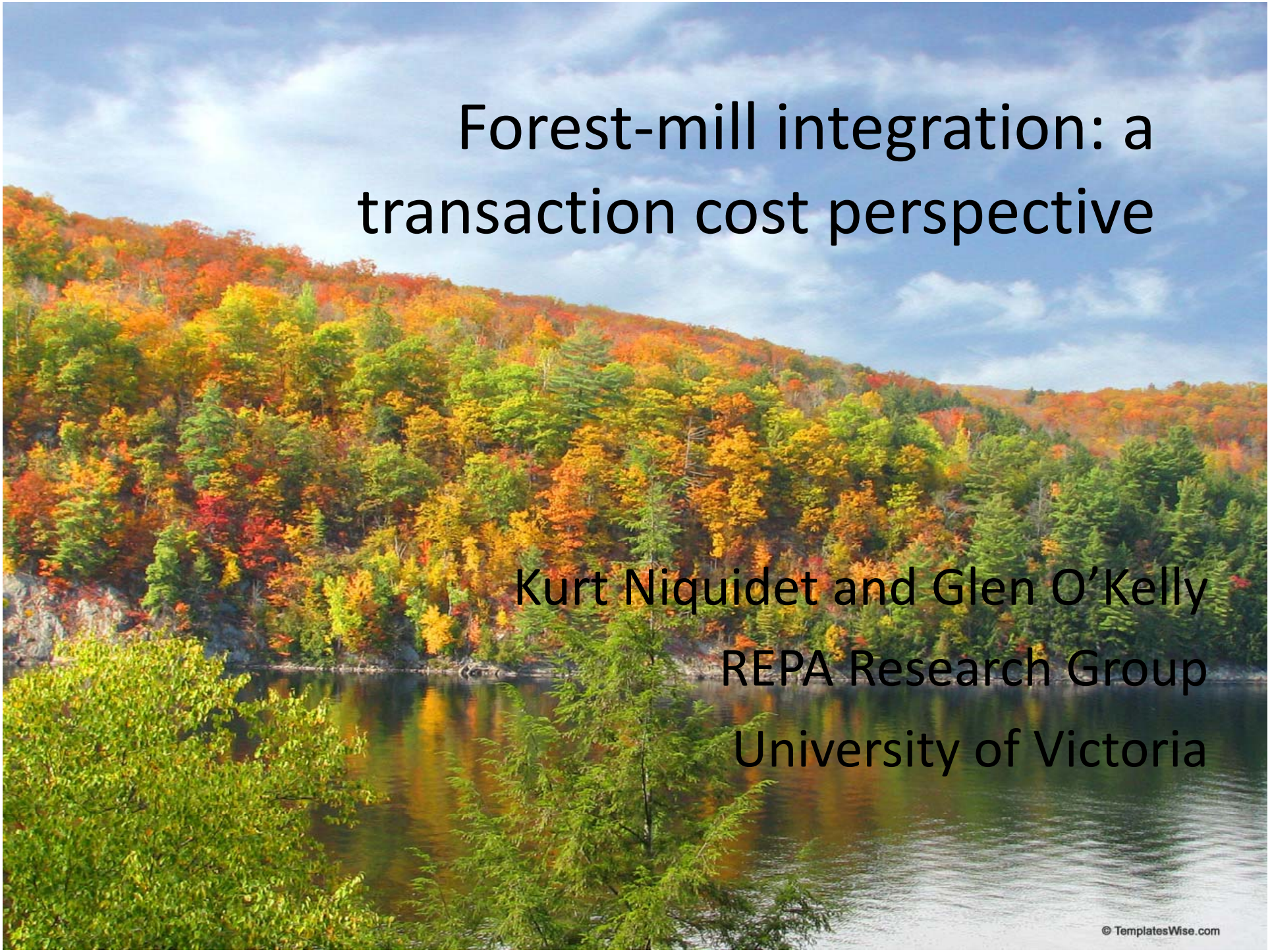
Forest-mill integration: a transaction cost perspective
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Outline

- Policy background in Canada.
- Brief overview of transaction cost theory
- Forestry and transaction cost economics
- Empirical model of forest-mill integration
- Discussion/Conclusions

Full paper can be found at:

http://www.vkooten.net/repa/publications.htm.
Working paper 2008-07

Policy background in Canada

- Vertical integration traditionally favored through appurtenance agreements
- Concerns: Pearse (1976). 1991 FRC recommended 50% of volume devoted to markets.
- BC - 2003 FRP 20% auction on open market and increased arms length transactions through small scale tenures.
- Quebec – 2008 new forest regime 25% market.

