Policies and Programs in CDM: Observations based on US Experience

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Frequently Asked Questions about Policy and Program CDM

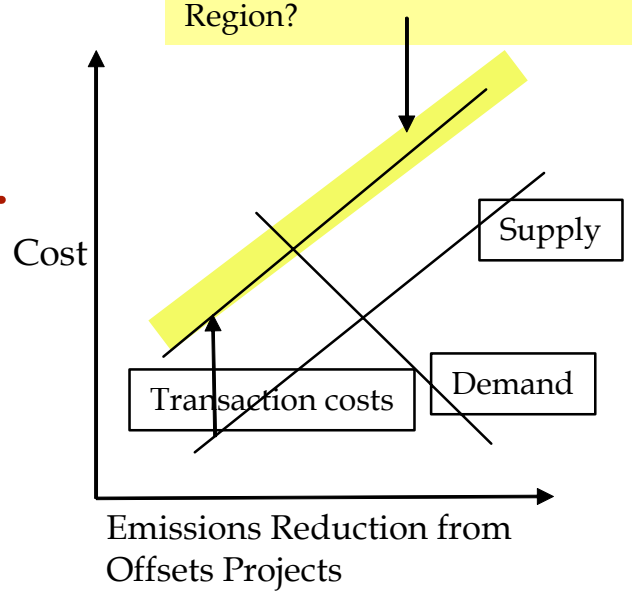
- Does a program of activities save money? How much?
- What has been the prior US experience with policies and programs?
- Should a policy be included? Can its additionality be tested?
- Should multiple technologies be included under a program of activities?
- Does the existing methodology (NM) for setting baselines and monitoring of project activities also apply to programs?
- Is it possible to use a statistical approach to monitor emissions reductions? And with what certainty?
- Would statistical sampling be adequate to obviate the need for identification and location of each CPA?
- Should CERs be reduced based on the percentage of free riders?
- Does capacity exist in developing countries to design and implement programmatic CDM?

Transaction Costs Influence Supply of Traded Carbon

- **Data Set 1: (26 projects)**
  - The Nature Conservancy (Forestry) -- Bolivia, and Brazil
  - Indian Institute of Science (Forestry) , LBNL (Household woodstoves)
  - Oregon Climate Trust (Forestry, energy efficiency, renewable energy)
  - Natural Resources Canada (Forestry)
  - Trexler and Associates (Methane, large power plants, energy efficiency, carbon capture)
- **Data Set 2: (13 projects)**
  - Ecofys (renewable energy)
  - Ecoenergy (bagasse cogeneration)
- **Data Set 3: (50 projects) –**
  - Swedish AIJ Programme (Energy efficiency and renewable energy)
- **Data Set 4: (10 projects)**
  - Global Environmental Facility (Transportation, energy efficiency, renewable energy)

- **Project search costs – Identification and stakeholder consultation**
  - May be spread over many projects
- **Feasibility studies costs – engineering, economic, and environmental assessments**
  - GHG Baseline estimation and establishing additionality
- **Negotiations costs – obtaining permits, negotiating and enforcing contracts for fuel supply, arranging financing**
  - Marketing GHG credits, carbon contracting and enforcement
- **Insurance costs – project risk insurance**
  - GHG credit insurance (Difficult to get or too expensive today)
- **Regulatory approval costs (GHG)**
  - Project validation and government review (May include both domestic and international validation costs)
- **Monitoring and verification costs (GHG) – During project implementation**
  - Monitoring including equipment cost, verification and certification (Spread over many years of project life)

Supply with transaction costs
Range varies with
Project size?
Current vs. mature market?
Project type?
Region?



