

# Supporting Open Access Nationwide

Jadranka Stojanovski

[jadranka.stojanovski@irb.hr](mailto:jadranka.stojanovski@irb.hr)

University of Zadar, LIS Dept, Ruđer Bošković Institute, Library, F. Tuđmana 24i,  
HR-23000 Zadar, Bijenička c. 54, HR-10000 Zagreb (Croatia)

## Abstract

To support the Croatian scholarly publishing environment, and inspired by the global open access movement, the portal of Croatian scientific journals HRČAK (<http://hrcak.srce.hr>) was introduced in 2006 offering an open access publishing platform for Croatian journals. Today, HRČAK gathers about 290 scholarly and professional Croatian journals. This paper is focused on the currency and visibility of the journals included in HRČAK, giving accurate statistical data about the HRČAK repository, its growth and development. Collaboration with Croatian publishers – namely, they are mainly academic and research institutions or professional societies – on the continuous work of raising the quality of Croatian scientific journals is presented in this paper. HRČAK journals are available for harvesting using the OAI-PMH protocol and papers are distributed through many different repositories, archives, databases and search engines. Future plans include work on full-text documents, inclusion of the additional types of publications and formats, harvesting process improvements, additional functionalities and standardization.

**Keywords:** Croatia; Open Access; publishing; scientific journals; Gold Open Access

## Introduction

In the era of ACTA<sup>1</sup>, PIPA<sup>2</sup>, SOPA<sup>3</sup>, RWA<sup>4</sup> and other threats to the open access movement, it is important to recognize specific practices which are present in the scholarly publishing environment, and to be aware of the present changes and future trends. Today's research is interdisciplinary and collaborative, requiring fast and efficient information and data ex-

---

<sup>1</sup> *Anti-Counterfeiting Trade Agreement*

<sup>2</sup> *Protect IP Act*

<sup>3</sup> *Stop Online Piracy Act*

<sup>4</sup> *Research Works Act*

---

change, as well as full and open access to published research. However, the predominant part of scholarly publications is still in the hands of publishers with profit oriented business models. Although today the average researcher at the university or research institute has access to a much broader range of scholarly literature than before, in the print era, the open access (OA) movement promoting access to articles without any restrictions posed by subscriptions is more important than ever ([Björk et al., 2010](#)). OA journals are more visible and readable and that is why a comparison of OA and NOA articles showed that OA articles consistently have more citations, varying from 36%-172% by discipline and year ([Hajjem, Harnad, & Gingras, 2005](#)).

The most important step in bringing research from small and developing scientific communities to mainstream science was the inclusion of journals in international bibliographic databases and making journals available in free full text on the Internet ([Marušić, Sambunjak, & Marušić, 2006](#), page 372). It is also a widely accepted opinion that publicly funded research data should be openly available. This statement is supported in the official science & technology policy issued by the Croatian Ministry of Science, Education and Sports (MSES), where it is specified that the results of research “...financed by public resources must be accessible to the public in the form of open publications or databases” ([Stojanovski, Petrak, & Macan, 2009](#)), and it is taken as the base for the promotion of the OA movement in Croatia.

The transformation of Croatian scientific journals from print to digital started in the late nineties and at a very slow pace. In 2002 there were only 21 Croatian scientific journal with online versions and full-articles available ([Konjević, 2003](#)). Publishers were not ready for evolutionary changes in the publication process for many reasons: lack of awareness about existing trends, poor ICT equipment, low level of computer literacy, lack of technical support, etc. To support the Croatian scholarly publishing environment, and inspired by the global open access movement, the portal of Croatian scientific journals HRČAK (<http://hrcak.srce.hr>) was introduced in 2006 offering an OA publishing platform for Croatian journals. The abbreviation HRČAK (in English: hamster) comes from the phrase “HRvatski ČAsopisi” (in English: Croatian Journals). HRČAK

was conceptualized and designed by a small group of librarians, researchers and information specialists, and created in cooperation with programmers at the University Computing Centre SRCE, with MSES support. The primary intention of the HRČAK team was to offer a free building tool for digital versions of the Croatian journals, and from the very beginning open access was promoted as the most appropriate model for scholarly publishing in Croatia.

