The Impact of Foreign Pharmaceutical Patents on Innovation in Chile

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Historically, pharmaceutical patents are among the most controversially debated issues with regard to intellectual property (IP) protection, especially in developing countries. During the negotiations of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, pharmaceutical product patents represented one of the most divisive issues, being opposed by developing countries because of concerns that stronger patent protection would hinder access to drugs and prevent the development of a domestic pharmaceutical industry. Two decades after TRIPS, the empirical evidence on its effect on developing countries suggests that its impact might have been less dramatic than predicted by developing countries (Duggan et al., 2016). Although research on the topic so far has been heavily focused on India (Arora et al., 2009; 2011; Chaudhuri et al., 2006), Cockburn et al. (2016) find for a large sample of developed and developing countries that new drugs are launched faster in markets with strong patent protection. Moreover, Kyle and Qian (2013) using cross-country regressions find higher sales for patented drugs, and a lower price premium of patented drugs post-TRIPS in lower- and middle-income economies.

The core of the debate on foreign pharmaceutical patenting concerns two closely related issues: the first issue concerns the impact of pharmaceutical patents on access to essential drugs in developing countries. Given the difficulty in inventing around patented pharmaceutical compounds, patents are considered to be effective in limiting competition and hence affect drug prices. The second concern is about the effect of pharmaceutical patents by foreign multinationals on the ability of domestic companies to produce pharmaceutical products and on their incentives to invest in R&D to develop new drugs, in particular those tailored to the domestic disease environment. Our proposed study focuses on this latter concern, that is, we analyze the impact of foreign pharmaceutical patenting on the domestic pharmaceutical industry in Chile. Our objective is twofold. The first objective is to compare the characteristics of drugs on the Chilean market that are patented by foreign multinationals to those that are patented by domestic companies or not patented. Second, we investigate in which way foreign pharmaceutical companies use these patents in Chile and analyze the effect of this choice on domestic companies behavior, in terms of drugs developed and marketed.

For these purposes, we propose to extend a database that we have created in earlier work (Abud et al., 2015). The database links *all* patents (over 3,000 patents) granted

by the Chilean intellectual property office (INAPI) between 1991 and 2010 to drugs approved for sale in the Chilean market by the Chilean National Public Health authority. Due to the difficulty in linking patents to the drugs that they protect (for a detailed discussion see Abud et al., 2015), the work was carried out with the help of patent examiners specialized in pharmaceutical patents who manually associated each individual patent with the drugs that a given patent protects. Our database also contains detailed information on the drugs approved by the Chilean health authority, including information on local contract manufacturing (e.g. a foreign originator company outsources the manufacturing of a drug to a Chilean generics producer). Moreover, we have also linked drugs to trademarks, which provides us with another angle through which we can analyze the activities of foreign and domestic drug companies. We have used part of these data in prior work to study the use of secondary patents in Chile (Abud et al., 2015). For this new project, we propose to extend the existing database in an important dimension by adding drug-level sales data, which can be purchased from IMS Health. Sales information is crucial to determine whether drugs are sold in the Chilean market and to measure market shares and competition.

This study will contribute to the empirical literature on the impact of pharmaceutical patents and in particular the patenting of foreign multinationals on the capacity of an emerging economy to develop a local pharmaceutical industry. Chile is an interesting setting to study these questions. In Chile, pharmaceutical patents were introduced in 1991, but pharmaceutical drugs that had been patented abroad before Chile's new IP law came into effect in 1991 were expressly not patentable in Chile. Nevertheless, foreign pharmaceutical companies quickly started filing patents in Chile, to the extent that now about 95% of all patents across technology areas are pharmaceutical patents owned by pharmaceutical multinationals (Abud et al., 2013). During the same time, a highly successful domestic pharmaceutical industry has emerged in Chile. This projects, therefore, will shed light on the extent to which the introduction of patents in Chile has contributed to the emergence of the industry and how it was affected by the patenting activity of foreign multinationals.