Recent Publication:

Antinori C. and Sathaye J. (2007). *Assessing Transaction Costs of Project-based Greenhouse Gas Emissions Trading.* LBNL-57316

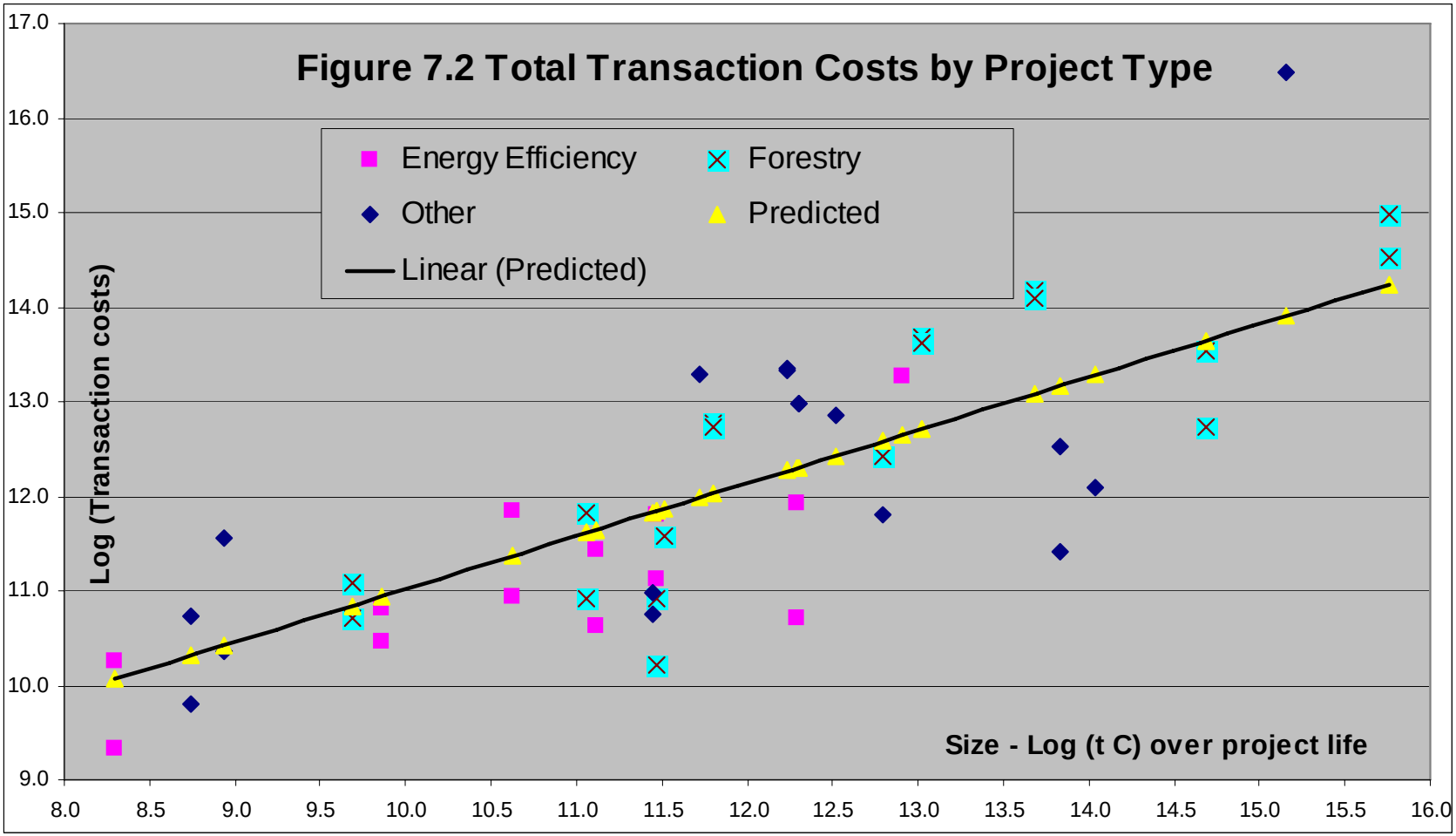


Figure 7.2 Total Transaction Costs by Project Type
Energy Efficiency
Forestry
Other
Predicted
Linear (Predicted)
Log (Transaction costs)
Size - Log (t C) over project life
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
8.5
9.0
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
14.5
15.0
15.5
16.0