There are two widely accepted routes to OA: digital repositories or archives (“green”) and OA journals (“gold”), often considered as two parallel tracks. “Gold” journals are available to their readers free of charge, and “green” uses online repositories to store digital duplicates of published research output and make them freely and openly available across the Internet ([Hubbard, 2011](#)). “Gold” applies only to publication through publishers, while “green” relates to self-archiving. Although this classification often caused confusion ([Murray-Rust, 2011](#)), it is widely adopted in the OA community. However, it has recently become apparent that there is potential for repositories and journals to interact with each other on an ongoing basis and to form a coherent OA scholarly communication system between them ([Pinfield, 2009](#)). In Croatia, the majority of journals followed the “golden” open access road in providing digital journals, including freely available peer-reviewed articles, and the HRČAK version of an online journal is the only digital version of the journal. However, some journals have their online version independent from the HRČAK platform, and editors submit articles in HRČAK as additional copies, so this part can be considered as “green”, even though it is not submitted by the author.

The main goal of HRČAK was to provide a simple and free interface for creating digital online versions of Croatian journals, technical support for publishers, maintenance and long-term data protection and management. With time, the visibility of Croatian scientific journals was improved, and research in Croatia in general became one of the priorities. Visibility can be measured by different criteria: number of visits, usage of the Open Access Initiative – Protocol for Metadata Harvesting (OAI-PMH) for sharing data, data traffic, replication of bibliographic content by online databases, number of citations, etc. The research question in this paper is to what ex-

tent the analysis of different data sets can reflect the visibility of the HRČAK portal, including journals and their content.

### **Data and methods**

In this paper the visibility of the journals included in HRČAK is analysed and discussed, giving accurate statistical data about the HRČAK repository, its growth and development. The descriptive data analysis and interpretation method was used in this study, implying a simple quantitative summary of data sets that have been collected from different sources. The data about journals, their size, and the number of full-text articles stored were collected from the HRČAK database. The data about traffic, visits, and harvesters were extracted from Web server log files using Webalizer, a program that looks at Web server logs and produces detailed reports accessible online. The data about harvesters using the OAI-PMH protocol were analysed separately from the usage statistics representing visits to regular Web pages at <http://hrcak.srce.hr>, from which usage of the editors and staff was excluded. Scopus (Elsevier), Web of Science – WoS (Thomson Reuters) and Journal Citation Reports – JCR (Thomson Reuters) databases were consulted to get the data about indexed journals. All data were gathered and analysed in the period March-May 2012.

### **Results and discussion**

There are about 220 scientific and professional journals in Croatia that are publicly funded and mostly published by academic and research institutions or professional societies, half of which come from social sciences and humanities. According to a 2007 study, the median grant for journals by MSES was 46.000 HRK, e.g. approximately 6.200 EUR ([Macan & Stojanovski, 2008](#)). To get a grant from MSES, publishers are evaluated by several criteria: publishers should be not-for-profit organisations, the journal should be issued regularly, the articles should pass a peer review process, the journal content should be more focused on original scientific papers, a certain number of journal papers should have a corresponding author from a foreign country, the journal should be in OA, the journal should be indexed in relevant international bibliographic databases, publishers should use a journal management and publishing system, the journal should be edited according to the *Guidelines for editing and*

*formatting journals*<sup>5</sup>, the journals should have cultural, national and local importance for the scientific community, etc.<sup>6</sup>

The number of journals included in HRČAK increased steadily from 2006 till 2012, and in May 2012 HRČAK gathered 292 scholarly and professional Croatian journals. The distribution of the journals by discipline shows that the majority of journals come from humanities and social sciences (33 percent and 28 percent accordingly), which corresponds to the number of journals supported by MSES in these disciplines (Stojanovski et al., 2009). Social sciences and humanities journals are closely oriented to subjects related to Croatian language, culture and history. Other disciplines are represented by 7 to 11 percent (Figure 1), also following the proportion of the total number of journals published in these disciplines. Croatian researchers working in sciences, biomedicine and health, technical sciences and biotechnical sciences also publish in international journals, and that is why there is no need for a larger number of domestic journals in those scientific fields. Also, the advancement and evaluation criteria particularly motivate science researchers to publish in more prominent international journals.