Researchers and itemized budget

Researchers:

- Bronwyn Hall (UC Berkeley)
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The grant of $20,000 would be used during the academic year 2016/17 for:

- Data purchase: IMS Health $10,000
- Data cleaning, construction, analysis: 1 economics research assistant $3,000; 1 pharmaceutical patents expert $3,000
- Research trip to Chile, conferences/workshop: $4,000

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ACADEMIC POSITIONS

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02/2013-12/2013	Visiting Research Scholar, Department of Agricultural & Resource Economics, UC Berkeley
07/2012-10/2012	Visiting Researcher, Economics Division, World Intellectual Property Organization (WIPO)
01/2012-06/2012	Visiting Research Scholar, Department of Economics, Stanford University
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EDUCATION

2006-2010	DPhil in Economics, Department of Economics, University of Oxford
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AFFILIATIONS

2011 -	Research Associate – Centre for the Study of African Economies (CSAE), Oxford
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2008 -2014	Research Affiliate – Kiel Institute for World Economics (IfW)

ENTREPRENEURSHIP

2015	www.mykubby.com

PUBLICATIONS

Patent Litigation in Europe, with Katrin Cremers, Maximilian Ernicke, Dietmar Harhoff, Luke McDonagh, Paula Schliessler, Nicolas van Zeebroeck, ***European Journal of Law and Economics***, forthcoming

My precious! The location and diffusion of scientific research: evidence from the Synchrotron Diamond Light Source, with Henry Overman, ***Economic Journal***, forthcoming

Patent Litigation in China: Protecting Rights or the Local Economy?, with Brian Love and Markus Eberhardt, ***Vanderbilt Journal of Entertainment and Technology Law***, forthcoming

Inter Partes Review and the Design of Post-Grant Patent Reviews, with Colleen Chien, ***Stanford Technology Law Review***, forthcoming

An Empirical Analysis of Primary and Secondary Pharmaceutical Patents in Chile, with Maria-Jose Abud and Bronwyn Hall, ***PLOS ONE***, DOI: 10.1371/journal.pone.0124257.

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Innovation and the Survival of New Firms in the UK, with Mark Rogers, ***Review of Industrial Organization***, Vol. 36, No. 3, pp. 227-248 (2010)

The role of patent protection in (clean) technology transfer, with Bronwyn Hall, ***Santa Clara Computer and High Technology Law Journal***, Vol. 26 (4), pp. 487-532 (2010)
Reprinted in Peter Menell and Sarah Tran (eds.) 'Intellectual Property, Innovation and the Environment,' Edward Elgar, forthcoming 2013

Firm Growth and Firm Size, with Christoffer Koch and Mark Rogers, ***Applied Economics Letters***, Vol. 17 (16), pp. 1547-1550 (2010)

SUBMITTED WORKING PAPERS

What Can Explain the Chinese Patent Explosion?, with Markus Eberhardt and Zhihong Yu, CSAE Working Paper 2011-15 (*revised & resubmitted Oxford Economic Papers*)
[media coverage: BBC World Service, China Daily, Il Sole 24ore, FT Investment Adviser]

Invalid but Infringed?! An Analysis of the Bifurcated Patent Litigation System, with Katrin Cremers, Fabian Gässler, Dietmar Harhoff, and Yassine Lefouili (*revise & resubmit Journal of Economic Behavior & Organization*)

Technology Entry in the Presence of Patent Thickets, with Bronwyn Hall, and Georg von Graevenitz, NBER WP 21455.