Data Set 1: Transaction costs

- **Range from \$0.03 per t CO_2 for large projects to \$4.05 per t CO_2 for smaller ones**
- **Weighted average of \$0.26 per t CO_2 for all projects**
- **Range from 1% to 19% of project costs for forestry projects**

Past and Current US Policy and Program Experience

Energy Efficiency Programs: Prior Experience

- Programs with > 20 years of experience
  - Building codes – ASHRAE Standards
  - Appliance standards – CLASP Guidelines
  - Voluntary programs – Energy Star
  - Demand-side management (DSM) utility programs
  - ESCOs – IPMVP Protocol
- Above programs use methodologies similar to CDM
  - Estimation of baselines and project energy use and calculation of energy savings prior to program initiation
  - Monitoring and evaluation of energy savings during program implementation

Monitoring

- CDM-PoA:
  - Emissions reductions of each CDM Program Activity shall be monitored as per the registered monitoring plan
  - Method or approach used to verify emissions reductions (that may include random sampling) shall ensure the accuracy of these emission reductions
- Current California and New England Programs:
  - Monitoring and evaluation plan prior to program implementation
  - Monitoring done by implementer and evaluation by an independent entity
  - Free riders, spillover, and comparison groups used in program evaluation

Monitoring in US Programs

- Current California and New England Programs:
  - Reliance on net to gross savings ratio calculation
    - Gross savings are adjusted for free riders and spillovers in order to estimate net savings
  - Comparison groups are used to monitor evolution of baselines over time
  - A table of ratios is used to estimate free riders for each type of end-use
  - Free-rider survey data is used to adjust next set of programs
    - Reduces uncertainty for developers
  - Individual applications are not monitored
    - Sampling procedure is used to determine emissions savings

Determining Additionality Using a Free-rider Approach

Free riders

- Participants who would have taken the energy saving measures irrespective of the programme
    - Customers who would have purchased an energy-efficient appliance even had they not received a rebate from the utility
- Since by definition their actions are not influenced by the programme, the energy saved by free riders should be excluded from estimates of programme savings.

Estimating Percentage of Freeriders

- Measurement done through participant and non-participant surveys
  - Early programs in mid-1990s -- Large variation in the percentage of free riders
    - From 3-9% for HVAC* equipment to 90-100% for building shell
  - Programs redesigned to reduce free riders

* HVAC: Heating, ventilation and air conditioning

Accounting for Spillovers

Spillovers

- Spillover adjustments add to program reported savings when participants or non-participants implement energy-saving measures due to the program's influence, but do not apply to participate in the program.
- Net to Gross Ratio = (1-FR) * (I+SO)
- NTG may exceed 1

Estimating Percentage of Freeriders and Spillovers

- Evaluation of the NY Energy Smart Public Benefits Program for activities completed through 2005 showed
- Freeridership at 30% for Business and Institutional Programs at 90% confidence interval
- Inside project, outside project and non-participant spillover amounted to 6%, 19%, and 14% at 90% confidence interval
- Net to Gross Ratio = (1-FR) * (I+SO)

  = (1-0.30)*(1+.39) = 0.97

Observation on Policies and Programs in CDM

Additionality Conditions Should be Applied at Each Hierarchical Levels

- Program Level
  - Ghana CDM air conditioners project (NM 0159) offers one example of a program that needs to overcome a barrier, i.e. the lack of a air conditioner test facility
  - Use of common practice criteria can help determine scaled policy additionality
- CDM-PoA (EB28):
  - Article 2 calls for additionality test of the program
- Project Participant Level
  - Each participant needs to meet additionality conditions
    - E.g., CDM NM0157 – Open-DSM type CDM for Green Lighting in China
    - Estimating free riders is one way to determine additionality
    - Use of comparison groups as in AM0046 is essential to ensure that savings are additional
- CDM-PoA (EB28):
  - Calls for additionality test of the project activities

