Transaction Costs for Nonpoint Source Water Quality Trading Credits: Implications for the Chesapeake Bay

Kurt Stephenson & Gwen DeBoe
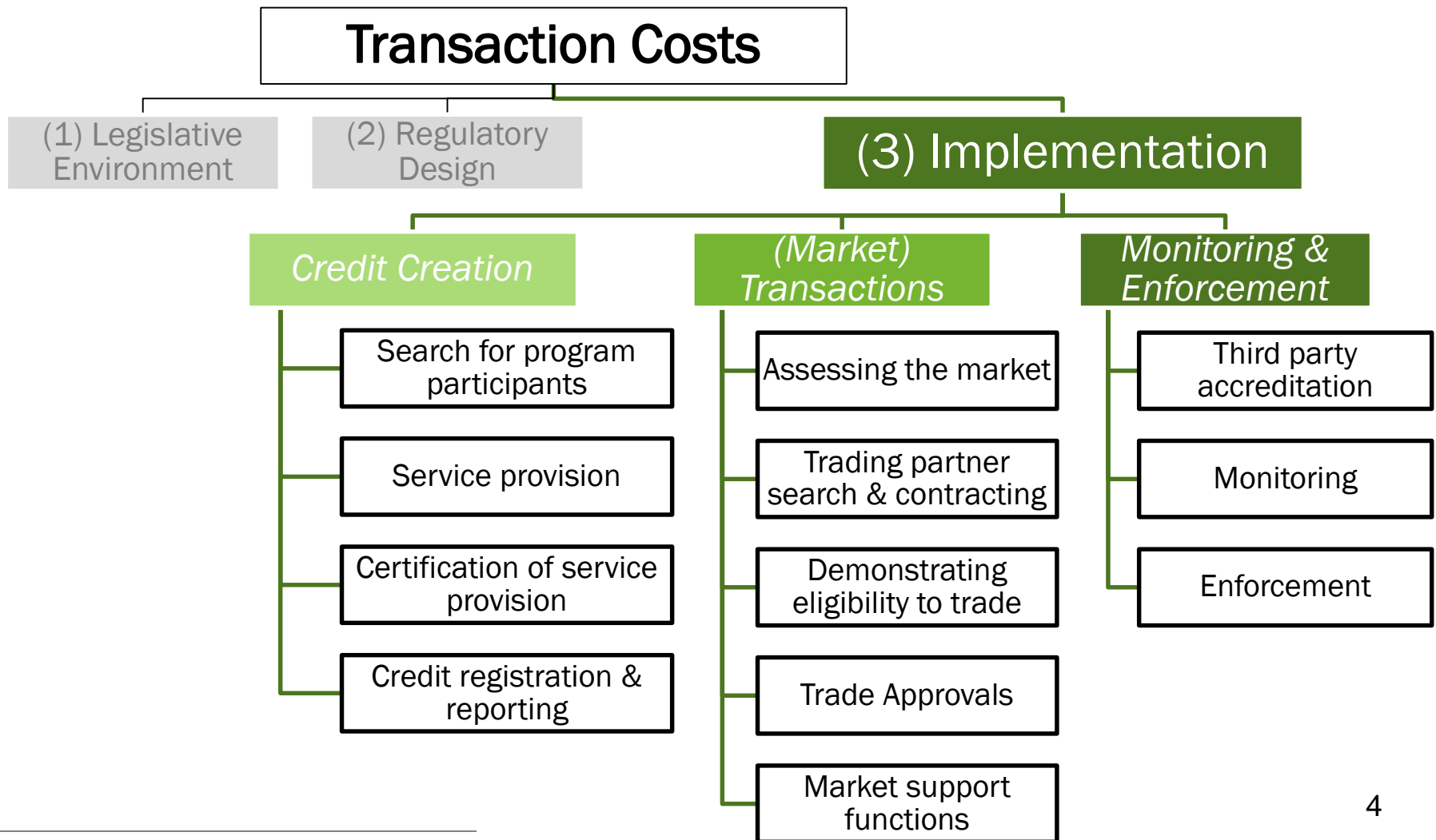Department of Agricultural & Applied Economics
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➢ Nutrient trading programs often plagued with relatively few NPS trades

