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Intellectual property protection in plant varieties: A worldwide index (1961–2011)

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ABSTRACT

In this paper, we construct a new index measuring the strength of intellectual property (IP) protection for plant varieties in 69 countries over the period 1961–2011. We examine the statistical properties of the index and compare it with other indicators of IP protection. We conclude that the index provides a reasonable synthetic assessment of the relative strength of IP protection in plant varieties across countries. In addition, we study the main determinants of the evolution of the index and examine the patterns of correlation between the index and agricultural production.

1. Introduction

In 2005 and 2006, Monsanto began a systematic campaign of infringement suits against importers of Argentinian soybean products and by-products to Europe. In brief, the root of the controversy was that Monsanto's patent on the "Roundup Ready" (RR) soybean gene had been denied in Argentina but it had been granted by the European Patent Office (EPO). Therefore, Monsanto argued that imports from Argentina of soybean related products containing the RR gene were liable for infringement (Kranakis, 2007, pp. 723–724). Monsanto was successful in obtaining the impoundment of several shipments of soybean-related products in Spain, the UK and the Netherlands (Correa, 2009). Soybean and its by-products were and still are the major export staple of Argentina (representing more than 50% of agricultural exports). To date, both a UK court and the European Court of Justice have ruled against Monsanto (Cohen and Morgan, 2008).

In 2012, the United States and Colombia signed a trade agreement establishing that Colombian farmers could only use "certified seeds", effectively prohibiting the widespread practice of self-reproduction of seeds. This decision triggered a wave of major protests, strikes and demonstrations all over the country, which finally forced the government to suspend the infamous "seed law".[1]

These two episodes starkly illustrate the significance that intellectual property rights (IPRs) for plant varieties have attained in the world economy. In the last 30 years or so, plant breeding and the commercialization of seeds have witnessed dramatic growth at the global level. The International Seed Federation (www.worldseed.org) estimates an increase in the international seed trade from less than USD 1 billion in 1970 to more than USD 10 billion in 2010. The value of domestic seed markets has also presumably been growing at a similar pace. In addition, global agricultural R&D spending has increased during the 2000–2008 period from $26.1 billion to $31.7 billion in 2005 constant prices (22%) (Beintema et al., 2012).

As it is well known, the ratification of the agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) in 1994 has resulted in the adoption of tighter regimes of intellectual

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[1] http://www.gmwatch.org/index.php/news/archive/2013/15062-colombian-farmers-get-seeds-control-law-suspended (accessed 09.03.14).

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property rights in many developing countries.[2] In particular, the TRIPS agreement demands higher protection in domains that, in many countries, were previously not covered by formal IPRs, such as genetic resources (including plant varieties). To date, most research on the effects of TRIPS and on the impact of IPRs regimes on the world economy has typically focused on patents and their effects on the performance of the manufacturing sector. Meanwhile, other types of IP protection that are particularly relevant for agriculture, such as plant breeders' rights (PBRs), have been relatively neglected.

This limited attention towards IPRs in agriculture by economists of innovation is unfortunate because the assessment of the merits and limitations of different IPRs regimes in this domain is particularly complex. A proper appraisal of this issue requires consideration of an intricate array of thorny policy issues, ranging from the suitability of patents versus *sui generis* forms of intellectual property (IP) protection as the most appropriate incentive system for stimulating innovations, to the moral and ethical aspects revolving around the consideration of living organisms as inventions (see Dutfield (2011) and Nuvolari and Tartari (2014) for historical overviews). Furthermore, recent developments in molecular biology applied to agriculture have contributed to increasing the complexity of this landscape. Genetically modified varieties may now be regarded as composed by different elements (the plant variety itself and its related gene), which can be protected by different types of IPRs and can even be owned by different actors. In this way, plant breeding has become an economic activity that is at the very core of the interests of major multinational companies involved in the production of genetically modified seeds. These developments have inevitably triggered conflicts, disputes and lobbying actions around IP protection for seeds.

