

INVENTOR NATIONALITY AND PATENT EXAMINATION OUTCOMES

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INTRODUCTION

- Late 19thC international agreements to stop beggar-thy-neighbor policies
- “national treatment” = local & foreign patent applicants equal treatment
- countries have incentive to free-ride R&D investment incurred by other countries
- Several legal studies (McKee 1985; Braga 1989; Anderson 1998, Wineberg 1988; Linck and McGarry 1993), few economics studies (Aoki and Prusa 1993, Scotchmer 2004; Kotabe 1992, Lee 2007)
- No systematic empirical evidence – absolute differences in examination outcomes do not control for application quality differences

THIS PAPER

- Questions:
 - (a) Is there an absolute advantage for local vis-à-vis foreign inventors?
 - (b) What is behind any effect?
- Matched sample of 47,437 single, common priority, non-PCT, granted USPTO, examined EPO and JPO.
- Same invention
- Application years 1990-1995. Leaves >8 years for an examination decision.

EMPIRICAL MODEL

$$y_{ij}^* = f(q_i, n_i, s_i, X_i; \beta) + \varepsilon_i$$

$$y_{ij} = \begin{cases} 1 & \text{if } y^* > 0 \text{ (application is granted)} \\ 0 & \text{if } y^* \leq 0 \text{ (application is refused)} \end{cases}$$

y_{ij} = patent grant for application i in office $j \approx$ JPO & EPO grant decision

q_i = technological quality of invention \approx normalized forward citations at the USPTO & X/Y citation at EPO

n_i = nationality of the inventor

s_j = local economy R&D specialization \approx *Revealed Research Advantage* index of annual average R&D expenditure 1987-2000,

= inventor experience at said office,

= # claims

X = prior other grant, prior other refusal, prior us grant, office experience, technology, year.

DATA

- OECD Triadic Patent Family (TPF) Database;
- EPO's public access online database (esp@cenet);
- JPO's public access online Industrial Property Digital Library (IPDL) databases (Patent & Utility Model Concordance, both English and Japanese versions, and the Japanese only database);
- NBER Patent-Citations Data File (see Hall et al. 2002);
- PATSTAT, EPO Worldwide Patent Statistical Database;
- UN export data, and
- SourceOECD Basic Science and Technology Statistics.

NUMBER OF PATENT APPLICATIONS, 1990 TO 1995

Office of Application	Number of Applications
<i>All applications</i>	
USPTO applications	843,435
EPO applications	433,186
JPO applications	2,191,084
<i>Matched Applications (Triadic Patent Families)</i>	
• Non-PCT families	190,583
-single priority	172,095
- & examined in 3 offices (or quasi-refusal)	70,473
	47,437

Quasi-refusal = application withdrawn at EPO after an “X” or “Y” citation

Local inventor measured 4 ways

- Dummy for one local inventor (address of inventor)
- % of local inventors (address of inventor)
- Dummy for local applicant (address of applicant)
- Dummy for ethnic family name

Technological specialisation measured 3 ways

- Share of world R&D expenditure – concorded to IPC4 using Silverman
- Share of world exports – concorded to IPC4 using Silverman
- Share of world patents by inventor country (note: this result had different effect)