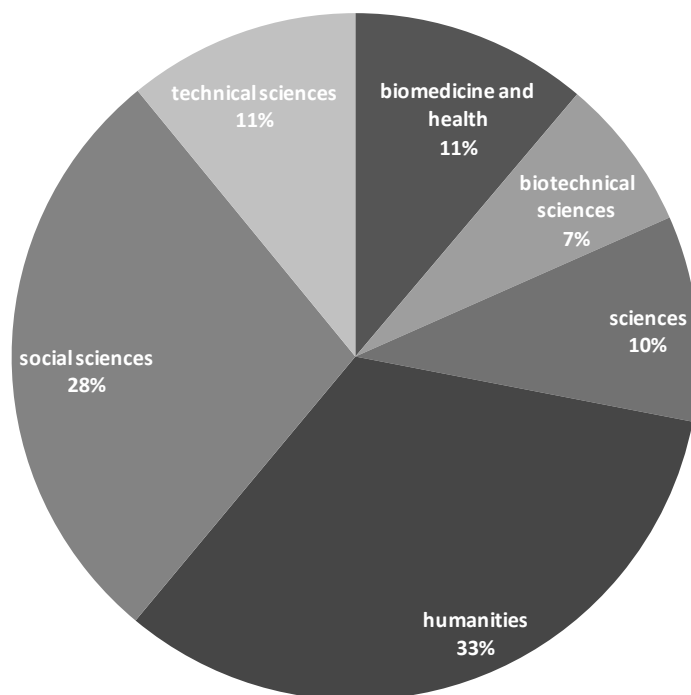
HRČAK's growth was impressive, going far beyond the team's expectations. The majority of publishers immediately accepted the HRČAK portal after the introduction of the OA approach, and also the visible data about journal/issue/paper visits and downloads by HRČAK played a significant role in their further self-promotion. Very soon after the first release, without any systematic promotional activities, the HRČAK portal became the most popular place for accessing scholarly content. There are many reasons for the success of HRČAK, and some of them are (not ordered by relevance):

- (1) readers are more likely to access scholarly content through a single portal instead of trying to find and select the content of interest from many different websites;

---

<sup>5</sup> <http://public.mzos.hr/Default.aspx?art=9110&sec=3202>

<sup>6</sup> Guidelines about financial support of scholarly publishing for 2010 issued by the Croatian Ministry of Science, Education and Sport.



**Figure 1. Distribution of journals included in the HRČAK portal by discipline**

- (2) free infrastructure and support from the HRČAK team were encouraging for many Croatian publishers unable to publish digital version of their journals using their own resources;
- (3) credibility and competences of the HRČAK team and the University Computing Centre SRCE helped form a trustworthy relationship between Croatian publishers and the HRČAK team from the very beginning;
- (4) MSES, which supports a majority of the journals, shared the HRČAK's main goals, such as online environment, open access, increased visibility, user-centred approach, and advancements in editorial work;

- (5) HRČAK platform is used for collaboration and cooperation, establishing a dialog and empowering small publishers' positions;
- (6) regular statistical reports with data about repository growth, number of visits, data traffic, etc.

In May 2011, for 292 included journals there were 74,404 full-text articles stored in the HRČAK repository. The size of the repository is 89.2 GB: 85 GB for the file system and 4.2 GB for the database. Some publishers provided the content of their journals since volume 1, using HRČAK as the place to archive their complete collections.

Data traffic in 2011 according to Webalizer was 5.94 TB in total, with an average traffic of 465 GB per month ([Table 1](#)), and traffic growth is following content growth. HRČAK is in the top ten world repositories, according to the Ranking of Web of World Repositories<sup>7</sup>. Data about traffic done by OAI harvesters are excluded from the statistics.