Use Scaled Additionality at the Policy and Other Hierarchical Levels

- CDM-PoA (EB28):
  - local/regional/national policy or standard cannot be considered as a clean development mechanism project activity
- Scaled additionality would allow a proportion of CERs to be accepted, unlike the current project activity approach of binary additionality
  - Scaled additionality concept may be applied at the policy, program, or project activity level
  - Could use penetration level with or without thresholds as a basis
  - For example, only eight countries (2 developing) today have minimum performance and other standards for split air conditioner units
  - If the government of a CDM-eligible country were to take the decision to pursue such standards, one could subject it to a common practice test and then use the concept of scaled additionality to estimate the percentage of CDM credits
  - Over time as more countries pursue such air conditioner standards each successive country would get a diminishing proportion of the CERs (Self-regulating)

Technology Applicability Conditions

- CDM-PoA (EB28-Article 6):
  - A *PoA* shall apply one approved baseline and monitoring methodology, involving one type of technology or measure applicable to all *CPAs*
- Should depend on extent to which technologies are integrated
  - Lighting and water pumping could be treated as separate technologies
  - Improving motor systems that have both motor and pump improvements should be treated together as a package

Article 8 and the measurement of each CPA Too stringent?

- CDM-PoA(EB28-Article 8):
  - Each *CPA* shall be uniquely identified, defined and localized in an unambiguous manner including the exact start and end date of the crediting period, by providing, at the stage it is added to the registered *PoA*, information which is determined for the purpose in the registered *PoA*;

- Not necessary to identify, define, and localize each CPA. Further, each CPA need not be monitored separately
  - AM0046 for instance appears to call for measurement of lighting energy consumption separately for the lighting circuit in each participant household
  - An appropriately stratified sample should suffice

- CERs should be reduced by the percentage of free riders

Conclusions

- Extensive experience with DSM programs, appliance standards, voluntary programs, and ESCO activities
- Methodologies exist to support program design and implementation
- Similar approaches could be adopted for CDM projects under current rules and procedures for the project activity approach
- EB 28
  - Should consider policies and multiple technologies
  - Requiring location, identification and definition of CPAs is unnecessarily stringent
- Need to build capacity about approaches for –
  - Conducting surveys and design of survey instruments, and determination of free rider percentage

References

- www.cpuc.ca.gov
- www.evo-world.org

- Vine E. and J. Sathaye (1999). Monitoring, Evaluation, Reporting and Verification of Climate Change Mitigation Projects: Discussion of Issues and Methodologies and Review of Existing Protocols and Guidelines.. *Mitigation and Adaptation Strategies for Global Change*, Vol.4: 43-60.

Other slides

Who gets the CERs?

- Using the DSM model, the total CERs would be reduced by percentage of free riders
- Each participant, including a free rider, would get the same CERs
  - Possible to weed out free riders but transaction costs may be too high

