The impact of joining the European Patent Convention

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Why this paper?

- Growth in worldwide patenting post 2000
  - Fink et al. (WIPO) – due to increase in multiple filings
  - Several patent offices working on harmonization to reduce workloads
  - One solution is regional patent systems, which can lower cost
- TRIPS encourages all WTO members to operate some kind of patent system
  - encourages growth of regional systems as a cost-saver
- We ask what the consequence of joining a regional patent system is for inventor patenting

European Patent Convention

- Created in 1977 with 7 countries (now 38)
- Single application to the EPO
  - Application designates states in which it may be validated
  - After grant, must be validated in every state in which coverage is desired
  - Enforcement is national (some progress towards a EU-wide court at present)
  - In principle, lower cost than applying at each national office

Accession to the EPO

- Pre 2000: Belgium, France, Germany, Luxembourg, Netherlands, Switzerland, UK, Sweden, Italy, Austria, Liechtenstein, Greece, Spain, Denmark, Monaco, Portugal, Ireland, Finland, Cyprus
  - average 2005 GDP = $33.8K
- 2000-2008 (**our sample**): Turkey, Bulgaria, Czech Republic, Estonia, Slovakia, Slovenia, Hungary, Romania, Poland, Iceland, Lithuania, Latvia, Malta, Croatia, Norway
  - average 2005 GDP = $18.7K, without Iceland and Norway = $14.6K
- Post 2008: FYROM, San Marino, Albania, Serbia

Effects of joining the EPC

- Residents in the country – cheaper to obtain coverage abroad (in Europe)
- Non-resident inventors that already apply to the EPO – cheaper to get coverage in the country
- Full costs difficult to compute.
  - table of fees at the Nat offices around 100 euros for validation, and then 100 euros a year
  - EPO cost substantially higher
  - but there are also legal and translation fees…..

Simple stylized model

V_j = value of patent in country j, $j = 0,1,....,J$

C_j = cost of filing/renewal/legal in country j

0 = domestic country

patent in j if V_j - C_j > 0; except that may choose EPO if

$$\sum_{j=1}^{J} V_j - C_{EPO} > \sum_{j=1}^{J}(V_j - C_j) \text{ or } \sum_{j=1}^{J} C_j - C_{EPO} > 0$$

after accession, if value and fees remain unchanged, will patent at EPO if

$$C_0 + \sum_{j=1}^{J} C_j - C_{EPO} > 0$$

Implications

- Inventor who only applies to domestic office will not change behavior post accession

- Inventor who applied domestically and at EPO will shift applications to EPO only

- Inventors on the margin who used to apply domestically and to one or two European countries will switch to the EPO

Empirical analysis

- Impact of accession on aggregate patent filings
  - At the EPO
  - At national office
  - By residents in the country
  - By non-residents
- Impact of accession on individual firms in the country

Data

- Patent data from Patstat (October 2011):
  - Applications filed at the EPO, national patent offices, and via the PCT route at WIPO
  - Designation (filed within 6 months of the EPO search report) identifies countries where patent is expected to be validated, but only 44% are actually validated in designated states, so
  - Also collect validation info with a lag, and focus on patents applied for prior to 2008
- Firm data from Amadeus matched manually to patent data by applicant name
  - no data for Turkey