Inventive step measured 2 ways

- Normalised forward citations
- Fixed effect panel estimation

RESULTS

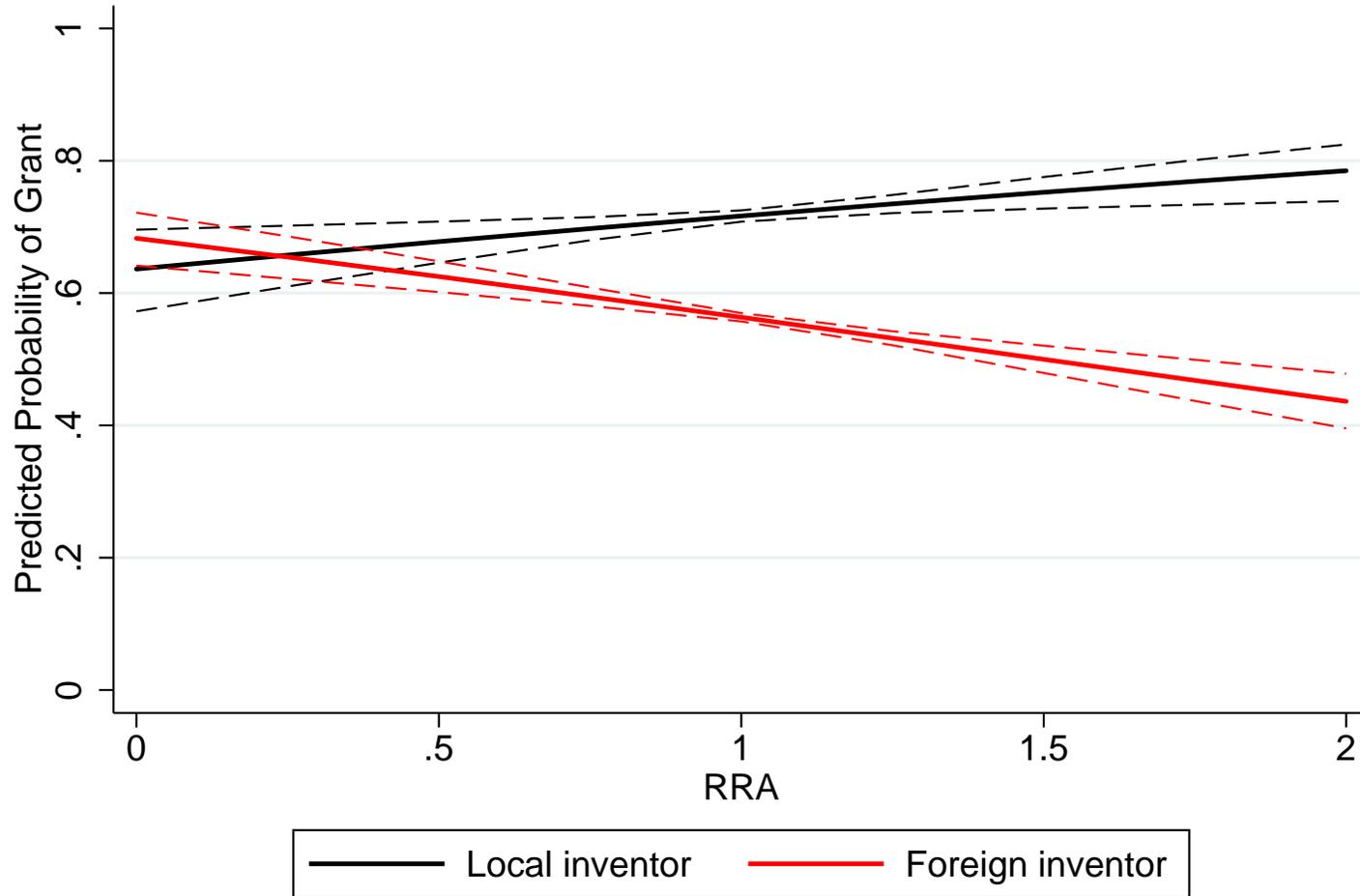
COEFFICIENT ESTIMATES, POOLED LOGIT (ROBUST)

<i>Dep. Variable: Grant Probability</i>	<i>Both offices</i>	<i>Both offices</i>	<i>Both offices</i>	<i>Both offices</i>
	(1)	(3)	(4)	(5)
MARGINAL EFFECT of LOCAL INVENTOR – percentage points	13.6	14.4	14.5	15.7
Nationality				
<i>Local inventor</i>	0.731***	0.236**	0.720***	0.472***
Explanatory variables				
<i>RRA</i>		-0.346***	-0.191***	-0.223***
<i>Local inventor*RRA</i>		0.430***		
<i>Inventor experience</i>		-0.001	0.030***	0.000
<i>Local inventor*Inventor experience</i>			-0.0383***	
<i>Claims</i>		-0.0146***	-0.0142***	-0.0194***
<i>Local inventor*Claims</i>				0.0277***
Obs.	95,894	94,874	94,874	94,874

