



Economic growth, development of telecommunications infrastructure, and financial development in Asia, 1991–2012



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ARTICLE INFO

Article history:

Received 25 February 2014

Received in revised form 24 March 2015

Accepted 29 June 2015

Available online 8 July 2015

Keywords:

PCA

Panel VAR

Development indices

Economic growth

Asia

ABSTRACT

We use principal component analysis (PCA) to construct an index for the development of telecommunications infrastructure (DTI), and an index for financial development. We then assess the causal relationship among DTI, financial development, and economic growth in 21 Asian countries between 1991 and 2012. We study the Asian countries in four regional groups, and use a panel vector auto-regressive (VAR) model to detect the direction of causality among the three variables. Our results reveal that there is Granger-causality among the variables, both in the short run and in the long run, although the exact nature of the results varies by region in Asia.

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1. Introduction

Schumpeter's (1911) theoretical proposition that financial development is an important determinant of a country's economic growth has received much attention in recent literature (for instance, see Cole, Moshirian, & Wu, 2008; Levine, 2005). The proposition is logical, since a well-developed financial system greases the wheels of economic activity. Higher savings and investments facilitate further development of the economy on several fronts, including commercial and technological. Thus, many economists regard financial development as a key driver of economic growth (Hsueh, Hu, & Tu, 2013; Samargandi, Fidrmuc, & Ghosh, 2015; Schumpeter, 1911).

Two issues relevant to the relationship between financial development and economic growth need to be empirically examined: first, the determinants and sources of financial development; second, the long-run equilibrium relationship between financial development and economic growth, and the direction of causality between the two variables. The empirical literature on this topic has followed two main econometric approaches: cross-country and time series studies. Cross-country regressions

have examined the determinants of financial development (Beck, Levine, & Loayza, 2000; Cole, Moshirian, & Wu, 2008; King & Levine, 1993), whereas time series regressions have identified the limitations associated with cross-country regressions. Economists have long sought evidence for a long-run relationship between the variables (Levine, Loayza, & Beck, 2000). The current study uses panel data (that is, it uses both cross-country and time series data) to present new evidence on the causal relationship between financial development and economic growth.

The innovation in this paper, compared to the existing literature on the financial development-economic growth nexus is that we use a trivariate framework in which, in addition to economic growth and financial development, we incorporate a third variable, namely the development of telecommunications infrastructure (DTI). This links the literature examining the causal nexus between financial development and economic growth to the literature that investigates the link between DTI and financial development. Our simultaneous consideration of DTI is important, since telecommunications technology is likely to be linked to both economic growth and financial development in increasingly globalized and interconnected economies around the world. In this context, it should be noted that economic growth theory has always maintained that economic development includes a process of innovation. Thus it may be argued that the interactions between developments in both the financial and information technology sectors provide a

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Table 1
Summary of studies on the connection between financial development and economic growth.

Studies	Methods	Study area	Data used
A: Studies supporting supply-leading hypothesis			
Kar et al. (2011)	4	15 MENA countries	1980–2007
Chaiechi (2012)	4	South Korea, Hong Kong, UK	1990–2006
Hsueh et al. (2013)	1	Ten Asian countries	1980–2007
Menyah et al. (2014)	2	21 African countries	1965–2008
B: Studies supporting demand-following hypothesis			
Kar et al. (2011)	4	15 MENA countries	1980–2007
Menyah et al. (2014)	2	21 African countries	1965–2008
C: Studies supporting feedback hypothesis			
Pradhan et al. (2014)	4	ASEAN countries	1961–2012
Wolde-Rufael (2009)	3	Kenya	1966–2005
D: Studies supporting neutrality hypothesis			
Mukhopadhyay, Pradhan, and Feridun (2011)	3	7 Asian countries	1979–2009

Note 1: Supply-leading hypothesis: if unidirectional causality is present from financial development to economic growth; Demand-following hypothesis: if unidirectional causality form economic growth to financial development is present; Feedback hypothesis: if bidirectional causality between financial development and economic growth is present; Neutrality hypothesis: if no causality between financial development and economic growth is present.