Policy background in Canada

- Follow de-integration in US?
- Globermann and Schwindt (1986) study suggests transaction costs are driving integration decision.
- Industry expresses need for secure supplies for investment
- What is an appropriate proportion to devote to markets?

Transaction cost theory

- Origins owed to Coase (1937). Questioned the emergence and boundaries of firms. Developed and formalized by Williamson(1975), Klein et al. (1978), Joskow (1985) etc.
- “make or buy” decision
- Ranges from anonymous spot markets through to vertical integration with several “hybrid” arrangements in between.

Transaction cost theory

- Choice of organization form is dictated by transaction costs.
- Transaction costs depend on:

1. Asset specificity – physical, geographical etc.
2. Uncertainty
3. Transaction frequency

- Avoid “hold up” problem (quasi rent extraction)

Forestry and transaction cost economics

- Pulp and paper integration (Ohanian 1994), Silviculture (Wang and van Kooten 1999, Wang et al. 2000)
- Prior forest mill integration studies (Globerman and Schwindt 1986, Yin et al. 2000, Lönnstedt 2007) have mentioned transaction costs but no empirical testing.

Empirical forest-mill integration model

- Surveyed 136 mills in New Zealand and Sweden. 88 participated.
- Survey gained information on proportion of fibre sourced from market (*fibrem),* long term contract (*fibrec*), and own forest *(fibreo*)
- Also retrieved potential transaction cost variables

Descriptive statistics

Variable	description	Mean	Std. Dev.	Min	Max
fibrem	Proportion of fibre from market	0.50	0.39	0	1
fibrec	Proportion of fibre from long term contract	0.37	0.37	0	1
fibreo	Proportion of fibre from own forest	0.13	0.26	0	1
NZ	Indicator variable for New Zealand	0.38	0.49	0	1
pulp	Indicator variable for Pulp mill	0.32	0.47	0	1
fibresp	Ranking of fibre specificity	3.25	1.36	1	5
uncert	Ranking of market uncertainty	2.93	1.36	1	5
mills	# of mills owned in fibre basin	2.24	2.09	1	13
size	Fibre consumption	224.53	279.22	1	1250
Mod_con	3 firm forest ownership concentration ratio 0.3 to 0.6	0.41	0.49	0	1
high_con	3 firm forest ownership concentration ratio >0.6	0.30	0.46	0	1
net_export	Region is net exporter of fibre	0.34	0.48	0	1

Empirical forest-mill integration model

- Dependent variable *fibrem*
- OLS biased and inconsistent with proportion as dependent variable
- Log odds ratio conversion and beta distribution model can’t handle extreme points (0,1)
- Two limit tobit (Hobbs 1997): 0 and 1 points are not really censored or missing data.
- Instead use fractional logit model (FLOGIT) developed by Papke and Wooldridge (1996)

Results

Variable	Coef.	Std. Err.	P value	Marginal Effects
constant	3.213	0.760	0.000	
NZ	1.132	0.478	0.018	0.275
pulp	-1.518	0.460	0.001	-0.354
fibresp	-0.540	0.145	0.000	-0.135
uncert	-0.285	0.127	0.024	-0.071
mills	-0.171	0.075	0.023	-0.043
size	0.001	0.001	0.040	0.0003
net_export	0.336	0.347	0.333	0.084
mod_con	-0.804	0.445	0.071	-0.198
high_con	-0.986	0.648	0.128	-0.239

Log pseudo-likelihood = -40.61
# of observations: 88

Discussion

- Overall target of 50% market suggested by 1991 FRC supported.
- However, transaction costs factors are significant so flexibility desirable.
- Pulp sector seems to have legitimate demands for longer term supply commitment.
- If greater market use is desired, reducing overall supply uncertainty (land use decisions etc.) could be critical.

Conclusion

- Transaction cost factors are significant in explaining forest-mill integration decision.
- Future research: other regions and variables (potentially outside TCE theory).
- Do factors such as growth rates, possibilities for alternative land use (agriculture, real estate) affect landowners willingness to enter into longer term supply commitment?
- How and why do contract duration and pricing adjustments in long-term contracts vary?