The main objective of this paper is to contribute to this line of research by proposing a new index that provides an effective characterization of the relative strength of IP protection on plant varieties at the country level. Following the seminal contribution of Ginarte and Park (1997), similar indices have been constructed for assessing the strength of patent protection and, more generally, of the overall IPRs system at the country level. These indices have been a useful tool for unravelling broad patterns of correlation between IPRs regimes and indicators of innovation and economic performance such as R&D investment, productivity and GDP.[3]

Because the effects of IPRs tend to be highly sector specific (Teece, 1986; Dosi et al., 2006), the construction of a new indicator explicitly focused on IP protection in agriculture can be a useful tool for researchers interested in assessing the effects of IPRs on innovation, growth, technology transfer, trade and productivity in this sector.[4]

The index was constructed by means of a detailed study of the evolution of the legislation in each country. Our approach has been thoroughly comparative from the outset: we have tried to identify the key-features characterizing the differences of IPRs systems for plant varieties at the country level and we have developed a simple approach for transforming these features in quantitative indicators. Subsequently, we have aggregated these indicators in a composite index. We have checked the robustness and plausibility of the index using different methods of aggregation of the individual components and examining its correlation with other measures of IP protection.

In this paper, we also provide an exploratory appraisal of the connection between our index and other variables and indicators by means of two econometric exercises. In the first one, we investigate the possible determinants of the strength of IP protection for plant varieties at the country level. In the second one, we examine the correlation between the index and agricultural production. In these two exercises, we shall explicitly take into account the different level of development of countries because we are particularly interested in unravelling whether the impact of IPRs displays different effects in developing and developed countries. This issue is especially relevant because the TRIPS agreement promotes the diffusion of harmonized IPRs systems to developing countries with little consideration of their specificities.

The rest of the paper is organized as follows. In the next section, we introduce the index and the sources used for its construction and discuss its main properties. Section 3 examines the trends of evolution of the index across countries. Section 4 contains our econometric investigation of the possible determinants of the index. Section 5 provides an appraisal of the patterns of correlation between the index and agricultural production at the country level. Section 6 concludes.

2. Measuring IP protection for plant varieties

Measuring the relative "strength" of IP protection has been a key issue in the literature addressing the impact of IPRs on innovation and economic performance at the country level. Accordingly, several contributions have been devoted to constructing synthetic indices of IP protection.[5] Gadbaw and Richards (1988) have constructed a measure of IP protection for seven developing countries for the period 1984–1988. Rapp and Rozek (1990) have developed an index measuring the strength of patent systems in 159 countries for the year 1984. Sherwood (1996) has also developed a similar index for a cross-section of 18 developing countries. Lerner (2002) has examined shifts in the strength of patent protection across 60 countries over a 150-year period. Finally, the most used and well-known index of patent protection is the one constructed by Ginarte and Park (1997) for 110 countries for the period 1960–1990 and, subsequently, updated until 2005.[6]

Some contributions have also been devoted to constructing sector-specific measures of IP protection. Liu and La Croix (2014) have developed an index that measures IP protection in the pharmaceutical sector. They found that their index starts at low levels in 1960, increases slowly through the early 1990s and dramatically grows thereafter due to the minimum standards set by the TRIPS agreement. Pugatch (2006) has also proposed another index of the strength of IP protection in the pharmaceutical industry for the US, UK, Singapore and Israel. Reynolds (2004) has proposed a similar measure of copyright protection and trademark rights. He found that copyright and trademark indices have been increasing by approximately 36% between 1990 and 2000.

[2] The TRIPS agreement was negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994 and became effective in 1996.

[3] For example, among many others, see Kanwar and Evenson (2003) and Lederman and Saenz (2005).

[4] In a related contribution, Campi and Dueñas (2014) use the index to study the effect of IPRs on the trade of agricultural products.

[5] By and large, most of these indices are based on the appraisal of formal legislation rather than its actual enforcement. Of course, one may argue that the actual implementation and enforcement of a IPRs regime may be more relevant than its formal character. However, actual implementation is clearly much more difficult to characterize and measure. Conversely, legislators clearly do not intend for their regulations not to be enforced; rather, they expect the rules and laws that they enact to be implemented and binding. For these reasons, one should expect some kind of connection between the formal legislation and actual implementation of IP protection laws. On this issue, see Ginarte and Park (1997, pp. 289–291).

[6] Revisions and updates of the index of Ginarte and Park (1997) can be found in Park (2001); Park and Wagh (2002); and Park (2008).

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