Do Board Interlocks Increase Innovation? Evidence from Natural Experiments in India, with Manasa Patnam and Raghavendra Rau

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The heterogeneous effect of software patents onexpected returns: evidence from India, with Markus Eberhardt, Marcel Fafchamps, and Manasa Patnam

Looking for Trouble? Technological Change and the Growing Importance of Patents for Telecom Operators, with Andrea Fosfuri and David Wehrheim

Attention and Saliency on the Internet: Evidence from an Online Recommendation System, with Pramila Krishnan and Manasa Patnam, CEPR Discussion Paper No. 10939

Choose the Neighbor before the House: Agglomeration Externalities in UK Science Parks, Winner of best paper award "Centro Stefano Franscini – ETH Zürich"

Untested Assumptions and Data Slicing: A Critical Review of Firm-Level Production Function Estimators, with Markus Eberhardt, Oxford University, Department of Economics Discussion Paper No. 513

WORKING PAPERS

Does Online Search Increase Sales? Evidence from Big Data for Car Markets in Germany and the UK, with Valentine Millot, Oliver Turnbull, Eddie Wilson, and Georg von Graevenitz

Shared Ownership of Intangible Property Rights: The Case of Patent Co-Assignments, with Andrea Fosfuri and Catherine Roux

The Effect of Market Entry on Innovation - Evidence from UK University Incubators, CEP Discussion Paper No. 1002. [media coverage: Times Higher Education]

The Impact of International Patent Systems: Evidence from Accession to the European Patent Convention, with Bronwyn Hall

WORK IN PROGRESS

Incentives to Litigate: Evidence from a Court Reform in the UK, with Yassine Lefouili and Luke McDonagh

The Impact of Foreign Pharmaceutical Patents on Innovation in Chile, with Bronwyn Hall

Measuring Brand Value Using Product Recall Shocks, with Valentine Millot and Georg von Graevenitz

DATA

The Use of Intellectual Property in Chile, with Maria-Jose Abud, Carsten Fink, and Bronwyn Hall, WIPO Economic Research Working Paper No. 11

Intellectual Property at the Firm-Level in the UK: The Oxford Firm-Level Intellectual Property Database, with Mark Rogers and Philipp Schautschick Oxford University, Department of Economics Discussion Paper No. 546
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BOOK CHAPTERS

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Trade Marks and Performance in UK firms, with Mark Rogers, in Teresa da Silva Lopes and Paul Duguid (eds.) 'Trade Marks, Brands and Competitiveness,' Routledge.

GUEST EDITOR

Introduction to the Special Issue on Innovation and Intellectual Property, with Christine Greenhalgh and Jonathan Haskel, ***Oxford Economic Papers***, Vol. 65(3), pp. 597-602 (2013)

OTHER WRITING

Patent Litigation in China: protecting rights or the local economy, with Brian Love and Markus Eberhardt, Intellectual Asset Management, http://www.iam-media.com/Magazine/Issue/76/Features/Patent-litigation-in-China-protecting-rights-or-the-local-economy (February 2016)

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The impact of university research on corporate patenting: New evidence from the UK, with Mark Rogers VoxEU http://www.voxeu.org/index.php?q=node/5949 (December 2010)

Intellectual property and climate change, with Bronwyn Hall VoxEU http://www.voxeu.org/index.php?q=node/5706 (October 2010)

POLICY RELATED WRITTEN WORK

INTELLECTUAL PROPERTY and R&D

2015 *Examining Patent Cases at the Patents Court and Intellectual Property Enterprise Court 2007-2013*, with Luke McDonagh and Yassine Lefouilli, UK Intellectual Property Office.

2013 *The Use of Intellectual Property Right Bundles by Firms in the UK*, with Philipp Schautschick, UK Intellectual Property Office.

2013 *Intellectual property rights and high-growth firms in the UK*, with Georg von Graevenitz, Christine Greenhalgh, and Philipp Schautschick, UK Intellectual Property Office.

2012 *A Study of Patent Thickets*, with Bronwyn Hall, Georg von Graevenitz, and Chiara Rosazza-Bondibene, UK Intellectual Property Office.

2012 *Report on the EPO's Economic and Scientific Advisory Board's Workshop on Patent Quality*, European Patent Office.

