Research in Economics 72 (2018) 343–355

Contents lists available at ScienceDirect

Research in Economics

journal homepage: www.elsevier.com/locate/rie

Research Paper

Trade liberalization, financial modernization and economic development: An empirical study of selected Asia–Pacific countries

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ARTICLE INFO

Article history:
Received 14 July 2016
Accepted 1 March 2017
Available online 11 March 2017

Keywords:
Trade liberalization
Financial modernization
Economic development
Panel data analysis
Asia and Pacific region

ABSTRACT

This study investigates the relationship between trade liberalization, financial modernization and economic development for 14 countries in the Asia and Pacific region over the period spanning from 1961 to 2011. The study uses panel data as they have many advantages over cross-sectional or time series data. In addition to analyzing the full panel, we also divide the 14 countries under study into two sub-samples: high-income countries and middle-income countries, based on World Bank's income classification as of 1st July 2013. The panel cointegration tests show a long run relationship between the above variables. The study uses Feasible Generalized Least Squares (FGLS) method to estimate the models and then conducts Granger causality tests to identify patterns of causation among the variables of interest. In general, the results indicate unidirectional causality (1) from financial modernization to economic development for the entire panel and the panel of middle-income countries; (2) from trade liberalization to economic development for the whole panel as well as two subpanels of high-income and middle-income countries; and (3) from trade liberalization to financial modernization for the whole panel as well as two subpanels. The findings of this study support that the actual effect of financial depth on economic development (and vice versa) seems to depend on the level of financial development.

1. Introduction

The last decades have witnessed development strategies adopted by many economies that prioritize trade liberalization and financial modernization. The countries of the Asia and Pacific (henceforth AP) region are not exceptional cases. The current remarkable development in the AP financial markets, particularly with the recent developments in credit markets, is certain to continue. In principle, efforts to develop financial markets are needed to foster critical economic activities including the capital allocation process, monetary policy implementation and government borrowing (and spending). The current global economic situation further highlights the importance of developing sound and integrated financial markets in the region. With regard to trade liberalization, this process has been fostered in the AP region during the past decades. The

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http://dx.doi.org/10.1016/j.rie.2017.03.001
1090-9443/

free trade agreement (FTA) network has been steadily expanding in the region since 2000, especially with the engagement of China, Japan and South Korea in various trade negotiations with member countries of the Association of Southeast Asian Nations (ASEAN). As of 2015, there have been 145 FTAs signed and in force and 70 others under negotiation in the AP region.[1] However, the effectiveness of such policies requires the existence of a causal relationship between financial and real sectors (Gries et al., 2009).

This research assesses whether trade liberalization and financial modernization have led to economic development in a sample of 14 AP countries over the 1961–2011 period as these markets are expected to play a further critical role in the world capital markets for investment and risk management. The study investigates whether a policy focus on trade liberalization or financial modernization or both is appropriate for fostering development. Thus causality between trade liberalization, financial modernization and economic development is tested by conducting panel Granger causality tests, capturing indirect linkages also by scrutinizing the relationship between trade liberalization and financial modernization. For instance, it might be necessary to evaluate how big a financial system should be to remain anchored in real economic activity. Further, it is important to see if financial systems are being built to serve economies, or economies are being made subservient to the needs of financial system. The ambiguity of the empirical literature, based on the above discussion, provides an additional motivation for this study.

The principal findings of the study are: (1) there exists a nexus between financial modernization and trade liberalization, and an indirect effect of trade openness on economic development via the channel of financial development for selected high-income countries in the AP region, (2) no indirect effect of financial deepening on economic development through the channel of trade openness is found for the whole sample, (3) unidirectional causality runs from financial modernization to trade liberalization in selected middle-income countries in the region, and (4) there is stable long-run causality from economic development and trade liberalization to financial development for the whole panel as well as subpanels and from economic development and financial modernization to trade liberalization for the region panel and the subpanel of high-income countries.

The remainder of this paper is structured as follows. Section 2 reviews the related academic literature. Section 3 describes the research methodology, data and variables. Section 4 presents and discusses the empirical results. Section 5 concludes with a summary.