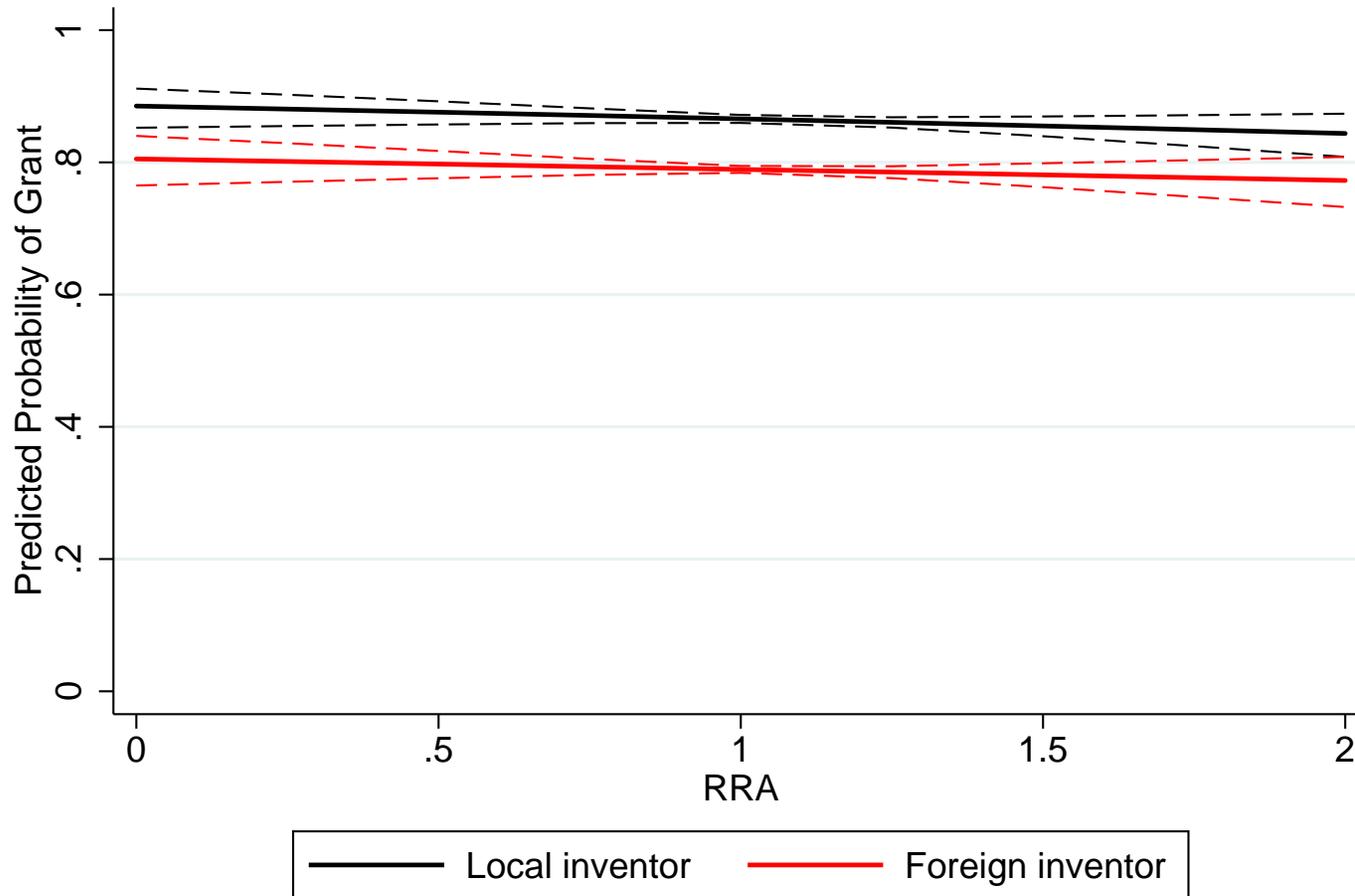
COEFFICIENT ESTIMATES, SINGLE OFFICES (ROBUST)

<i>Dep. Variable: Grant Probability</i>	<i>JPO</i>	<i>JPO</i>	<i>EPO</i>	<i>EPO</i>
	(1)	(2)	(4)	(5)
MARGINAL EFFECT of LOCAL INVENTOR – percentage points	15.6	15.6	8.0	7.9
Nationality				
<i>Local inventor</i>	-0.207	0.717***	0.624***	0.583***
Explanatory variables				
<i>RRA</i>	-0.511***	-0.251***	-0.0982	-0.108
<i>Local inventor*RRA</i>	0.879***		-0.0804	
<i>Inventor experience</i>	0.033***	0.049***	-0.006**	0.019***
<i>Local inventor*Inventor experience</i>		-0.042**		-0.031***
<i>Claims</i>	-0.0027**	-0.0027**	-0.024***	-0.024***
Obs	47,437	47,437	47,437	47,437

JPO



EPO



EXPLANATIONS

- Local applicants more persistent? But should applicant persistence influence examination decisions?
- Patent examiners in ‘home’ technologies more experienced → but this does not mean differential treatment between foreigners and locals
- Applicants in ‘home’ technologies produce higher quality inventions? Inventors should appear superior in both home and foreign patent offices.
- Foreign inventors’ have language and cultural barriers? *All* applicants must use local patent attorney in JPO & “strongly advised to” in EPO & most are large MNEs.

ROBUSTNESS CHECKS

Japanese and Europeans are superior inventors

- Possible that both European and Japanese inventions superior to inventions from elsewhere
- Estimated models with only European or Japanese inventor applications
- Not possible for local inventors to be simultaneously superior
- Find similar results as before

Marginal local inventions get a small advantage

- Borderline local inventors granted but foreign equivalent refused? But coefficient on *Local inventor** $XY < 0$

Ex Ante and Ex Post Claims Comparison

- Local inventors more willing to concede on claims → more likely to get a (partial) grant?
- Regression gives equal weight to each patent grant.
- Patent attorney & 2 senior science/engineering students read and compared the *ex ante* and *ex post* set of independent claims on a random sample of 318 applications submitted to either the EPO or JPO in 1997-2007.
- Method amended from that devised by patent legal scholars and patent attorney Dent, Liddicoat and Christie.
- Found foreign applicants more (not less) likely to have claims narrowed during examination.

CONCLUSION

- Is there a local inventor effect?
- Is patent office behavior is a behind-the-border trade barrier?
- Local inventor advantage \approx 13-16 percentage points
- Poor patent protection for foreign companies interferes with trade and R&D flows (Smith 1999, 2001; Branstetter, Fisman, and Foley 2006).

THANK-YOU

