The effect of inventor mobility on invention complexity

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Table 1: Preliminary Regression of Mobility of Inventors on Complexity of Inventions

	(1) log(complexity)	(2) log(complexity)	(3) log(complexity)
moved region	0.389***	0.383***	0.957***
	(0.000)	(0.000)	(0.000)
moved country	0.751***	0.736***	1.610***
	(0.000)	(0.000)	(0.000)
IPR index		-0.0371***	-0.0229***
		(0.000)	(0.000)
moved region * IPR index			-0.0601***
			(0.000)
moved country * IPR index			-0.0964***
			(0.000)
Observations	7957162	7918297	7918297
R^2	0.00676	0.00721	0.00757
Clustered SE	No	No	No
Year Dummies	No	No	No
Sample	All Obs	All Obs	All Obs

p-values in parentheses

None of the models include fixed effects, or technology subcategory controls

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: IPR Strength and Mobility of Inventors on Complexity of Inventions

	(1) log(complexity)	(2) log(complexity)	(3) log(complexity)
moved region	0.847***	-0.0635	0.270***
	(0.000)	(0.559)	(0.000)
moved country	1.824***	2.385***	1.255***
	(0.000)	(0.000)	(0.000)
IPR index	-0.0257***	0.0773***	
	(0.000)	(0.000)	
moved region * IPR index	-0.0530***	0.0322**	
	(0.000)	(0.003)	
moved country * IPR index	-0.110***	-0.189***	
	(0.000)	(0.000)	
strong IPR			0.473***
			(0.000)
moved region * strong IPR			-0.0130
			(0.744)
moved country * strong IPR			-0.833***
			(0.000)
Observations	5280190	5280190	5280190
R^2	0.009	0.145	0.146
Clusters	579,806	579,806	579,806
Clustered SE	Region Assignee	Region Assignee	Region Assignee
Year Dummies	No	Yes	Yes
Sample	All Obs	All Obs	All Obs

p-values in parentheses

None of the models include fixed effects, or technology subcategory controls

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: IPR Strength and Mobility of Inventors on Varying Measures of Complexity

	(1) log(complexity) 2x	(2) log(complexity) 3x	(3) log(complexity) 4x	(4) log(complexity) 5x
moved region	0.270***	0.269	0.381	0.450
	(0.000)	(0.072)	(0.068)	(0.102)
moved country	1.255***	2.219***	2.847***	3.490***
	(0.000)	(0.000)	(0.000)	(0.000)
strong IPR	0.473***	2.089***	2.823***	3.540***
	(0.000)	(0.000)	(0.000)	(0.000)
moved region * strong IPR	-0.0130	-0.0914	-0.122	-0.106
	(0.744)	(0.562)	(0.579)	(0.715)
moved country * strong IPR	-0.833***	-2.086***	-2.752***	-3.465***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	5280190	537491	460578	391121
R^2	0.146	0.026	0.026	0.026
Clusters	579,806	91,564	80,985	71,085
Clustered SE	Region Assignee	Region Assignee	Region Assignee	Region Assignee
Year Dummies	Yes	Yes	Yes	Yes
Sample	All Obs	All Obs	All Obs	All Obs

p-values in parentheses

None of the models include fixed effects, or technology subcategory controls

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Technology Complexity and Mobility of Inventors on Invention Complexity

	(1) log(complexity)	(2) log(complexity)	(3) log(complexity)
moved region	0.172***	0.183***	0.210
	(0.000)	(0.000)	(0.055)
moved country	1.213***	0.305***	0.0599
	(0.000)	(0.000)	(0.700)
strong IPR	0.408***		
	(0.000)		
moved region * strong IPR	0.0192		
	(0.590)		
moved country * strong IPR	-0.813***		
	(0.000)		
moved region * tech complexity	0.149***	0.250***	0.0448
	(0.000)	(0.000)	(0.734)
moved country * tech complexity	0.00195	-0.123***	0.566**
	(0.927)	(0.000)	(0.002)
Observations	5245466	2599718	32095
R^2	0.169	0.251	0.124
Clusters	575,441	323,620	4,647
Clustered SE	Region Assignee	Region Assignee	Region Assignee
Year Dummies	Yes	Yes	Yes
Technology Controls	Yes	Yes	Yes
Sample	All Obs	US inventions	Indian inventions

p-values in parentheses

None of the models include fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Extent of Regional Mobility of Inventors on Invention Complexity

	(1) log(complexity)
moved region	-0.0334
	(0.287)
moved country	1.089***
	(0.000)
strong IPR	0.407***
	(0.000)
moved region * strong IPR	0.0503
	(0.103)
moved country * strong IPR	-0.727***
	(0.000)
moved region * tech complexity	0.148***
	(0.000)
moved country * tech complexity	-0.0181
	(0.389)
region moves = 1	-0.0236***
	(0.000)
region moves = 2	0.0167
	(0.058)
3 <= region moves <= 5	0.0517***
	(0.000)
6 <= region moves <= 8	0.120***
	(0.000)
region moves >= 9	0.488***
	(0.000)
Observations	5245466
R^2	0.170
Clusters	575,441
Clustered SE	Region Assignee
Year Dummies	Yes
Technology Controls	Yes
Sample	All Obs

p-values in parentheses

None of the models include fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Extent of Country Mobility of Inventors on Invention Complexity