2. Literature review

2.1. Trade liberalization and economic development

Conventional trade theory proposes that international trade is associated with a reallocation of resources within national borders, which is determined by exogenous differences across countries. This generates efficiency gains that lead to a rise in the level of aggregate national income. Krugman (1979, 1980) claims other sources of gain from openness to international trade. First, there could be more varieties of products available for consumption. Second, the increased competition lowers the market power of firms and hence the equilibrium prices, which is another source of gain for consumers. Furthermore, the increased size of the market allows firms to realize economies of scale. Even though there might be disputes related to the size and distribution of the welfare gains from trade, there is strong consensus of a positive relationship existing between international trade and aggregate national income.

New development theories, however, do not predict that trade will unambiguously raise economic development. It is argued that increased competition could discourage innovation by lowering expected profits (Schumpeter, 1934, 1942). On the other hand, it is argued that intervention in trade could raise long-run output if investment in research-intensive sectors is encouraged through protection in countries with an internationally comparative advantage in producing this kind of goods. Some empirical evidence suggests that openness to trade may significantly and favorably affect economic performance (e.g., Edwards, 1998; Harrison, 1996) but some found that these effects are often rather small. Since the theoretical literature shows a mixed answer, empirical work is further needed to help resolve the debate.

2.2. Financial modernization and economic development

Financial markets, at a very broad level, are the venues where borrowers and lenders interact, and capital is raised for real investment and then gets reallocated among investors (Sundaresan, 2010). The debate on the direction of causal relationship between financial development and economic growth has been ongoing since the 19th century. The first view argues that financial development leads to economic development due to its influence through the accumulative and the allocative channel. The accumulative channel emphasizes the finance-induced effects of physical and human capital accumulation on economic development (e.g., Pagano, 1993). Meanwhile, the allocative channel focuses on the finance-induced gains in resource allocation efficiency which translates into augmented development (e.g., King and Levine, 1993). The second view contends that economic development drives the development of the financial sector. For example, when an economy is

[1] Please refer to Free Trade Agreements, Asian Development Bank's Asian Regional Integration Center, available at http://aric.adb.org/fta.

expanding, the private sector may demand new financial instruments and a better access to external finance. As such, the finance activities would amplify instep with the stage of economic development (e.g., Robinson, 1952).

The third view proposes that finance and development may be mutually dependent. Accordingly, the real sector may supply funds to the financial system which enables financial deepening. This eventually leads to a capitalization on financial economies of scale that in turn facilitates economic development (e.g., Berthelemy and Varoudakis, 1996). Finally, the fourth view follows more sceptical views that finance and development may also evolve independently of each other, so there is no or insignificant causal relationship between them (Chandavarkar, 1992).

The majority of empirical studies on the relationship between finance and development are cross-sectional studies based on cross-sectional regressions. They documented a positive connection between financial development and economic activity (e.g., King and Levine, 1993; La Porta et al., 2002). Compared with cross-country studies, in individual-country studies, researchers can design specific measures of financial development based on the particular characteristics of the country as well as avoid dealing with country-specific factors in regression analysis. None of these studies, however, has given a satisfactory answer to the causality question between financial depth and economic output.

2.3. Financial modernization and trade liberalization

It is shown that the countries with a relatively well-developed financial sector have a comparative advantage in industries and sectors that rely on external finance (Kletzer and Bardhan, 1987). Extending this argument and allowing both sectors to use external finance, one being more credit intensive due to increasing returns to scale, the level of financial development is found to have an effect on the structure of the trade balance (Beck, 2002). On the one hand, the reform of the financial sector could generate policy implications for the trade balance if the development of financial sector is a determinant of a country's comparative advantage. On the other hand, the impact of trade reforms on the level and structure of the trade balance might rely on the level of financial development (Beck, 2002). Subsequently, Do and Levchenko (2004) find that trade openness will impact demand for external finance, and hence financial development in the trading countries.

2.4. Financial modernization-trade liberalization links and economic development

Multi-causal linkages among trade liberalization, economic development and financial modernization emerge from the evidence that not only financial development favorably impacts development but the extent of financial activity itself depends positively on the level of development (e.g., Bencivenga and Smith, 1998). This is because the cost of financial services consists of a fix component that reduces with the volume of financial transactions. As such, financial markets develop only when a threshold level of income is attained. But, if financial outcomes are endogenous to economic development, the question of interest would be how greater trade openness affects the level of financial development itself.