2011 *Trademark Cluttering*, with Georg von Graevenitz, Christine Greenhalgh, and Philipp Schautschick, UK Intellectual Property Office.

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2009 *A literature review on the efficiency and effectiveness of university technology transfer offices and hybrid commercialisation models*, Mark Rogers, David Baghurst and Terry Pollard, Strategic Advisory Board for IP policy and UK Intellectual Property Office.

2009 *An Analysis of the Innovative Activity of Entrepreneurial and Young Firms in the UK*, with Mark Rogers, UK Department for Business, Innovation and Skills (BIS) and OECD

2008 *High Growth Firms in the UK*, with Mark Rogers, UK Department for Business, Enterprise and Regulatory Reform (BERR) – BERR Economics Paper No. 3

INTERNATIONAL TRADE

2009 *The Role of Trade Policy in Reducing Ukraine's Current Account Deficit - Lessons from Abroad*, with Ricardo Giucci, Veronika Movchan and Kateryna Kutsenko, Institute for Economic Research IER Policy Paper 01/2009

2007 *Analysis of International Trade in Services: Mongolia, with Miles Light, GTZ*, USAID, and Mongolian Ministry for Industry and Trade.

2006 *Assessing Bilateral Trade Potential at the Commodity Level*, with Jean-Michel Pasteels, ITC UNCTAD/WTO Working Paper 2006-11.

2006 *Options for Mongolia for the Formation of Bilateral Free Trade Agreements - Options in Merchandise Trade: An Overview; GTZ*, UNDP, USAID, and Mongolian Ministry for Industry and Trade.

2005 *TradeSim3: A Gravity Model for the Calculation of Trade Potentials for Developing Countries and Countries in Transition*; with Jean-Michel Pasteels, ITC UNCTAD/WTO Working Paper 2005-05.

CONFERENCES/SEMINARS

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2015 Santa Clara University, UC Berkeley; 13th International Industrial Organization Conference, Boston; Bay Area IP Scholars Workshop, Berkeley; Economic Analysis of Litigation, Torino; 6th ZEW/MaCCI Conference on the Economics of Innovation and Patenting; UC Berkeley; NBER Summer Institute (Digitization), Latin American and Caribbean Economic Association Annual Meeting, Santa Cruz.

2014 Latin American and Caribbean Economic Association Annual Meeting, São Paulo; 9th Annual Conference of the EPIP Association, Brussels; 41st Annual Conference EARIE, Milan; European Finance Association 41st Annual Meetings, Lugano; 14th Annual Intellectual Property Scholars Conference, Berkeley; ZEW Economics of ICT Conference; 12th International Industrial Organization Conference, Chicago; Santa Clara University; "Beyond Spillovers?" University of Kassel.

2013 American Economic Association Meetings San Diego; NBER Summer Institute (IPE); UC Merced; UC Berkeley; UC Davis; Santa Clara University; EPFL Lausanne; Tsinghua University; Royal Economic Society Conference; 5th ZEW/MaCCI Conference on the Economics of Innovation and Patenting; Barcelona GSE Summer Forum Economics of Science and Innovation; Rovira i Virgili; European Commission JRC Seville; USPTO-NYU Trademark Workshop; MEIDE Santiago de Chile.

2012 Empirical Studies of Trademark Data, University of Oxford; Universitat de Barcelona; University of Zürich; WIPO; 12th Annual Intellectual Property Scholars Conference, Stanford; Academy of Management Annual Meeting, Boston; TILEC Innovation, Intellectual Property and Competition Policy Conference, Tilburg; 11th Comparative Analysis of Enterprise Data Conference, Nürnberg; Stanford; UC Berkeley; 2nd SEEK Conference, ZEW.

