

# The Link Between Standardization and Economic Growth: A Bibliometric Analysis

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## ABSTRACT

The authors analyze the link between standardization and economic growth by systematically reviewing leading economics journals, leading economic growth researchers' articles, and economic growth-related books. They make the following observations: 1) No article has analyzed the link between standardization and economic growth in top 5 economics journals between 1996 and 2018. 2) A representative sample of the leading researchers of economic growth has allocated little attention to the link between standardization and economic growth. 3) Typically, economic growth textbooks do not contain “standards” or “standardization” in their word indices. These findings suggest that the economic growth theory has neglected the role of standardization.

## KEYWORDS

Allocation of Attention, Bibliometric Analysis, Economic Growth, Standardization

## 1 INTRODUCTION

*“The lack of cooperative standardization in British industry is conspicuous in regard to locomotives. Every considerable railway has its own models, though the materials are to some extent standardized”*

Alfred Marshall (1919, p.591)

*“Standardisation and connection standards may seem purely technical details to the casual observer, but in fact they reflect the importance of achieving economies of scale.”*

Nathan Rosenberg (1983, p.183)

*“Perhaps because these standards are so taken for granted, they are rarely the subject of discussion in circles beyond those in which they are formulated. They are even more rarely the subject of discussion in the public square in democratic institutions of government, or among friends. Indeed, standards are so taken for granted, so mundane, so ubiquitous, that they are extremely difficult to write about. They are usually noticed only when they fail to work.”*

DOI: 10.4018/IJSR.287101

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Lawrence Busch (2011, p.2)

Standards can be defined as rules, guidelines, or characteristics established by consensus and approved by a recognized body (see ISO/IEC, 2004). According to ISO/IEC (2004), standardization is “the process of development and application of standards” (see Choi et al., 2011). Standards are ubiquitous, and every one of us is exposed to several standards every day (Kindleberger, 1983; Busch, 2011). Consider, for instance, the measurement of time, metric systems, various safety standards, electricity standards, including plugs and sockets, data, image, video and audio compression technologies (codecs), Internet protocols, connectivity of devices via cellular networks, Wi-Fi or Bluetooth, etc. Standards have obvious public good characteristics (Kindleberger, 1983; David & Greenstein, 1990; Swann, 2000; Blind & Jungmittag, 2008) and, generally, the promotion of standards is considered beneficial, as reflected, for instance, by the increasing number of national and voluntary standards organizations and their expressed missions. For example, the International Organization for Standardization (ISO) has more than 164 national standards organizations as members that promote standardization nationally.<sup>1</sup>

It has been documented that societies underinvest in R&D (Jones & Williams, 2000; Lucking et al., 2018). Much less empirical evidence exists on whether societies under- or overinvest in standardization. According to Rysman and Simcoe (2009, p.1932): “the importance of SSOs has been widely discussed, yet there have been no attempts to systematically measure the effects of these institutions.” Standards can be national, international, or global by their geographical dimension (Swann et al., 1996; Nadvi, 2008; Blind et al., 2018). Scale and network effects are typically greater the more international the scope of a standard is.<sup>2</sup> Standards have played an indispensable role, for instance, in creating and maintaining the proper functioning of the European Single Market (Pelkmans, 1987; David & Steinmueller, 1994; EC, 2018; Blind et al., 2018). Economists agree that institutions matter for economic growth (North, 1991; Mokyr, 2002; Acemoglu & Robinson, 2012). Blind and Jungmittag (2008) noted that “standards can also be interpreted as institutions. Institutional economists postulate a close relationship between institutional development and economic growth.” This is also an important premise of the current article: Standards are important institutions that matter for technological progress, innovation, and, therefore, for economic growth and development.

While there exists a variety of different types of standards, we focus here on standards that are a result of open and voluntary standard development or setting and are related to technologies. We also note that the dimension of feedback processes classifies standardization organizations. Their operational mode is either one-shot standard setting or dynamic standard development (Teece, 2018).<sup>3</sup> Economists share the belief that innovations and technological progress are the key drivers of economic growth in the long run (Aghion & Howitt, 2009) and, presumably, technology standardization impacts the rate and direction of technological change.<sup>4</sup> While researchers of network economics and industrial organization economists have extensively studied standardization (e.g., Farrell & Saloner, 1985; Katz & Shapiro, 1986) and the role of patents in standard development (e.g., Lerner & Tirole, 2015), it appears that economic growth theory is almost silent about the macroeconomic impacts of standardization (e.g., Blind & Jungmittag, 2008; Swann, 2010; Baron & Schmidt, 2017). Consequently, we know much more about the microdynamics than the macrodynamics of standardization.

It is interesting that the macroeconomic impacts of technology standardization have received little attention among economists, particularly as standardization organizations have existed for more than a century.<sup>5</sup> Examples of standards that have had a substantial global impact include, among others, freight container standards (ISO/TC 104 Freight containers; Levinson, 2006; Bernhofen et al., 2016), Internet standards (IETF, W3C, Simcoe, 2015) and telecommunication standards (ETSI, ITU, Röllner & Waverman, 2001; Teece, 2018). These standards have significantly promoted globalization and technological change. The heterogeneous nature of different standards and standardization processes makes it challenging to analyze the aggregate macroeconomic impacts of standardization. Presumably, this is a major factor explaining the dearth of research on the topic. The goal of this article is to shed more light on this research gap and the link between standardization and economic growth. We

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