Selected Carbon Emissions Trading Schemes

Program	Dates of operation	Market Scope	Compliance	Type	GHG Coverage	Registry
Past and current						
UK Emissions Trading System	2002-2006	31 Direct Participants and 6000 companies with climate change agreements with government	Voluntary	Allowance	All six Kyoto GHGs*	UK Dept. of Env., Food and Rural Affairs
Danish CO2 Quota Act	2001-03	Eight Danish electricity companies as suppliers and open market for buyers of rights to emit	Mandatory for suppliers	Allowance	CO2	Danish Energy Agency
Chicago Climate Exchange	2003	GHG emitters and GHG reduction providers	Voluntary	Allowance and project	All six Kyoto GHGs	Chicago Climate Exchange
BP internal company CO2 trading	1998-2002	All business units	Mandatory	??	CO2 and CH4	None
Shell Tradable Emissions Permits System	2000-02	Six business units, based in Australia, Canada, Europe, and the US	Voluntary	Allowance	CO2 and CH4	None?
Hesse –Tender (Germany)	2003	Six companies	Voluntary	??	CO2	
Canadian Domestic Emissions Trading		Member companies in Partnerships for Climate Action	Voluntary	Allowance	CO2	Partnerships for Climate Action
Dutch ERUPT and CERUPT Programs	2000	Any entity capable of generating a CO2 reduction project	Voluntary	Project	All six Kyoto GHGs	JI and CDM
World Bank PCF and Bio-carbon Fund	1999	Any entity capable of generating a CO2 reduction project	Voluntary	Project	All six Kyoto GHGs	JI and CDM
Global Environment Facility	1991	All signatories to the UNFCCC	Voluntary	No trades, project based activity	All six Kyoto GHGs	None
Activities Implemented Jointly (AIJ)	199x	All signatories to the UNFCCC	Voluntary	No trades, project based activity	All six Kyoto GHGs	UNFCCC
Climate Trust	1997	Unrestricted	Voluntary	Allowance and project	CO2	State of Oregon
Proposed						
EU Emissions Trading System	2005	Industry, electricity generators, and combustors > 20 MW size	Mandatory	Allowance	CO2	EU
Japan	2005	Not known	Voluntary		Not known	
Norway	2005	Selected industrial processes	Mandatory		CO2	