Patent filings by residents in a country
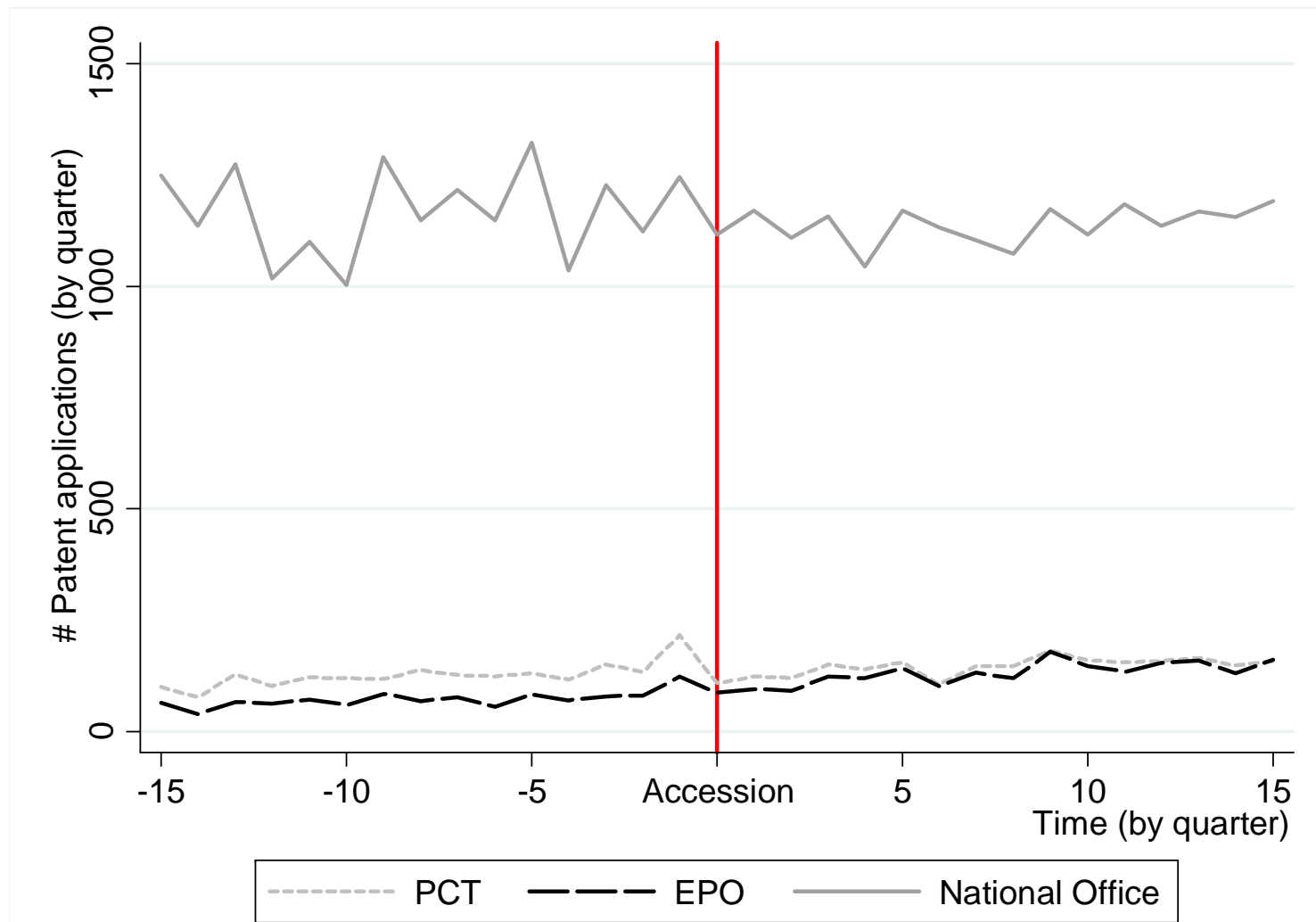
