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ICT technologies and financial innovations: The case of exchange traded funds in Brazil, Japan, Mexico, South Korea and the United States



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ABSTRACT

Exchange traded funds (ETFs), funds structured in order to mimic the performance of selected financial assets, are one of the most significant innovative financial instruments recently introduced. They have gained considerable popularity among investors due to their advantages in comparison with conventional mutual funds, investment vehicles with a significantly longer history. This paper explores empirically links between information and communications technology (ICT) penetration and the introduction of financial innovations in emerging economies. It examines the impact of increasing ICT penetration on the assets of exchange traded funds in Brazil, Mexico, Japan and South Korea and the United States over 2002–2012. The methodological framework includes descriptive statistics, logistic growth models applied to estimate ETF market development patterns, and panel data analysis used to test the hypothesized relationship between increasing ICT penetration and ETF market development. The empirical findings collectively indicate that in all countries increases in ICT penetration have been pervasive and accompanied by a rapid development of ETF markets. Furthermore, the relationship between increasing ICT penetration and ETF market development is found to be strong, positive and statistically significant in Japan, Mexico, the United States and South Korea; while in Brazil the analogous relationship is relatively weak, although still positive.

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1. Introduction

In most emerging economies, a historically unprecedented, in terms of speed and geographical coverage, growth in information and communications technologies (ICT, see International Telecommunication Union ICT Statistics, 2013) is playing an undeniable role in accelerating economic development. One of the main advantages of the rapid expansion of ICT in emerging economies is a dynamic development of financial systems, which fosters foreign capital inflows, encourages new investors, and provides domestic participants with an opportunity to invest abroad. In this context, research relating the

level of adoption of new information and communication technologies and financial development (we define financial development as growth in the size of all segments of the financial system such as banking sector and capital market, including stock market) constitutes a good base for further analysis of the benefits of the introduction of ICT in emerging economies.

This study contributes to the state of the art by providing evidence on relationships between ICT penetration and financial development with special emphasis put on the development of exchange traded funds – ETFs. To the best of our knowledge, this is the first study to examine this important relationship.

First, the contribution of this analysis is to evaluate the development pattern of exchange traded funds (ETFs) in developing countries, and to empirically verify the hypothesis of a quantitative link between ICT deployment and ETF market

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development (analyzed as absolute growth in value of assets of ETFs and as growth in share of ETFs in assets of a similar investment option¹) in a particular country. Following this approach, we focus on emerging markets to unveil their development paths with respect to information and communications technologies and financial markets. Second, the contribution to the present state of knowledge consists in providing a deep insight into the empirical links between increasing ICT penetration and financial development (with emphasis on the development of exchange traded funds). We hypothesize that increasing ICT penetration positively impacted ETF market development across countries in scope over 2002–2012. To verify the hypothesis empirically, we select two advanced (Kvint, 2009) emerging economies, Brazil and Mexico, and a highly developed country – the United States – which we set as a benchmark in terms of ICT penetration and financial development. Apart from their similar levels of economic development (in terms of GDP per capita; see World Bank, 2013), other reasons for selecting Brazil and Mexico are their institutional and cultural similarities (both countries are in the Latin American region) and, to a lesser extent, a similarity of their financial systems (for example, strong links with the United States). While the two countries share certain features, they differ significantly in terms of ETF market development. Nevertheless, the ETF markets in these countries are among the largest in the emerging economies (in most such countries there are no listed ETFs, or their assets are very low). Selecting countries with a number of aspects in common enables us to focus on the impact of a selected factor influencing the ETF market, for instance, ICT, and allows for deep analysis of country-specific trends. To shed light on the nature of the relationship examined we include in the sample two more countries with large ETF markets, one emerging and one highly developed – South Korea and Japan.

The paper comprises six logically structured sections. The first section is the Introduction. Section 2 provides conceptual framework and extended background of the study. It describes ETFs as a prominent recent financial innovation, it explains the relationship between ICT and financial markets, and it formulates the explicit hypothesis that increasing ICT penetration positively impacted ETF market development across analyzed countries over 2002–2012. Section 2 of the paper is followed by a third section specifying the data sources and methodological procedures. Sections 4 and 5 are entirely empirical. Section 4 presents preliminary evidence on ETF market development and changes in ICT penetration in analyzed countries over 2002–2012. These two elements – ETFs and ICT – are analyzed separately. Additionally, in Section 4, the logistic growth model is used to approximate ETF market development patterns and demonstrate their prospective future development. Section five exhibits panel regression results, which explicitly address the hypothesis that increasing ICT penetration positively impacted ETF market development across analyzed countries over 2002–2012. In this section, we also deliberately disaggregate the evidence and present country-specific (for Brazil, Japan, Mexico, South Korea, and the United States) estimations. Finally, the last section contains the main findings and discussion.

¹ For details – see Section 2.

2. Exchange traded funds and new technologies. Conceptual framework

2.1. Exchange traded funds – a case of financial innovation

The last few decades have witnessed the development and growth of numerous financial innovations. These innovations include new or modified financial products and services, financial market technologies and institutions transforming the global financial system (Allen, 2012). One example of such financial innovations is exchange traded funds. ETFs first became available in Canada in 1989 (on the Toronto Stock Exchange), four years later they were launched in the United States, in Asia in 1999, and finally in Europe in 2001 (Deville, 2008). Despite their short history, ETFs are currently one of the most popular instruments among financial professionals (it should be noted that due to the features of ETFs they are also regarded as a category of financial companies instead of instruments ICI, 2013). In their basic form, ETFs are financial instruments with prices closely replicating (tracking) the performance of selected financial assets (usually tracking the returns of financial market indexes) (Hehn, 2005). The structure of the first ETFs was simple as they were based solely on stocks or other securities. Such ETFs remain the most popular and are called 'physical'. However, in the 2000s the rising status of less liquid markets and the increased sophistication of the instruments offered on global financial markets led to the development of new types of ETFs with complex structures ('synthetic' ETFs) based on derivatives (Awrey, 2013). Due to regulatory concerns and the lack of sufficiently developed derivatives markets, synthetic ETFs are seldom used in emerging economies (apart from the most developed ones, such as South Korea).

Physical ETFs are the oldest and least complex type. The key roles in the creation and trading of physical ETFs are played by financial institutions that act as ETF sponsors and authorized participants (market-makers); other categories of market participants are secondary market investors and stock exchanges (Deville, 2008). The authorized participants are responsible for purchasing shares of the companies included in the market index and delivering them to the sponsor (the fund's trustee). In exchange for these baskets of securities, the authorized participants receive creation units (ETF shares) (Ramawamy, 2011). The creation units received by the authorized participants may then be sold to institutional investors or retail market participants, who can conduct transactions in ETF shares through stock exchanges without the intermediation of authorized participants (Aggarwal, 2012).

In our study we refer to two categories of investment companies (defined in ICI, 2013):

- mutual funds;
- exchange traded funds (ETFs).

We label together the investment companies in these two categories as 'investment funds' (IF). This choice is made in order to analyze the changing market shares of the two investment options. In the preliminary analysis, due to data availability issues, we also use a wider category of investment products: exchange traded products, ETPs, securities that may be traded on one or more exchanges. These include, in addition

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