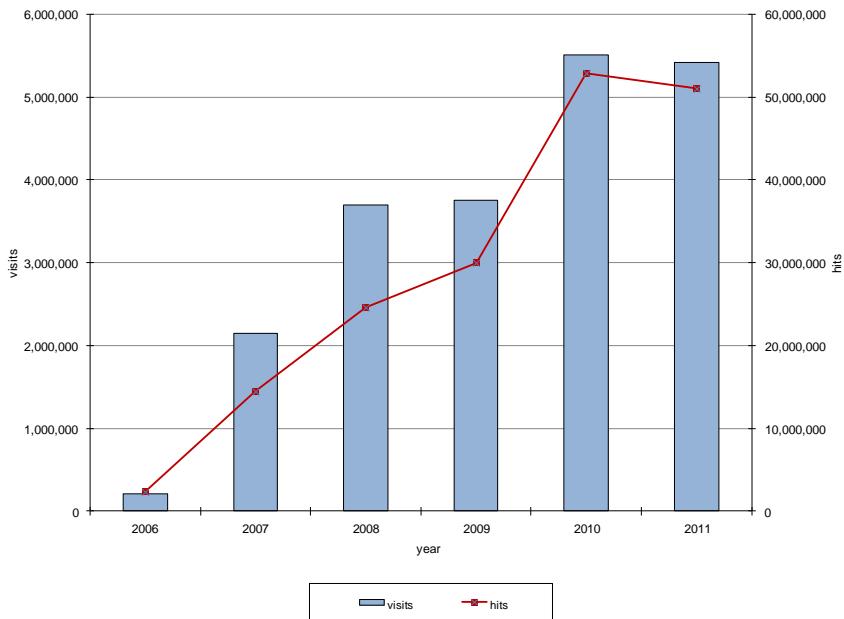
**Table 1. Traffic in the period 2006-2011**

<i>year</i>	<i>traffic (GB)</i>
2006	116.48
2007	1259.89
2008	2307.23
2009	3733.34
2010	5589.74
2011	5953.98

In the time period 2006-2011, the top number of visits was in 2010 ([Figure 2](#)). During 2011, 5,421,200 visits were recorded, with an average of 451,767 visits per month, where a visit is defined as any number of requests from the same IP address processed during a period of 30 minutes. The server processed a total of 51,011,881 requests (hits) during 2011, and the busiest months were October and November ([Figure 3](#)).

---

<sup>7</sup> <http://repositories.webometrics.info/>



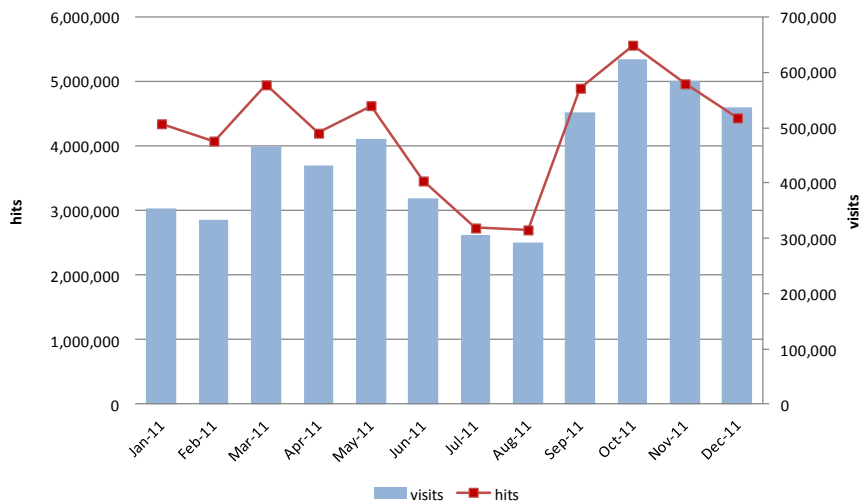
**Figure 2. Visits and hits by year 2006-2011**

HRČAK journals are available for harvesting using the OAI-PMH protocol<sup>8</sup> (RepositoryIdentifier: hrcak.hr; SampleIdentifier: oai:hrcak.hr:25), and papers are distributed through many different repositories, archives, databases and search engines. In 2011 the most active harvesters with resolved IP addresses were: Google Scholar, IFREMER, Yahoo! Research, Sakura Internet (Japan), Long Island University, OCLC, Bielefeld University, Scientific Commons Project, QSensei, Purdue University Libraries, Università degli Studi di Firenze, Physikalisch-Technische Bundesanstalt, University of Southampton, School of Electronics and Computer Science, and Staatsbibliothek zu Berlin.

Harvesters visited HRČAK on average 2508 times per month in 2011, and 3543 times per month during the first four months in 2012, which is a significant increase. The majority of harvesters are located inside the US commercial domain, Japan, France, US, Croatia, South Africa, Switzerland,

<sup>8</sup> <http://hrcak.srce.hr/oai>





**Figure 3. Visits and hits by month for 2011**

Bosnia and Herzegovina and Germany. A lot of IP addresses remain unresolved, and even for the known domains it was difficult to reveal in which repository, database, archive or catalogue the harvested data were included. Important information about a crawler, shared during “crawler introduction”, can improve the data exchange and should become a standard.