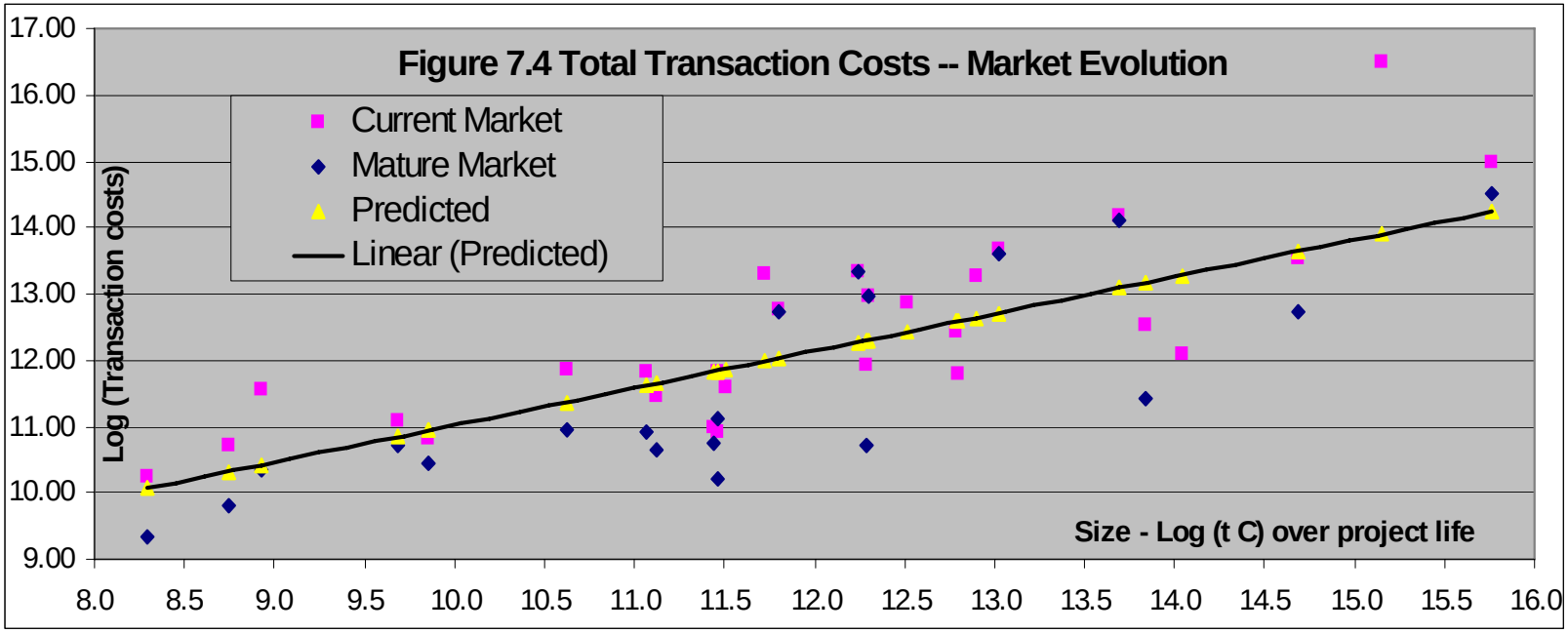


Figure 7.4 Total Transaction Costs -- Market Evolution
Current Market
Mature Market
Predicted
Linear (Predicted)
Log (Transaction costs)
Size - Log (t C) over project life
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16.00
15.00
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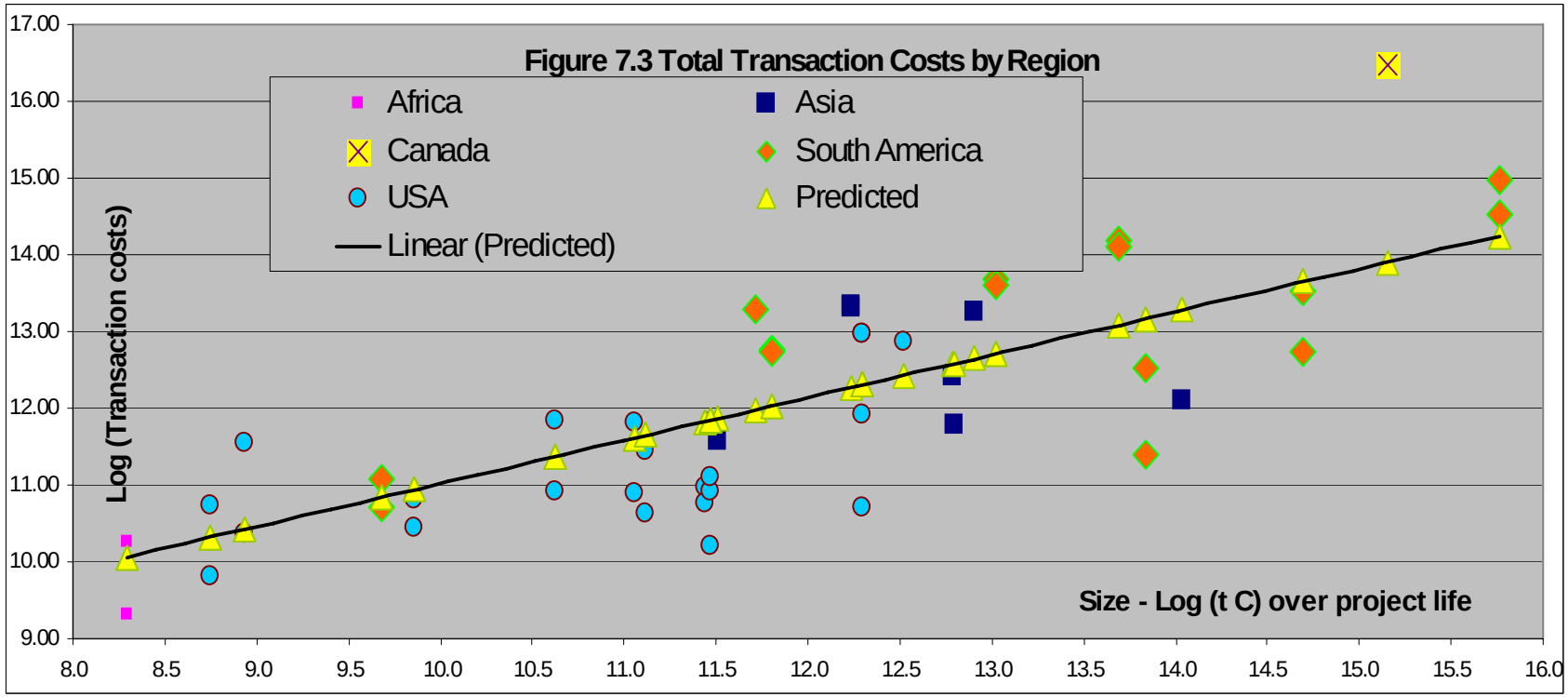
Figure 7.3 Total Transaction Costs by Region
Africa
Asia
Canada
South America
USA
Predicted
Linear (Predicted)
Log (Transaction costs)
Size - Log (t C) over project life
17.00
16.00
15.00
14.00
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NEW METHODOLOGY: BASELINE (CDM-NMB and NMM)
Can this methodology format be used for a program of project activities?