Patent filings at national offices
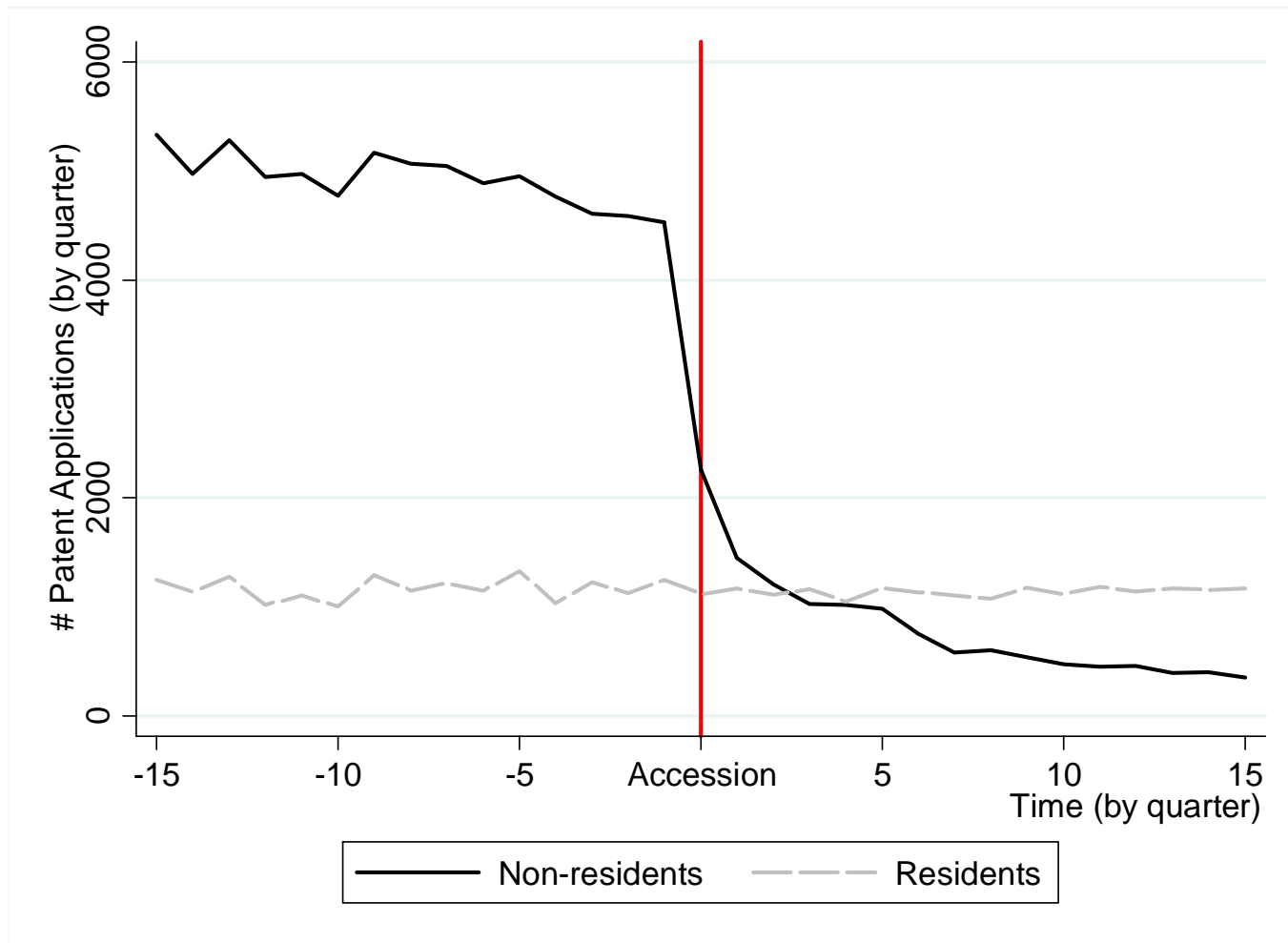
Regression analysis - aggregates

