of a welfare distorting per-unit user fee. However, when private certifiers compete to provide certification services, welfare under private certification is the same as that under public certification." In other words, more regulation is likely needed in the case of an exclusive license because the private certifier would distort the benefits of the information to capture higher profits, whereas a variety of private certifiers is no better or worse than having a public agency provide the information and is not market distorting. However, one must be careful to hold private certifiers to a high standard. In an examination of food safety certification in Britain, Zheng and Bar (2021) find that while food safety standards did go up after the introduction of private certification, more competition in the certification industry after time seemingly led to conflict of interest with certifiers possibly providing higher grades in order to gain new customers.

Summary

For carbon credit markets to thrive, standardization and credible certification are necessary. Right now, firms and agencies are giving a lot of thought about how to certify a carbon credit. However, *how* one establishes *the cost* of that certification is nearly as important a question as how one actually certifies. High fixed certification costs can be market distorting, leading to only large firms entering the certification business and/or only large producers being able to afford the certification. Costs matter. A regulator, such as the USDA, may unintentionally influence the number of certifiers by imposing a costly approval process or mandatory deposit that does not vary by the size of the potential certification market. Increasing the certification fixed cost could lower entry, thus reducing competition. Such an outcome would likely lower the benefits to carbon credit buyers and farmer producers through a higher retained margin between the credit producer and the credit buyer. While a fixed certification cost for MRV may be an unavoidable outcome of the available science and technology, regulators and policymakers should be aware that turning such fixed costs into something more akin to a variable cost might be less market distorting. Providing subsidies, credit, or spreading costs across firms might be worth considering given the goal of a carbon program. In short, although the regulatory decision to certify carbon markets is important in order to have viable markets, the decision on *how* to regulate a certification market is likewise important.

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