	(1) log(complexity)
moved region	0.0584
	(0.073)
moved country	0.864***
	(0.000)
strong IPR	0.409***
	(0.000)
moved region * strong IPR	0.0843*
	(0.012)
moved country * strong IPR	-0.744***
	(0.000)
moved region * tech complexity	0.147***
	(0.000)
moved country * tech complexity	-0.0351
	(0.089)
country moves = 1	-0.0155
	(0.156)
country moves = 2	0.0522***
	(0.000)
country moves = 3	0.0673***
	(0.000)
country moves = 4	0.118***
	(0.000)
country moves >= 5	0.652***
	(0.000)
Observations	5245466
R^2	0.170
Clusters	575,441
Clustered SE	Region Assignee
Year Dummies	Yes
Technology Controls	Yes
Sample	All Obs

p-values in parentheses

None of the models include fixed effects

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Inventor - Technology Class Controls in Mobility of Inventors on Invention Complexity

	(1) log(complexity)	(2) log(complexity)
moved region	0.172***	0.135***
	(0.000)	(0.000)
moved country	1.213***	1.167***
	(0.000)	(0.000)
strong IPR	0.408***	0.382***
	(0.000)	(0.000)
moved region * strong IPR	0.0192	0.0150
	(0.590)	(0.669)
moved country * strong IPR	-0.813***	-0.773***
	(0.000)	(0.000)
moved region * tech complexity	0.149***	0.149***
	(0.000)	(0.000)
moved country * tech complexity	0.00195	0.000912
	(0.927)	(0.966)
inventor-tech class		-5.72e-08***
		(0.000)
Observations	5245466	5245466
r2	0.169	0.169
N_clust	575,441	575,441
Clustered	Region Assignee	Region Assignee
Year	Yes	Yes
Tech	Yes	Yes
InventorClass	No	Yes
Sample	All Obs	All Obs

p-values in parentheses

Unable to add inventor-technology class dummies since there are 4,617,880 unique inventor-technology class tuples

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Using 9/11 Shock to Estimate the effect of Mobility of Inventors on Invention Complexity

	(1) log(complexity)	(2) log(complexity)	(3) log(complexity)
moved region	0.227***	0.0227	0.314***
	(0.000)	(0.165)	(0.000)
moved country	0.151***	0.227***	0.0604
	(0.000)	(0.000)	(0.057)
strong IPR	-0.254***		-0.297***
	(0.000)		(0.000)
moved region * strong IPR	-0.0541**		-0.0808***
	(0.006)		(0.000)
moved country * strong IPR	-0.0544		-0.0774*
	(0.071)		(0.013)
moved region * tech complexity	-0.000520	0.100***	-0.0117
	(0.971)	(0.000)	(0.566)
moved country * tech complexity	0.0219	-0.0444	0.0392
	(0.242)	(0.141)	(0.092)
inventor-tech class	1.78e-08**	3.78e-08***	-9.05e-09
	(0.001)	(0.000)	(0.273)
9/11 Shock	-0.121***	-0.119***	-0.130***
	(0.000)	(0.000)	(0.000)
moved region * 9/11	0.0423***	0.146***	-0.0140
	(0.000)	(0.000)	(0.368)
moved country * 9/11	0.127***	0.0453	0.203***
	(0.000)	(0.111)	(0.000)
Observations	1578946	796535	782411
r2	0.065	0.068	0.072
N_clust	223,041	124,376	98,799
Sample	All Obs	US Inventions	Non-US Inventions

p-values in parentheses

Standard Errors are clustered at the region-assignee level

All models include year dummies and NBER technology subcategory dummies

Control for inventor-technology subcategory included

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Instrumenting with 9/11 Shock to Estimate the effect of Regional Mobility of Inventors on Invention Complexity

	(1) log(complexity)	(2) log(complexity)	(3) log(complexity)
moved region	-23.69***	-6.135***	-16.05***
	(0.000)	(0.001)	(0.001)
strong IPR	-4.212***		-2.777***
	(0.000)		(0.000)
moved region * strong IPR	20.81***		13.32***
	(0.000)		(0.001)
moved country * strong IPR	-2.743***	4.387***	-2.281**
	(0.000)	(0.000)	(0.001)
moved region * tech complexity	5.355***	6.278***	5.778**
	(0.000)	(0.000)	(0.001)
moved country * tech complexity	4.375***	-4.209***	3.530***
	(0.000)	(0.000)	(0.001)
inventor-tech class	-0.000000307***	-8.79e-08*	-0.000000378***
	(0.000)	(0.015)	(0.001)
Observations	1578946	796535	782411
R^2	.	.	.
Clusters	223,041	124,376	98,799
Sample	All Obs	US Inventions	Non-US Inventions

p-values in parentheses

Standard Errors are clustered at the region-assignee level

All models include year dummies and NBER technology subcategory dummies

Control for inventor-technology subcategory included

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$