2011 Contributions to Smart, Green and Inclusive Growth for "Europe 2020", Madrid; Katholieke Universiteit Leuven; Universidad Carlos III Madrid; Patent Statistics for Decision Makers, USPTO Washington DC; University of Würzburg; Innovation, employment and welfare: a comparative study of Europe and China, UNU Merit; China's Technological Rise, ICTSD & Shanghai Institute of Foreign Trade & CIPS, Shanghai; Intellectual Property, Innovation and Business Performance, Oxford IP Research Centre; Technology Transfer Society Meetings, Augsburg; 6th Annual Conference of the EPIP Association, Brussels; 38th Annual Conference EARIE, Stockholm; 26th European Economic Association Meetings, Oslo; UC Berkeley – Peking

University Workshop on the Evolution of Chinese Patenting and its Implications for Research and Innovation, Beijing; Ludwig-Maximilians-Universität (LMU) München; 4th ZEW Conference on Economics of Innovation & Patenting, ZEW; Royal Economic Society Conference, Egham; 1st SEEK Conference, ZEW.

2010 ZEW `The Economics of Green IT'; LSE Urban and Regional Economics Seminar; Oxford University Kiel Institute (IfW); 5th Annual Conference of the EPIP Association, Maastricht; 25th European Economic Association Meetings, Glasgow; Econometric Society World Congress, Shanghai; Zvi Griliches Research Summer School, Barcelona; Knowledge in Organizations (KIO), Monte Verità; Competition and Innovation Summer School 2010, Turunc; Royal Economic Society Conference, Guildford; COINVEST Conference, Lisbon; Ludwig-Maximilians-Universität (LMU) München; Universidad Carlos III; Goethe University Frankfurt; European Business School (EBS); UC Berkeley.

2009 DIW Berlin `End of Year Summit'; Catholic University of Rio de Janeiro (PUC); Ludwig-Maximilians-Universität (LMU) München; Comparative Analysis of Enterprise Data Conference, Tokyo; 4th Annual Conference of the EPIP Association, Bologna; European Investment Bank; 8th Comparative Analysis of Enterprise Data Conference, Tokyo; 24th European Economic Association Meetings, Barcelona; Zvi Griliches Research Summer School, Barcelona; Oxford Intellectual Property Seminar; Gorman Workshop, Oxford University; Young Lives International Conference, Oxford; EUDN Workshop, Oxford; CSAE Oxford University.

2008 ZEW Mannheim; 3rd Annual Conference of the EPIP Association, Bern; 2nd World Conference of the Spatial Econometrics Association, New York; Latin American and Caribbean Economic Association Annual Meeting, Rio de Janeiro; 4th Annual Conference on Economic Growth and Development, Indian Statistical Institute, Delhi.

2007 22nd European Economic Association Meetings, Budapest; London Business School; Kiel Institute.

POLICY PRESENTATIONS

2015 Albanian Ministry of Economy, Trade, and Energy

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2012 Moldovan Intellectual Property Office (AGEPI), Chisinau; Chilean Intellectual Property Office (INAPI), Santiago de Chile; UK Intellectual Property Office, London

2011 WIPO Regional Forum, Bratislava; UK Intellectual Property Office, London; Chilean Intellectual Property Office (INAPI), Santiago de Chile

2010 ITC UNCTAD/WTO, Geneva; UK Department for Business, Innovation and Skills (BIS), London
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2009 European Investment Bank (EIB), Luxembourg; WIPO Meeting of Expert Group on Intellectual Property and SMEs, Geneva; Joint WIPO-PPO-KIPO Eastern European Regional Forum, Warsaw

2008 UK Intellectual Property Office, Newport; ITC UNCTAD/WTO, Geneva

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TEACHING EXPERIENCE

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- The Economics of Digitization (undergraduate economics)
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2009 Oxford University Consulting (ISIS Innovation)
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2005-2007 GTZ (German Technical Co-operation)

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2008 Young Lives Research Grant, University of Oxford (GBP 4,000)

REFEREE

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