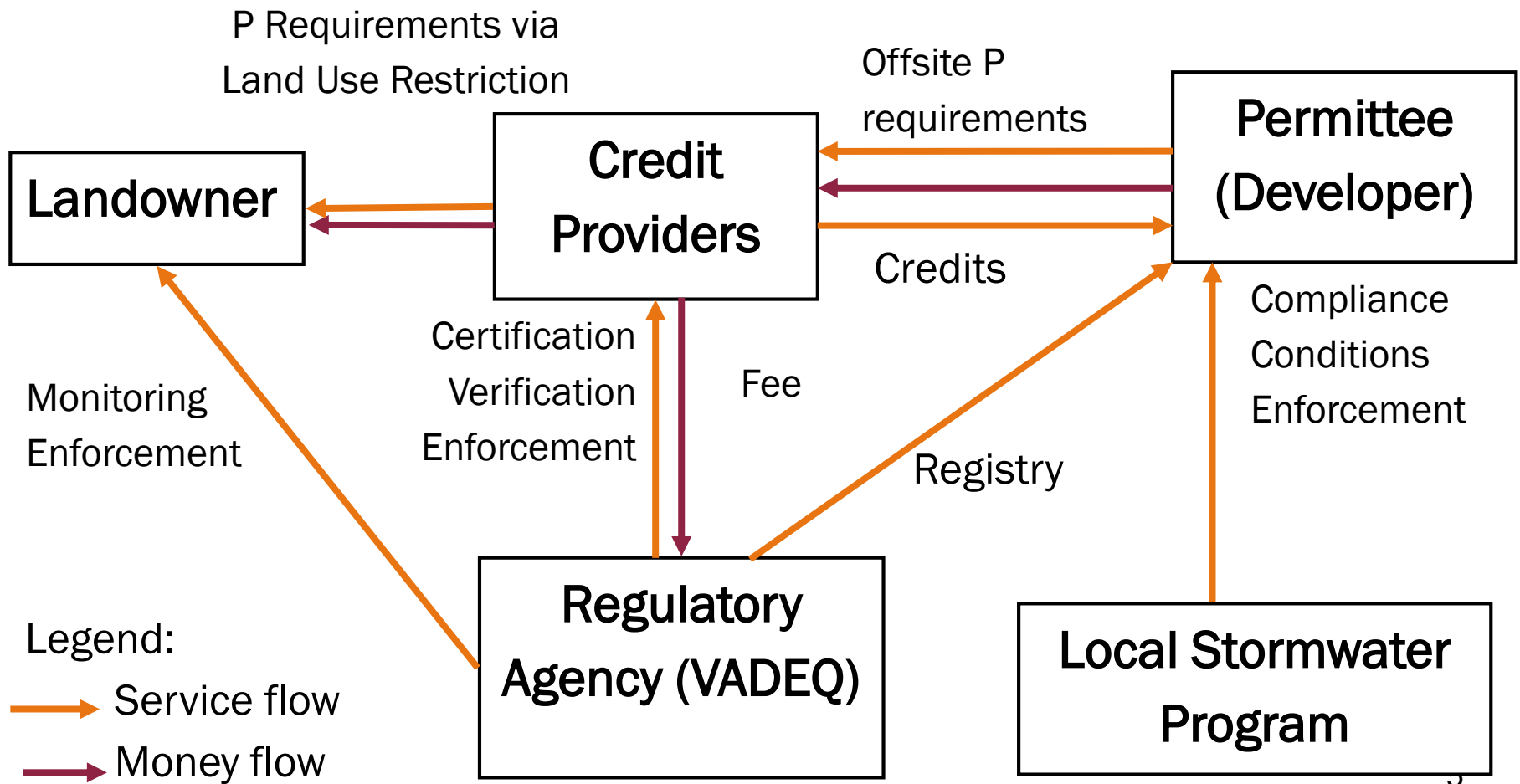➢ Desire to see NPS trades increase, particularly for working agricultural lands

Objectives

➢ Identify sensitivity of transaction costs to different types of NPS crediting activities and monitoring regimes.

➢ To examine to what degree alternative designs can lower transaction costs

Conceptual Framework: Transactions costs of Implementation

Transaction Costs

(1) Legislative Environment

(2) Regulatory Design

(3) Implementation

Credit Creation
- Search for program participants
- Service provision
- Certification of service provision
- Credit registration & reporting

(Market) Transactions
- Assessing the market
- Trading partner search & contracting
- Demonstrating eligibility to trade
- Trade Approvals
- Market support functions

Monitoring & Enforcement
- Third party accreditation
- Monitoring
- Enforcement

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Virginia Nutrient Trading (stormwater offsets)

➢ **Nutrient Stormwater Offsets Straightforward**

- "Permanent Credits": One time certification

- Performance criteria straight-forward (e.g. native 400 stems/ac)

- Remote verification

What might future transaction costs look like?

