



STRATEGIC LEARNING AND CORPORATE INVESTMENT

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WHY I LIKE THIS PAPER

- Great setting to answer an interesting question — can a “wait and see” effect delay investments *purely due to anticipation of information spillover?*
- Great data: can observe the timing of the start/availability of a *real option* and also all the unexercised real options
 - “*we are able to precisely define newly drilled wells as either the start of a new option, or the exercise of an existing option, simply by observing the section in which it is drilled*”
- Instrumental variable strategy based on a smart source of exogenous variation in number of peers using land allocation from a century ago
- **Main finding:** Each additional real option held by a firm’s peers significantly delays firm’s own investment decisions, as the firm looks to reduce uncertainty by first observing its peers’ decision
 - Higher effect with more skilled peer and when anticipated information more relevant
 - This anticipation of information dampens investment and production at the aggregate level

COMMENT 1: SOME MORE DETAIL NEEDED

- Clarify what parameters are relevant to the option exercise decision — the drilling of an infill well — in absence of any peers
- Among these, which parameters does a firm learn about due to a peer drilling an infill well in the neighbourhood?
 - Productivity: Observed actual production of neighbourhood wells should also provide (even more) information, including the first drilled wells in a section. Also production from self-owned first wells in the section.
 - On average, every unexercised real options has 4 peer unexercised options, 5 own unexercised options, and a total of 17 wells in the surrounding area
 - With so many wells in the vicinity whose production can be observed, it seems surprising that firms delay their exercise decision to obtain further additional information. How much marginal value should one expect such information to add?
 - One possibility: exercise reveals some time-varying parameter; therefore past exercises are less informative (extraction technology/efficiency changes quickly over time?)
 - Cost of drilling / rock quality
 - Is digging a second well optimal? Even if there are high deposits, whether digging one or two wells is the optimal extraction strategy may not be clear

COMMENT 2: INTERACTION WITH AVAILABLE INFORMATION

- “we also find that firms tend to wait less on their peers when the information they have already obtained signals higher expected profitability.”
 - “we measure the signal of quality using the market value of the mean well drilled by a firm’s peers”
 - Conclusion: “incentive to delay investment to learn from their peers is most salient when there is more uncertainty regarding the profitability of the potential investment.”
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- Information can be Good or Bad
 - Information can be Precise or Imprecise
 - Precise information, even if it is Bad, should also make additional potential information less relevant; the authors’ argument suggests that Good information has this property
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- Precision could be measured separately from level of the signal by the number of wells in the vicinity (alternatively: number of wells that are relevant in terms of oil-gas mix)
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- Side point: Why is the market value of only the peers being considered? Why not include the value of own wells in the vicinity?

COMMENT 3: OWN UNEXERCISED OPTIONS

	Hazard Model for Project Exercise					
	(1)		(2)		(3)	
	Estimates	HI(%)	Estimates	HI(%)	Estimates	HI(%)
Unexercised Investment Opportunities (Peers) _{j,t}	-0.030*** (0.011)	-2.93	-0.037*** (0.011)	-3.65	-0.037*** (0.010)	-3.62
Cumulative Number of Wells Drilled _{j,t}	0.053*** (0.004)	5.41	0.048*** (0.004)	4.95	0.050*** (0.004)	5.18
Unexercised Investment Opportunities (Own) _{j,t}	-0.035*** (0.011)	-3.47	-0.043*** (0.011)	-4.23	-0.051*** (0.010)	-4.99
Portfolio Concentration _{i,t}	0.188 (0.181)	20.72	0.096 (0.179)	10.06	0.076 (0.168)	7.94
Mean Distance Between Options _{i,t}	-0.059 (0.037)	-5.75	-0.067* (0.035)	-6.46	-0.074** (0.034)	-7.17
Firm Skill Level _{i,t}	-0.032 (0.057)	-3.14	-0.237*** (0.083)	-21.06	-0.192** (0.083)	-17.48
Royalty Rate _k (%)	0.007 (0.007)	0.69	0.007 (0.007)	0.67	0.006 (0.007)	0.58