$$\log(p_{it} + 1) = \alpha_i + \delta_t + f(d_i, t) + \varepsilon_{it}$$

i = country, *t* = quarter of the year

f(d_i,t) = functions of quarter and accession date:

1. A dummy post-accession
2. A separate trend post-accession
3. A set of year dummies post-accession

924 obs = 77 quarters (1990-2009Q1)*12 countries

Aggregate results

|	WIPO (PCT) apps by residents	EPO apps by residents	Residents at national offices	Non-residents at national offices
Post-accession dummy	0.04 (0.20)	0.18 (0.20)	-0.05 (0.11)	**-1.16 (0.32)**
Post-accession trend	0.05 (0.03)	0.04 (0.04)	0.07 (0.04)	**-0.14 (0.05)**

Standard errors clustered on country.

Results as expected – resident applicant behavior barely changes, while non-resident applications at national offices decline substantially.

Patenting by residents

- Look at behavior of applicant firms in the country
  - domestic firms
  - domestic subsidiaries
  - foreign-owned subsidiaries

Total patent filings by residents
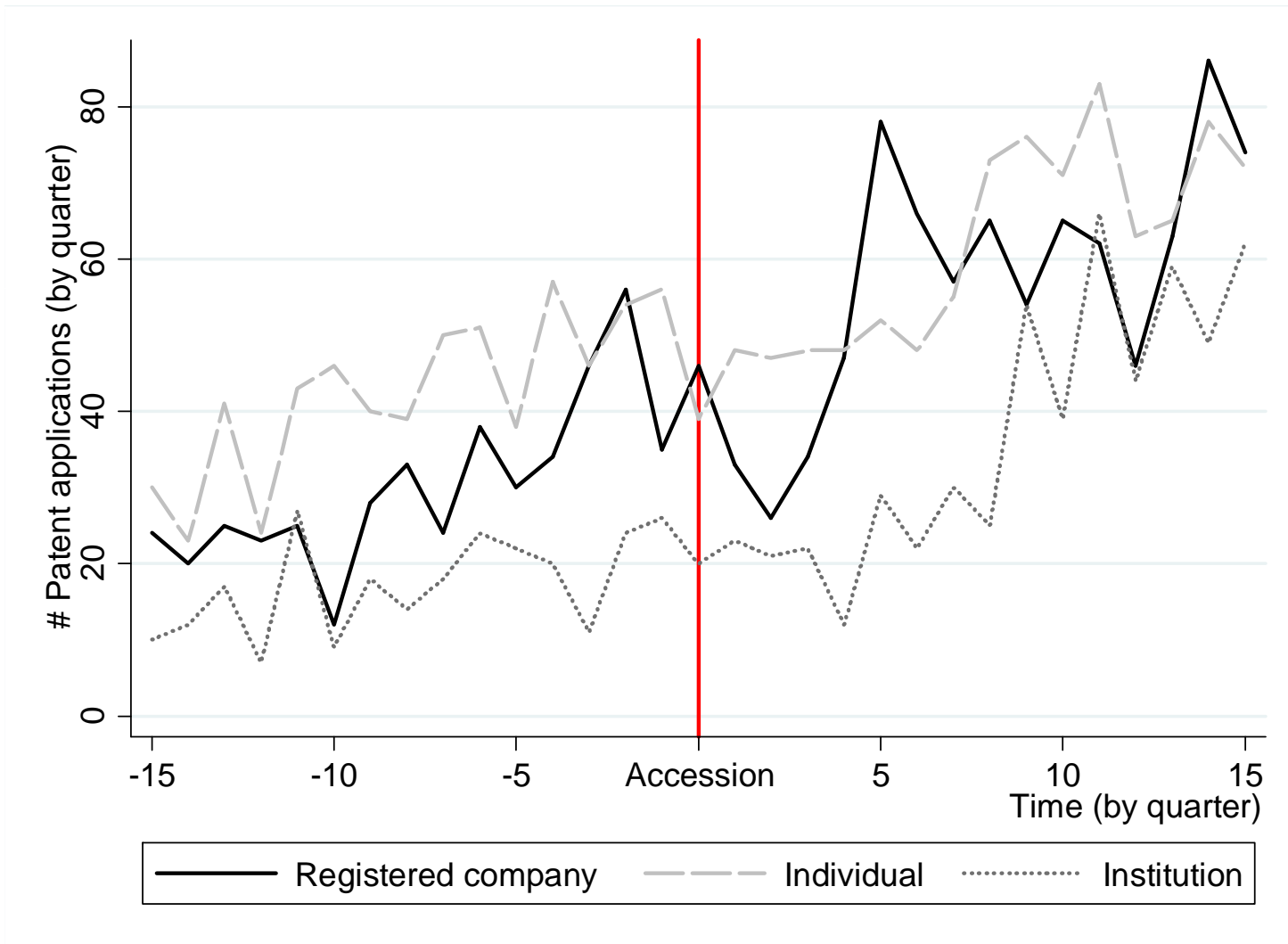
Firm-level analysis

Manufacturing only; 13 countries (exclude Turkey due to lack of firm data)

Compare patent filings at firm-level before & after accession in a given country relative to change observed during the same period in another country that has not yet joined the EPC

$$p_{ict} \sim f(\alpha_i + \delta_t + \gamma d_{ct} + X_{ict}\beta)$$

i = firm, t = time, c = country

d_{ct} = 1 after a country accedes to the EPC

Country	Firms	Patenting pre-accession	Patenting post-accession	Foreign-owned share
Bulgaria	5270	14	32	12.5%
Croatia*	1337	(27)	na	33.3%
Czech Republic	5619	62	183	26.3%
Estonia	451	0	1	100.0%
Hungary	1873	2	25	44.4%
Iceland	117	1	3	33.3%
Latvia	232	13	7	12.5%
Lithuania	221	2	8	10.0%
Norway*	10906	(438)	na	33.3%
Poland	8034	192	238	25.8%
Romania	29163	54	65	86.8%
Slovakia	766	2	30	9.7%
Slovenia	1150	34	67	13.2%
Total	65139	376**	659	32.0%

* Joined the EPC in 2008
** Excluding Croatia and Norway

Firm level estimates

Dep var:	Total patent apps	Pat apps at the national office	Pat apps at the EPO
D (post-accession)	-0.13 (0.20)	0.01 (0.20)	**1.53 (0.53)**
D (post-accession – foreign owned)	**-0.54 (0.26)**	**-0.71 (0.22)**	-0.15 (0.45)
Log (assets per emp)	**0.60 (0.05)**	**0.54 (0.05)**	**0.71 (0.09)**
Log (employees)	**0.91 (0.04)**	**0.87 (0.04)**	**1.03 (0.06)**
D (foreign owned)	**0.56 (0.18)**	**0.44 (0.19)**	0.65 (0.46)
D (subsidiary)	**0.44 (0.14)**	**0.37 (0.16)**	*0.48 (0.26)*

Country and year effects included
Method of estimation: max likelihood on a Poisson model
Standard errors clustered on firm and adjusted for heteroskedasticity

Conclusions

- Post-accession, domestic firms patenting at national offices is unchanged
- Post-accession, foreign-owned firm patenting at natl offices declines substantially
- Post-accession, all firms increase their patenting at the EPO (no difference between foreign & domestic)
- Other variables in the equation as expected:
  - patenting is proportional to firm size
  - is higher in capital-intensive firms
  - is higher in foreign-owned firms
- Including fixed firm effects: mostly insignificant but similar results for post-accession within firm.

Future work

- How were individual and institutional applications affected?

- Can we see any impact on innovation performance?

- What does this have to say about the impact of joining a regional patent system on economic growth in developing countries?