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
Patent filings at national offices

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 dummy</td>
<td>0.11 (0.11)</td>
<td>-0.19 (0.12)</td>
<td>-1.68 (0.26)</td>
</tr>
<tr>
<td>Post-accession trend</td>
<td>-0.003 (0.006)</td>
<td>0.003 (0.007)</td>
<td>-0.013 (0.005)</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 immediately and continue declining slowly.
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 patent holders 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>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1:</td>
<td>Renewal fee equal to the sum of the current renewal fees for Germany, France and UK</td>
<td>62% (13,765)</td>
</tr>
<tr>
<td>Scenario 2:</td>
<td>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>
</tr>
<tr>
<td>Scenario 3:</td>
<td>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% (2,662)</td>
</tr>
<tr>
<td>Scenario 4:</td>
<td>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>
</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

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

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

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

⇒ Assuming validation in 6 or more countries, EPO patenting clearly more likely after accession.