A. Methodology title and summary description
   - PoA restricted to one type of technology or measure

B. Applicability/ project activity

C. Project boundary –
   - Physical boundary may extend across more than one country

D. Baseline scenario – one approved baseline methodology

E. Scaled additionality

F. Baseline emissions adjusted for free riders and spillovers

G. Project activity emissions

H. Leakage, rebound, free riders, and spillovers

I. Emission reductions

J. Changes required for methodology implementation in 2nd and 3rd crediting periods (if relevant)

K. Selected baseline approach from paragraph 48 of the CDM modalities and procedures

L. Other information

M. Monitoring – statistical sampling approach

Crediting Period

- CDM-PoA:
  - Duration not to exceed 30 years
  - Any CPA may be added to the duration of the PoA by coordinating/managing entity
  - Crediting period will be maximum of seven years which may be renewed at most two times or a maximum of 10 years

Ownership of CERs

- Project-participants own CERs
  - Distribution of CERs is up to the participants

- CDM-PoA:
  - May be proposed by a public or private communicating entity
  - Project-participants make arrangements with communicating entity on distribution of CERs

Contents

- Definition of policies and programmes (PP)
- Frequently asked questions about PP
- Transaction costs of CDM and other offset projects
- Prior experience with energy efficiency programs
- Key Issues: Additionality by hierarchical level
- Key Issues: Establishing comparison groups and estimating free riders
- Capacity building
- Conclusions

Policy and Program Definitions

Policy:

- General principle, idea, objective, and/or a goal
- Policy Instrument?
- CDM -- Programme of activities (PoA)
  - Has to comply with current guidance on regulations for project activities
  - Improved enforcement is permissible

Program:

- Defines ways for implementing a policy.
- As such programs are
  - A system of services, opportunities, or projects, designed to meet a social need,
  - An ordered set of activities organized with the objective to implement a policy.
- CDM – Programme of activities (PoA)
  - Voluntary coordinated action by a private or public entity to implement a policy
  - GHG reductions have to be additional to any that would occur in the absence of a PoA

Data Set 1: Regression Analysis of Transaction Costs of Multiple Types of Offset Projects

Dependent variable: Log (Total Transaction Costs (USD))

	(Standard error in parenthesis)
Independent variables:	
t C (log)	0.56** (0.08)
Forestry	-1.04** (0.40)
Energy Efficiency	-0.59 (0.36)
Multiple objectives	-0.34 (0.30)
S. America	0.75* (0.45)
Asia	-0.24 (0.41)
Mature	-0.49* 0.27
Constant	6.08** (1.00)
R2	0.69
N	48

*Statistical significance at the 10% level
**Statistical significance at the 5% level

- **Statistical analysis to determine significant influence on costs of**
  - **Project Size**
  - **Multiple benefits**
    - **Technology demonstration, social development, other environmental benefits**
  - **Forestry, energy efficiency dummies**
  - **Regional dummies – Asia and Latin America**
  - **Mature vs. nascent markets**