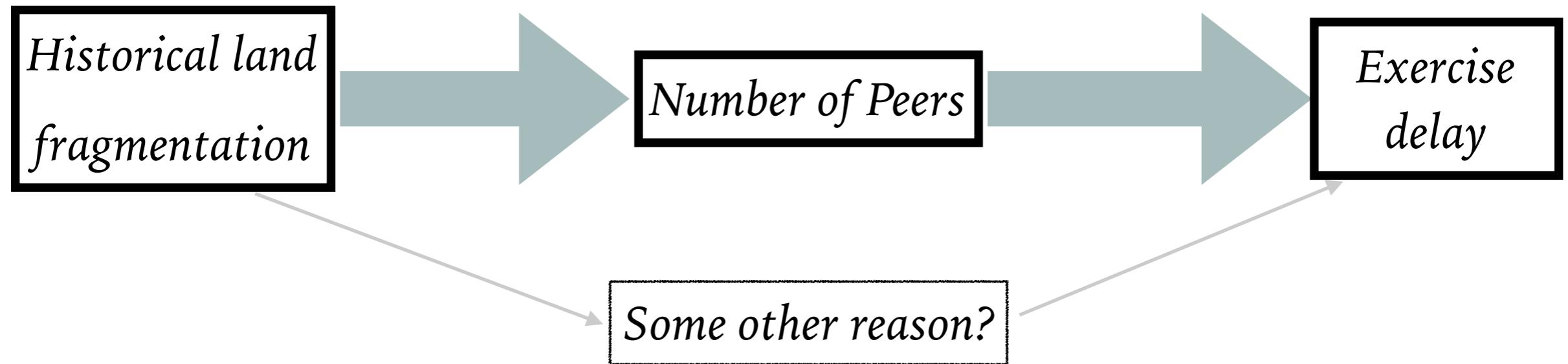
- Unexercised option owned by the same firm shows effect of similar size and magnitude as those owned by peers
- Theoretically this does not seem to make sense — a firm would not delay exercising an option due to the same strategic motive if it also owns the other option
- Could there be some omitted variable that is related to the number of first wells drilled in the region that is also related to tendency to delay drilling infill wells?
 - All firms are focussed on acquiring options in a region at a particular time and this focus crowds out drilling of infill wells
- Related... Interaction effect of own wells?: Perhaps having enough information from one's own wells reduces the relevance of peer options even more

COMMENT 4: INSTRUMENTAL VARIABLE

- Smart exogenous variation
- The second stage regression has a number of controls
 - Should one think of these as “included exogenous regressors?”
 - Are the controls in the first stage same as the second stage?
- Potentially endogenous regressors as controls can bias the coefficient of interest

	Hazard Model for Project Exercise					
	(1)		(2)		(3)	
	Estimates	HI(%)	Estimates	HI(%)	Estimates	HI(%)
Instrumented Unexercised Investment Opportunities (Peers) $_{j,t}$	-0.262** (0.120)	-23.02	-0.253** (0.114)	-22.39	-0.249** (0.113)	-22.02
Cumulative Number of Wells Drilled $_{j,t}$	0.092*** (0.024)	9.65	0.083*** (0.023)	8.66	0.087*** (0.023)	9.05
Unexercised Investment Opportunities (Own) $_{j,t}$	-0.120*** (0.045)	-11.35	-0.123*** (0.044)	-11.60	-0.132*** (0.044)	-12.37
Portfolio Concentration $_{i,t}$	-0.042 (0.215)	-4.13	-0.201 (0.230)	-18.24	-0.239 (0.203)	-21.24
Mean Distance Between Options $_{i,t}$	-0.141** (0.056)	-13.16	-0.160*** (0.057)	-14.79	-0.172*** (0.054)	-15.82
Firm Skill Level $_{i,t}$	0.061 (0.087)	6.25	-0.167 (0.111)	-15.35	-0.107 (0.115)	-10.17
Royalty Rate $_k$ (%)	0.011 (0.009)	1.15	0.011 (0.008)	1.08	0.010 (0.009)	0.96

COMMENT 4: INSTRUMENTAL VARIABLE... CONTD.



- Land fragmentation is observable to firms when decided whether to obtain initial drilling rights => types of firms that acquire rights could differ in areas with different land fragmentation (willingness to deal with small owners)
 - Do different types of firms (by size, financial constraints, cost of capital) acquire drilling rights in areas with high v.s. low value of the instrument (land fragmentation)?
- Are the areas different in terms of infrastructure (due to long shadow of history)?
- Number of unexercised options owned by the *same firm* correlated with the instrument?

CONCLUDING THOUGHTS

- Neat setting to answer an interesting question — can a “wait and see” effect in investments exist *purely due to anticipation of information spillover?*
- The paper would benefit by explaining some details of their story more clearly, especially related to aspects where the setting deviates from the motivating theoretical work
- The paper is succinct and well written
- I recommend you read the paper

THANK YOU!