In addition to disseminating data about Croatian scientific and professional journals and published papers through OAI-PMH, the HRČAK team is involved in the process of the inclusion of Croatian journals in the most prominent fee and free databases like Web of Science (WoS), Scopus, Google Scholar, EBSCO databases, DOAJ, Google Scholar, OAIster, BASE etc. Although HRČAK is an OA portal, exchanging its data with OA databases, archives, repositories and other digital collections primarily, and inclusion in popular, even commercial products, significantly improves the visibility of published papers. For articles indexed in citation databases the number of citations can be recorded, which can be used for evaluation and advancement purposes. In 2007 there were only 16 Croatian journals included in WoS ([Macan & Stojanovski, 2008](#)). To satisfy the inclusion criteria, publishers usually need to improve some elements of the publishing process and to follow professional standards for editing

more strictly. HRČAK as a collaboration tool supports publishers during this process in different ways. The HRČAK team provides Croatian publishers with contacts, links to selection/inclusion criteria, and help with their applications. These efforts, together with WoS's expansion of their content coverage, resulted in more than 60 Croatian journals (54 HRČAK) being indexed in the Web of Science in 2011. The Scopus database, launched in 2004, systematically included Croatian journals from the beginning, and is currently indexing 105 Croatian journals (90 HRČAK). From 292 journals included in HRČAK, 31.5 percent (92 titles) are indexed in WoS or Scopus databases: 48 journals are indexed in both databases, 6 journals are indexed only in WoS, and 42 journals are indexed only in Scopus. HRČAK journals included in WoS are distributed evenly across disciplines: natural sciences (11), biomedicine (8), technical sciences (11), biotechnology (5), social sciences (9), and humanities (10). According to JCR, there are 35 Croatian journals with an impact factor (IF), and only 4 of them are non-HRČAK journals. The best Croatian journals according to IF are included in HRČAK, and the first on the ranked list is the *Croatian Medical Journal* (IF 1.455). Two non-HRČAK journals with a relatively high IF are *Operators and Matrices* (IF 0.542) and *Mathematical Inequalities and Applications* (IF 0.524). Both journals have their web sites and articles can be accessed by pay-per-view/download (an advance payment of 10 EUR per article is charged) or by login for journal subscribers. The other two non-HRČAK journals, *Transactions of FAMENA* (IF 0.143) and *Neurologia Croatica* (IF 0.125), have web pages with general information about the journal and published articles, but full-text articles are available only by print subscription. Other Croatian journals included in WoS are still not listed in JCR, since a minimum of two year of presence in WoS is needed for IF calculation. In cooperation with database publishers and aggregators, the HRČAK team is working together with their technical teams on data harvesting using the OAI-PMH protocol instead of the traditional ways of data gathering. Croatian publishers are using HRČAK's mailing list to exchange their experiences, which was recognized as a good motivation tool. The popular search engines and databases that use OAI-PMH on a regular basis are Google Scholar (GS), where all HRČAK journals and papers are indexed and searchable, OAIster (OCLC) and BASE (Bielefeld).

To support the whole publishing process, an open source journal management system OJS – Open Journals System<sup>9</sup>, was introduced in 2008 to the Croatian publishers, and data synchronisation with the HRČAK repository has been established. For publishers without their own servers, there is a central version of OJS ver. 2.2.2.0 installed at SRCE<sup>10</sup>, and also local OJS installations are supported. At present, about twenty publishers are using OJS for the automation of their publishing process, from paper submission and peer review to the selection of papers and online journal publishing. Although OJS has been designed to help enhance the high quality standard for journal publishing, reduce cost, and provide efficient editorial processes (Willinski J. according [Kwaku Smit Esseh, 2006](#)), for a majority of Croatian publishers it encompasses the redefinition of the existing editorial process. This could be the reason for the relatively small number of publisher who accepted OJS as a tool for journal management. To educate, share opinions and to meet editors' requirements, workshops and round tables for discussions about current topics are regularly organized.