➢ **Severe data limitations (confidentiality, lack of experience, etc.)**

➢ **Method:**

  ➢ Gather data from other water quality programs (Ohio (EPRI), Oregon (Willamette Partnership))

  ➢ Consult with credit providers

  ➢ Use NRCS data on transactions costs of getting conservation on the ground

Analysis of transaction costs

➢ **Which transactions costs did we focus on?**

➢ Costs of "Credit Creation" (primarily credit provider)

➢ Costs of agency certification and verification monitoring

➢ **Did not focus on:**

➢ Market exchange costs

➢ Negotiation costs between credit provider & agency, permittee & agency

➢ Unique contracting issues

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Transaction costs: "Credit Creation"

➤ Estimated transaction costs associated with executing NRCS conservation contracts

➤ Transactions costs of credit creation depend on the type of practice(s) used

   ➤ **Simple project** (e.g. ag. land conversion, cover crop)

   ➤ **Moderate project** (livestock exclusion fence + watering)

   ➤ **Complex project** (e.g. livestock waste management + prescribed grazing; enhanced nutrient management)

Ex-Post Monitoring

➢ **Monitoring/Verification of credit generating activities**

➢ **Costs are a function of**

  ➢ Type of Monitoring (on-site, remote, etc)

  ➢ Frequency of Monitoring

  ➢ Coverage

Ex post Monitoring regimes

❖ Virginia DEQ (remote monitoring)

❖ Willamette Partnership (onsite, remote)

❖ EPRI (Ohio Basin) (annual on-site)

Putting this all together, how might transaction costs change with project complexity and ex post monitoring regime?

Estimate Credit Creation Costs and Monitoring Costs for Multiple Types of Projects

Ex post monitoring	Simple Project	Moderate Complex	Complex
Remote Verification			
Mixed Type Verification			
On-site Verification			

Projects have different durations and thus different number of credit contract renewals

Ex post monitoring	Simple Project			Moderate Complex			Complex		
	30 yr	10 yr	yearly	30 yr	10 yr	yearly	30 yr	10 yr	yearly
Remote Verification									
Mixed Type Verification									
On-site Verification									

Examples of Credit Generating Practices

	Simple Project			Moderate Complex			Complex		
	30 yr	10 yr	yearly	30 yr	10 yr	yearly	30 yr	10 yr	yearly
Remote Verification									
Mixed Type Verification	Land Conversion	Buffers	Cover Crops		Stream Fencing		Wetland restoration	Animal Waste Facility	Enhanced N Mang
On-site Verification									

Ex post monitoring

Estimating Transaction Costs

To make equivalent across BMP type:

- o Assume each BMP type generates credits for 30 yrs
- o Calculate present value of credit creation and monitoring costs
- o Normalize in reference to the low cost alternative (remote verification, permanent simple project)

Examples of Credit Generating Practices

Magnitude of Transaction Costs Relative to the Lowest Cost Alternative

	Simple			Moderate Complexity			Complex		
	30 yr	10 yr	3 yr	30 yr	10 yr	3 yr	30 yr	10 yr	3 yr
Remote Verification	1.0	1.3	3.0	1.5	1.9	3.6	2.5	3.1	5.7
Mixed Verification	1.3	1.5	3.6	1.8	2.1	4.2	2.8	3.3	6.4
Onsite Verification	2.9	3.1	4.3	3.4	3.7	4.9	4.4	4.8	7.0

Assuming minimal cost to renew 3 or 10 year credit contract

Relative Magnitude of Transaction Costs Relative to the Lowest Cost Alternative

	Simple			Moderate Complexity			Complex		
	30 yr	10 yr	3 yr	30 yr	10 yr	3 yr	30 yr	10 yr	3 yr
Remote Verification	1.0	2.1	6.6	1.5	3.2	9.6	2.5	5.0	14.8
Mixed Verification	1.3	2.3	7.3	1.8	3.4	10.3	2.8	5.2	15.5
Onsite Verification	2.9	3.9	7.9	3.4	5.0	10.9	4.4	6.8	16.1

Assuming full renew 3 or 10 year credit contracts

Transaction costs: *What have we learned?*

➢ TCs of creating credits from **management** and **structural** BMPs substantially **higher** than for credits from **land conversions**

➢ TC highly sensitive to frequency of credit renewals

➢ **Verification protocols** are important driver of transactions costs

For more information: G. DeBoe & K.Stephenson. 2016. "Transactions Costs of Expanding Nutrient Trading to Agricultural Working Lands: A Virginia Case Study" *Ecological Economics* 130:176-185

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