

# Does software piracy affect economic growth? Evidence across countries<sup>☆</sup>

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## Abstract

We examine the effect of software piracy on medium term growth using cross-country data over 2000–2007. While the empirical literature has focused on identifying the *causes* of software piracy, our contribution is to examine its *effects*. Our findings suggest that software piracy reduces economic growth over the medium term but the relationship is non-linear – the rate of decrease in economic growth diminishes with piracy increase. This growth-reducing effect is especially pronounced in low income countries. Policy implications are discussed.

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## 1. Introduction

In the recent years, there is a wide consensus on the key role that Intellectual Property Rights (henceforth IPRs) protection plays in promoting innovation processes and economic growth. Thus, a large number of countries have reformed their copyright systems in order to strengthen the IPRs protection. For example, in its 1998/99 World Development Report, the World Bank

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emphasizes the importance of stronger IPRs protection as one of the main channels to acquire foreign knowledge, especially in developing countries. This is justified based on the grounds that stronger IPRs protection should enhance economic growth by increasing the returns to innovation, and hence the incentives to innovate.

Intellectual property displays many of the features of public goods. That is, they are typically non-rival and non-excludable. Therefore, it becomes necessary to protect them from unauthorized use or access in order to ensure innovators profit from their innovations, which in turn would be expected to impact innovation and economic growth.

At the aggregate level, a (broader) strand of the literature has investigated the relationship between the intensity of IPRs protection and economic growth. The empirical literature on IPRs protection has largely concluded that IPRs protection has a positive effect on economic growth, often using cross-section data (see for example, Falvey, Foster, & Greenway, 2006; Gould & Gruben, 1996; Park & Ginarte, 1997; Thompson & Rushing, 1996, 1999). However, the available measures of IPRs protection are only rough measures of overall piracy activities in any particular economy and this research addresses the software piracy-growth linkage directly. The focus here is software piracy because it is also the IT sector's most serious problem (Anthes, 1993) and is one of the most notorious forms of IPRs violations.

A substantial recent empirical literature has focused on the socio-economic determinants of piracy rates in several copyright industries (Andrés, 2006; Banerjee, Khalid, & Sturm, 2005; Bezmen & Depken, 2006; Goel & Nelson, 2009; Peitz & Waelbroeck, 2006 for a review). In contrast, there is scant empirical evidence to validate the basic premise that software piracy might impact economic growth. One of the main motivations of this paper is to empirically test the impact of software piracy on economic growth. There are numerous avenues through which software piracy might impact economic growth. For instance, piracy rates might lower productivity, thereby affecting economic growth (negative effect). But pirated software might be useful in raising productivity and increasing economic growth (positive effect). Further piracy might influence incentives to write software programs, to do software related R&D, and invest in software capital. Piracy reduces the incentives to commercialize as well as innovate. Without adequate IPR protection, programmers will have little confidence in appropriating returns to their efforts, nor will venture capitalists be willing to invest in programs that lack protection (and hence are too risky). Further, greater piracy rates might signal weaker formal institutions (regulations, rules), again affecting growth (see detailed discussion below). The linkage between piracy and economic growth is a key question that underscores the importance of piracy control efforts.

The present research examines the (macro) effects of software piracy on economic growth using a large cross-section of countries. Understanding of the piracy-growth nexus is important for the formulation of effective policy. We make the assumption that the rate of software piracy can be seen more generally to proxy for piracy of other goods (e.g., sound recordings, motion pictures, books, etc.).<sup>1</sup> For that purpose, we use the neoclassical growth model (Solow, 1956) as the main theoretical model to explain economic growth. In addition to providing evidence on the impact of software piracy on medium term growth during the first decade of the new millennium, this study has a number of innovative elements: (i) the issue of possible nonlinearity between piracy and growth is examined; and (ii) the potential endogeneity of the piracy in economic growth regressions is taken into account. We find that software piracy affects economic growth

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<sup>1</sup> Unauthorized use of computer software resulted in a vast majority of the over \$31 billion loss to the US business software industry in 2009 (IIPA, 2010).

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