## **Conclusions**

The analysis in this paper revealed growth in all aspects of the HRČAK portal: number of included journals, content, usage statistics, and exchange of data, proving that the OA movement has found fertile ground inside the small Croatian publishing environment. One of the reasons for HRČAK's big success is the coherence with MSES criteria for journal grants, including the promotion of OA, the usage of journal management systems and the improved visibility of scholarly publishing in Croatia through the exchange of data and journal indexing in popular databases. Editors and authors can also track data about the number of visits and downloads – available on the journal, issue and article level, thus measuring their popularity.

There is still a lot of space for improvements, especially regarding interoperability and data exchange with other national and international information services. Future plans include work on existing full-text documents which are at the present only partially searchable, inclusion of

---

<sup>9</sup> <http://pkp.sfu.ca/ojs>

<sup>10</sup> <http://hrcak.srce.hr/ojs>

the additional types of publications, formats and research data gathering, harvesting process improvements, additional search functionalities, articles in press, website redesign and more standardization on different levels. Metadata description can also be improved. Although scientific journals in Croatia are recently suffering from serious budget cuts, this could also be considered as a new challenge leading to further modernisation and improvements, and leaving less space for unnecessary expenditures related to traditional publishing processes. The collaboration between publishers could still be improved, and more educational workshops and meetings should be organized. There is also a strong will to broaden HRČAK's coverage with conference proceedings and to include OA journals from other, neighbouring countries.

### Acknowledgements

I wish to thank colleagues at the University Computing Centre SRCE and their leader Miroslav Milinović for providing the data about traffic and usage statistics.

### References

- Björk, B., Welling, P., Laakso, M., Majlender, P., Hedlund, T., Guðnason, G., & Scalas, E. (2010). Open Access to the Scientific Journal Literature: Situation 2009. *PLoS One*, 5(6), [doi:10.1371/journal.pone.0011273](https://doi.org/10.1371/journal.pone.0011273).
- Hajjem, C., Harnad, S., & Gingras, Y. (2005). Ten-Year Cross-Disciplinary Comparison of the Growth of Open Access and How it Increases Research Citation Impact. *IEEE Data Engineering Bulletin*, 28(4), 39-47. Retrieved from <http://eprints.soton.ac.uk/261688/1/ArticleIEEE.pdf>
- Hubbard, B. (2011). Green, Blue, Yellow, White & Gold. Retrieved from <http://www.sherpa.ac.uk/documents/sherpaplusdocs/Nottingham-colour-guide.pdf>.
- Konjević, S. (2003). Hrvatski znanstveni časopisi na Internetu [Croatian scientific journals on the Internet]. *Vijesnik bibliotekara Hrvatske*, 4, 111-118. Retrieved from <http://eprints.rcelis.org/bitstream/10760/5598/1/Konjevic.pdf>.
- Smit, E. K. S. (2006). The open access (Open Journal Systems) paradigm and the production of scholarly journals in developing countries. Retrieved from <http://summit.sfu.ca/system/files/iritems1/2371/etd2183.pdf>.

- Macan, B., & Stojanovski, J. (2008). Analiza novčane potpore Ministarstva znanosti, obrazovanja i športa hrvatskim znanstvenim časopisima [Analysis of the financial support of the Ministry of Science, Education and Sports to the Croatian scientific journals]. *Kemija u industriji*, 57(3), 115-122. Retrieved from <http://hrcak.srce.hr/file/32964>.
- Marušić, M., Sambunjak, D., & Marušić, A. (2006). Life of small medical journal: How bibliographical indexing and international visibility affected editorial work in Croatian Medical Journal. *Croat Med J*, 47(3), 372-5. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2080425&tool=pmcentrez&rendertype=abstract>.
- Murray-Rust, P. (2011). Green and gold open access?, Libre and gratis. Reasons why readers and re-users matter. Retrieved from <http://blogs.ch.cam.ac.uk/pmr/2011/07/19/green-and-gold-open-access-libre-and-gratis-reasons-why-readers-and-re-users-matter/>, 2012 Apr 12.
- Pinfield, S. (2009). Journals and repositories: An evolving relationship. *Learned Publishing*, 22(3), 165-175. doi:10.1087/2009302.
- Stojanovski, J., Petrak, J., & Macan, B. (2009). The Croatian national open access journal platform. *Learned Publishing*, 22(4), 263-273. doi:10.1087/20090402.