The impact of international patent systems: Evidence from accession to the European Patent Convention

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(based on joint work with Christian Helmers)

Why our 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
  – Regional patent systems could lower cost
• TRIPS - all WTO members should operate some kind of patent system
  – encourages regional/global systems as a cost-saver
• What should we expect from the introduction of the European unitary patent?
  – Look at the consequences of joining a regional patent system (EPC) for patenting, when the existing systems remain in place
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 – invalidation at EPO through opposition and at national courts.
  - 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-residents 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.....

Predictions

1. **domestic** entities file fewer patents with national office and more with EPO
2. more **domestic** entities obtain patent protection domestically
3. fewer **foreign** entities apply for patent protection with the national office - validate EPO patent instead
4. more **foreign** entities obtain patent protection in the country

⇒ Changes the **intensive & extensive margin**
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 (*not in this presentation*)

Data

- Patent data from Patstat (April 2014):
  - 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 information, and focus on patents applied for prior to 2008
Table 2: Accession states and dates

<table>
<thead>
<tr>
<th>Country</th>
<th>EPC Extension Date</th>
<th>EPC Accession Date</th>
<th>EU Accession Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>1 July 2002</td>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>Croatia</td>
<td>1 January 2008</td>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1 July 2002</td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Estonia</td>
<td>1 July 2002</td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Hungary</td>
<td>1 January 2003</td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Lithuania</td>
<td>5 July 1994</td>
<td>1 December 2004</td>
<td>2004</td>
</tr>
<tr>
<td>Latvia</td>
<td>1 May 1995</td>
<td>1 July 2002</td>
<td>2004</td>
</tr>
<tr>
<td>Iceland</td>
<td></td>
<td>1 November 2004</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>1 January 2008</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td></td>
<td>1 March 2004</td>
<td>2004</td>
</tr>
<tr>
<td>Romania</td>
<td>15 October 1996</td>
<td>1 March 2003</td>
<td>2007</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1 March 1994</td>
<td>1 December 2002</td>
<td>2004</td>
</tr>
<tr>
<td>Slovakia</td>
<td></td>
<td>1 July 2002</td>
<td>2004</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>1 November 2000</td>
<td></td>
</tr>
</tbody>
</table>

Note: grey shaded areas indicate country is European Union (EU) member.

Patent filings by residents

Patent filing by accession countries
EPO and national offices, before and after accession

- Both EPO and national office
- EPO filing only
- National office filing only
1. Patent filings at national offices before and after accession

EPO validations in accession countries

7. EPO filings validated in accession countries
Regression analysis - aggregates

\[ \log(p_{it} + 1) = \beta_{EPC} + \gamma_{EPC}s + \alpha_i + \delta_t + \varepsilon_{it} \]

\( p_{it} = \) number of patent applications from country \( i \) at time \( t \) (quarter of the year)

\( s = \) quarter since accession to the EPC

1. A dummy post-accession
2. A separate trend post-accession
3. Country and time dummies

952 obs = 68 quarters (1995-2011)*14 countries

Aggregate results

<table>
<thead>
<tr>
<th></th>
<th>EPO apps by residents</th>
<th>Residents at national offices</th>
<th>Non-residents at national offices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-accession</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dummy</td>
<td>0.01 (0.12)</td>
<td>-0.29 (0.12)</td>
<td>-1.54 (0.27)</td>
</tr>
<tr>
<td>Post-accession</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trend</td>
<td>0.04 (0.02)</td>
<td>0.04 (0.03)</td>
<td>-0.06 (0.03)</td>
</tr>
</tbody>
</table>

Robust standard errors clustered on country.

Result: resident applicant behavior barely changes, while non-resident applications at national offices decline substantially.
Results for predictions

1. **domestic** entities file fewer patents with national office and more with EPO
   – Very weak increase in EPO filings observed
2. more **domestic** entities obtain patent protection domestically
   – No increase visible
3. fewer **foreign** entities apply for patent protection with the national office - validate EPO patent instead
   – Foreign entities essentially cease filing at national offices
4. more **foreign** entities obtain patent protection in the country
   – About 20 times as many validations as applications at the national offices before accession, and rising
5. a new puzzle:
   – In some cases residents file both EPO and national patents for the same invention both before (as expected) and after (unexpected) accession.

The Unitary Patent

- What does all this imply for the Unitary Patent?
  – The UP leaves the two other routes to a patent in place: EPO and national office
  – Some results of a survey of patent users and stakeholder meetings
    • Benefits and costs
    • Takeup as a function of fee levels
Benefits and costs of switching to UP

Benefits

– Lower transacation costs
– Low or no publication and patent transfer fees at NPOs
– Easier to use for financing or licensing
– Litigation
  • One-stop shop
  • More certainty
  • Lower cost due to competition among lawyers?

Costs

– Loss of renewal flexibility
– Language complexity
– Litigation costs might be higher overall
– Invalidity risk greater – if lost, lose in all jurisdictions
– Small local firms with national patents worry about MNE entry in their market

Results of a 2013 survey of current EPO patentholders by Europe Economics

Percentage of patents that would have been registered as UP in the last 5 years:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Percentage</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1: Renewal fee equal to the sum of the current renewal fees for Germany, France and UK</td>
<td>62% (13,765)</td>
<td></td>
</tr>
<tr>
<td>Scenario 2: Renewal fee equal to the sum of the current renewal fees for Germany, France, UK, Netherlands, Sweden and Belgium</td>
<td>19% (4,222)</td>
<td></td>
</tr>
<tr>
<td>Scenario 3: Renewal fee equal to the sum of the current renewal fees for Germany, France, UK, Netherlands, Sweden, Belgium, Austria, Ireland and Denmark</td>
<td>12% (2,642)</td>
<td></td>
</tr>
<tr>
<td>Scenario 4: Renewal fee equal to the sum of the current renewal fees for Germany, France, UK, Netherlands, Sweden, Belgium Austria, Ireland, Denmark, Poland, Finland and Czech Republic</td>
<td>9% (1,957)</td>
<td></td>
</tr>
</tbody>
</table>

The potential use of the UP is sensitive to the level that the centralised renewal fees will have. Current proposals (7 May 2015) call for fees around the level of 4 country validation.
Simple stylized model

\[ V_j = \text{value of patent in country } j, \ j = 0,1,\ldots,J \]
\[ C_j = \text{cost of filing/renewal/legal in country } j \]
\[ 0 = \text{domestic country} \]

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

\[ \sum_{j=1}^{J} V_j - C_{\text{EPO}} > \sum_{j=1}^{J} (V_j - C_j) \iff \sum_{j=1}^{J} C_j > C_{\text{EPO}} \]

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

\[ V_0 + \sum_{j=1}^{J} V_j - C_{\text{EPO}} > (V_0 - C_0) + \sum_{j=1}^{J} (V_j - C_j) \iff C_0 + \sum_{j=1}^{J} C_j > C_{\text{EPO}} \]

\( \Rightarrow \) Assuming validation in 6 or more countries, EPO patenting clearly more likely after accession.