Note 2: 1: Bivariate Granger Causality; 2: Trivariate Granger Causality; 3: Quadivariate Granger Causality; 4: Multivariate Granger Causality; ASEAN: Association of South East Asian Nations; and MENA: Middle East and North Africa.

driving force for dynamic economic growth (see, for example, Sassi & Goaid, 2013).

Two additional novel features of the study are that, first, we use a large sample of Asian countries, both developed and emerging, over a long period, but include recent data (1991–2012); and second, we use advanced panel cointegration and causality tests to arrive at our results. Neither approach has to date been used in studies that examine the causal nexus between these variables in Asian countries for both the short and the long run.

This research contributes information to economic and political decision-makers to empower them to enhance social upliftment among the inhabitants of their countries, because if there is any causality between economic growth, financial development, and telecommunications infrastructure, understanding that association can facilitate efficient allocation of infrastructure investment in a particular country. Moreover, potential investors and fund managers can use the results of this study as additional information to support their investment decisions.

The rest of this paper is organized as follows: Section 2 presents a literature review and rationale for the analysis; Section 3 sets out the methods used in the study; Section 4 discusses the empirical results; and finally, we summarize findings and provide a conclusion in Section 5.

2. Literature review and rationale for the analysis

The proposition that financial development is one of the vital determinants of economic growth (Levine, 1997) has led economists to investigate whether there is in fact such a relationship. A number of researchers have also focused on a possible link between DTI and economic growth (for instance, Cieslik & Kaniewsk, 2004; Shiu & Lam, 2008). Another group of researchers have examined a possible nexus between financial development and DTI (for example, Sassi & Goaid, 2013). In this paper, we explore the possibility that there is a link between all three variables: financial development, DTI, and economic growth. This section presents an overview of three separate bodies of the literature. This is followed by a summary of the relevance of the present study and a synopsis of the hypotheses proposed and tested in this paper.

2.1. Research pointers: A review of three bodies of literature

The first study to link financial development with economic growth was published by Schumpeter (1911). Chaiechi (2012), Christopoulos and Tsionas (2004), Hsueh et al. (2013), and Kar,

Nazlioglu, and Agir (2011) all found evidence in support of the hypothesis that financial development leads to economic growth (a supply-leading hypothesis). By contrast, Kar et al. (2011), and Levine (1997) found evidence in favor of the hypothesis that economic growth leads to financial development (a demand-following hypothesis). Other studies, such as those by Dritsakos and Adamopoulos (2004), and Wold-Rufael (2009) support the hypothesis of bidirectional causality between the two variables—a case where there is feedback. Lucas (1988) maintains that there is no causal relationship between the two variables; that is, they claim that there is neutrality. Finally, some studies supply mixed evidence. Table 1 presents a synopsis of research on the causal nexus between financial development and economic growth.

Another body of the literature examines the link between DTI and economic growth. Researchers such as Ahmed and Krishnasamy (2012), Cieslik and Kaniewsk (2004), and Mehmood and Siddiqui (2013) assert the validity of the hypothesis that DTI leads to economic growth (a supply-leading hypothesis). Beil, Ford, and Jackson (2005), Lee, Levendis, and Gutierrez (2012), and Veeramacheni, Ekanayake, and Vogel (2007) present support for the validity of causality in the opposite direction (a demand-following hypothesis). Chakraborty and Nandi (2011), and Ramlan and Ahmed (2009) support the presence of a mutual causal relationship between DTI and economic growth (a feedback hypothesis). On the other hand, Shiu and Lam (2008), and Veeramacheni et al. (2007) maintain that there is no causal relationship between the two variables (a null hypothesis). Table 2 presents a summary of these studies.

A third and smaller body of the literature offers a mixed set of results. These studies focus on the relationship between financial development and DTI (Sassi & Goaid, 2013; Zagorchev, Vasconcellos, & Bae, 2011).

2.2. Relevance of the study

The case for a possible link between financial development and economic growth was made in the pioneering study by Schumpeter (1911), which is covered in most macroeconomics textbooks and is therefore not repeated here. It is also logical to argue that today DTI links both financial development and economic growth, due to its spillover effects.

In recent decades, many economies have adopted development strategies that prioritize the modernization of their financial systems. Asian countries are no exception. Since the end of the 1980s, these countries have sought further development in their financial sector, for example, by reducing government intervention or

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