

# **Patent Applications – Structures, Trends and Recent Developments**

Rainer Frietsch, Ulrich Schmoch, Peter Neuhäusler, Oliver Rothengatter

---

**Studien zum deutschen Innovationssystem**  
**Nr. 09-2010**

---

Fraunhofer Institute for Systems and Innovation Research

February 2010

This study was conducted on behalf of the Expertenkommission Forschung und Innovation (EFI). The results and interpretations are the sole responsibility of the institute conducting the study. The EFI exercised no influence on the writing of this report.

## **Studien zum deutschen Innovationssystem**

**Nr. 09-2010**

ISSN 1613-4338

Publisher:

Expertenkommission Forschung und Innovation (EFI)

Geschäftsstelle:

Technische Universität Berlin, VWS 2

Müller-Breslau-Strasse (Schleuseninsel)

10623 Berlin

<http://www.e-fi.de/>

All rights, in particular the right to copy and distribute as well as to translate this study, are reserved. No part of the work may be reproduced in any form (by means of photocopy, microfilm or any other process), or using electronic systems be saved, processed, duplicated or distributed, without the written permission of the EFI or of the Institute.

### **Contact address and further information:**

**Rainer Frietsch**

Fraunhofer Institute for Systems and Innovation Research

Competence Center Policy and Regions

Breslauer Strasse 48

76139 Karlsruhe

Phone: +49-721-6809-197

Fax: +49-721-6809-176

Email: [rainer.frietsch@isi.fraunhofer.de](mailto:rainer.frietsch@isi.fraunhofer.de)

**Contents**

|  |           |
|--|-----------|
| <b>1. SUMMARY.....</b>   | <b>1</b>  |
| <b>2. INTRODUCTION.....</b>  | <b>3</b>  |
| <b>3. TRENDS IN INTERNATIONAL PATENT APPLICATIONS.....</b>                     | <b>7</b>  |
| <b>4. SHIFT-SHARE ANALYSIS.....</b>  | <b>15</b> |
| 4.1 METHODOLOGY.....   | 15        |
| 4.2 RESULTS.....   | 16        |
| <b>5. PATENT APPLICATIONS FILED AT THE USPTO – PRE-GRANT PUBLICATIONS.....</b> | <b>20</b> |
| <b>6. UNIVERSITY PATENTS .....</b>   | <b>23</b> |
| 6.1 METHODOLOGY.....   | 24        |
| 6.2 TOTAL NUMBERS OF PATENT APPLICATIONS OF UNIVERSITIES.....                  | 26        |
| 6.3 TECHNICAL ORIENTATION OF PATENT APPLICATIONS OF UNIVERSITIES.....          | 28        |
| <b>7. REFERENCES .....</b>   | <b>30</b> |
| <b>8. ANNEX.....</b>   | <b>32</b> |

## Figures

|  |           |
|--|-----------|
| <i>Figure 1: Indicator System to Analyse Innovation Systems Performance .....</i>  | <i>4</i>  |
| <i>Figure 2: Absolute Number of Transnational Patent Applications, 1991-2007 .....</i>                                   | <i>7</i>  |
| <i>Figure 3: Absolute Number of Transnational Patent Applications in High-tech Fields.....</i>                           | <i>9</i>  |
| <i>Figure 4: Specialisation of Selected Countries in Leading-edge Technologies, 1991-2007 .....</i>                      | <i>11</i> |
| <i>Figure 5: Patent Specialisation of Germany and EU-27 countries, 2005-2007.....</i>                                    | <i>13</i> |
| <i>Figure 6: Patent Specialisation of the USA and EU-27 countries, 2005-2007.....</i>                                    | <i>14</i> |
| <i>Figure 7: Patent Applications (Pre-grant Publications) at the USPTO, 2001-2007.....</i>                               | <i>20</i> |
| <i>Figure 8: Patent Applications (Pre-grant Publications) at the USPTO by Technological Areas, 2001-2007 .....</i>       | <i>21</i> |
| <i>Figure 9: Patent Applications of German Universities at the DPMA by Different Types of Applicants .....</i>           | <i>26</i> |
| <i>Figure 10: Share of University Patent Applications within All Applications at the DPMA by Technology Fields .....</i> | <i>29</i> |
| <i>Figure A1: Patent Specialisation of Germany, 1998-2000 and 2005-2007 .....</i>  | <i>32</i> |
| <i>Figure A2: Patent Specialisation of the USA, 1998-2000 and 2005-2007.....</i>   | <i>33</i> |
| <i>Figure A3: Patent Specialisation of Japan, 1998-2000 and 2005-2007 .....</i>  | <i>34</i> |
| <i>Figure A4: Patent Specialisation of Great Britain, 1998-2000 and 2005-2007 .....</i>                                  | <i>35</i> |
| <i>Figure A5: Patent Specialisation of France, 1998-2000 and 2005-2007 .....</i>   | <i>36</i> |
| <i>Figure A6: Patent Specialisation of Italy, 1998-2000 and 2005-2007.....</i>   | <i>37</i> |
| <i>Figure A7: Patent Specialisation of the Netherlands, 1998-2000 and 2005-2007.....</i>                                 | <i>38</i> |
| <i>Figure A8: Patent Specialisation of Switzerland, 1998-2000 and 2005-2007 .....</i>                                    | <i>39</i> |
| <i>Figure A9: Patent Specialisation of Canada, 1998-2000 and 2005-2007 .....</i>   | <i>40</i> |
| <i>Figure A10: Patent Specialisation of Sweden, 1998-2000 and 2005-2007.....</i>   | <i>41</i> |
| <i>Figure A11: Patent Specialisation of Finland, 1998-2000 and 2005-2007 .....</i>                                       | <i>42</i> |
| <i>Figure A12: Patent Specialisation of South Korea, 1998-2000 and 2005-2007.....</i>                                    | <i>43</i> |
| <i>Figure A13: Patent Specialisation of China, 1998-2000 and 2005-2007 .....</i>   | <i>44</i> |
| <i>Figure A14: Patent Specialisation of the Russian Federation, 1998-2000 and 2005-2007.....</i>                         | <i>45</i> |

**Tables**

*Table 1: Core Indicators for High-tech Patents, 2007 ..... 10*

*Table 2: Shift-share Analysis of Transnational Patents for USA and Japan..... 18*

*Table 3: Shift-share Analysis of Transnational Patents for Germany and EU-27 ..... 19*

*Table 4: Absolute Numbers and Shares of German Applications at the USPTO ..... 22*