Gries et al. (2009) contend that linkages between financial depth and trade openness could allow for more complex paths to economic development. In particular, if increasing trade openness contributes to a higher level of financial development, this may promote economic development where financial depth is found to enhance output via allocative and accumulative channels. But if financial deepening induces trade openness, it may subsequently foster economic development where openness to trade is found to be a development factor.

Blackburn and Hung (1998) employ the well-known endogenous development model of Romer (1990) to explore the multi-causal relationships among trade openness, economic output and financial development. In their model, economic output is driven by horizontal innovation in intermediate goods, which are encouraged by expanding the markets for new goods, e.g., through trade liberalization. This implies that more firms would enter the research sector and seek for external financing of risky and independent research projects. This enables financial intermediaries to better diversify their portfolios and reduces their default probability. As a result, the agency cost associated with the need for depositors to monitor the intermediary portfolio is decreased. The reduction in the agency cost of financial intermediation leads to higher economic output. This is because firms in the research sector start operating at positive profits and this encourages new entrants to the market. The rate at which new process are invented is thus increased. This is an indirect financial market's gain from trade. Specifically, trade liberalization can accelerate innovations and the development of financial markets through the scale effects. Hence, in theory, a complementary relationship might exist between trade openness and financial development.

Even though the relationships between trade, financial deepening and economic development have been extensively explored in literature, the majority of the previous studies have employed a bi-variate framework to examine the causal relationship between trade and economic development and between financial deepening and economic development (see, for example, Calderon and Lin, 2003; Shahbaz, 2012). However, it has been clear that the results obtained by conducting bivariate causality test might be invalid due to the omission of an important variable which affect both the variables included in the causality model. As such, the introduction of a third variable in the causality framework may not only alter the magnitude of the estimates but also the direction of causality (Loizides and Vamvoukas, 2005).

Furthermore, several studies have employed methods for cross-sectional data analysis expecting that the causalities between the variables of interest could be generalized (e.g., Harrison, 1996; Yanikkaya, 2003). Yet, the problem of using the cross-sectional method is that by grouping countries at different stages of trade liberalization, financial deepening and economic development, the method could not take into account the country-specific effects of trade liberalization and financial

modernization on economic development and vice versa. Particularly, it fails to explicitly address the potential biases arising from the existence of cross-country heterogeneity, which may lead to inconsistent and misleading estimates (see, for example, Ghirmay, 2004; Casselli et al., 1996).

To avoid this drawback, the present study attempts to investigate the causalities between trade liberalization, financial modernization and economic development using a tri-variate framework. This study thus contributes to the existing literature by (i) using advanced econometric methods that are less prone to the misspecifications that occur when testing for cointegration and causality, (ii) employing a composite finance indicator in order to proxy financial development in a broad sense, and (iii) taking into account the linkages between trade liberalization and financial modernization that allow for further impacts on economic development.

3. Data and estimation strategy

3.1. The baseline model and data description

The baseline model used for our empirical analysis is the following:

$$OUTPUT_{it} = \alpha_{it} + \beta_i TRADE_{it} + \gamma_i FINANCE_{it} + \varepsilon_{it} \quad (1)$$

where $i = 1, 2, \ldots, N$ for each country in the panel and $t = 1, 2, \ldots, T$ refers to the time period; $FINANCE_{it}$ is the financial modernization variables; $TRADE_{it}$ is the degree of trade openness, $OUTPUT_{it}$ is economic development, and ε_{it} is the classical error term.

Our country sample includes 14 AP countries and the sample period spans from 1961 to 2011. This study uses panel data with annual observations as they are sufficient to ensure the quality of the analysis, as argued by Hakkio and Rush (1991). The choice of countries in the sample, the data frequency and the sample period is based primarily on data availability. As for economic development, the natural logarithm of real GDP per capita (log-level data) is used and labeled as *OUTPUT*. For trade openness, the logarithm of the sum of exports plus imports to real GDP (log-level data) is used and labeled as *TRADE* because this measure is a simple and common indicator of trade openness as suggested by Harrison (1996). All data is taken from International Financial Statistics (IFS).

As to financial development, there is a large literature discussing its possible measures. Several proxies for financial depth have been suggested including, for instance, money aggregates such as M2 to GDP (for example, Odhiambo, 2008) but there has been no consensus on the superiority of any indicator. For the level of financial development, the most popular measure is the ratio of liquid liabilities to GDP (LLGDP, or *LL* for short). Based on the liquid liabilities of the financial system, this measure has been employed in King and Levine (1993). This measure can, however, be too high in countries with undeveloped financial markets. Other standard measures are the ratio to GDP of credit issued to the private sector by banks and other financial intermediaries (PCRDBOFGDP, or *PC* for short) and the ratio of the commercial bank assets to the sum of commercial bank assets and central bank assets (DBACBA, or *DB* for short).

This study follows a recent method by Ang and McKibbin (2007) to construct a composite indicator of financial deepening which is as broad as possible. Specifically the finance proxies including *LL, PC* and *DB* are used to construct an index labeled *FINANCE* via a principal component analysis. Since most financial systems in the AP region are bank-based, the financial indicators that are primarily associated with bank development are used. Data for the individual finance indicators is taken from the updated and expanded version of Financial Development and Structure Database (FDSD). The principal component analysis reduces data sets to lower dimensions while retaining as much information of the original sets as possible. In this case, the finance indicators are transformed into natural logarithms and only the first unrotated principal component is extracted as *FINANCE*.

The sample countries included are at different stages of economic development. Previous studies seem to indicate that the relationship between financial modernization, trade liberalization and economic development might be different for countries at different income levels (for instance, Kim et al., 2010; Sakyi et al., 2015). In light of this possibility, in addition to analyzing the whole panel, we also divide the 14 countries under study into two sub-samples based on the World Bank's income classification as at 1st July 2013. Specifically, the first subpanel consists of high-income countries, namely, Japan, South Korea, New Zealand, Australia and Israel, and the second subpanel covers middle-income countries, including Indonesia, India, Malaysia, Philippines, Thailand, China, Pakistan, Nepal and Sri Lanka.

Table 1 provides summary statistics of the averages and the average growth rates of the key variables used in the study. Except for trade liberalization, the levels of most variables are generally higher for high-income countries than those of the middle-income countries. However, the pattern is different for growth rates. Middle-income countries have the higher growth rates as compared to high-income countries for most of the variables, except for trade openness.

3.2. Estimation strategy

To investigate the relationships between trade liberalization (*TRADE*), financial modernization (*FINANCE*), and economic development (*OUTPUT*) for 14 countries in the AP region for the period 1961–2011, we use a panel data model. Panel data has many advantages over cross-sectional or time series data. For example, in the case of short time series, using panel

Table 1
Summary statistics.

Level variables					
	DB	*LL*	*PC*	*OUTPUT*	*TRADE*
Australia	94.087	52.711	50.941	16517.869	0.241
Israel	88.494	62.699	49.958	14135.514	0.332
Japan	95.903	155.488	122.017	26847.563	0.109
South Korea	94.603	53.391	55.651	6440.777	0.378
New Zealand	87.618	60.626	54.314	18102.077	0.245
High-income countries	92.088	78.143	67.216	16408.760	0.261
China	96.113	114.417	94.406	561.861	0.285
India	73.558	40.683	22.457	332.059	0.160
Indonesia	85.042	36.368	28.101	533.455	0.416
Malaysia	97.445	84.612	69.027	2529.895	1.082
Nepal	81.748	30.807	14.967	177.773	0.265
Philippines	84.648	37.004	24.374	981.202	0.397
Pakistan	70.836	40.074	21.704	401.169	0.240
Sri Lanka	65.741	33.735	17.915	588.636	0.458
Thailand	92.525	68.839	69.330	1239.372	0.630
Middle-income countries	82.031	51.049	37.205	816.158	0.438
All countries	85.793	61.183	48.430	6384.944	0.374
Growth rates, %					
	DB	*LL*	*PC*	*OUTPUT*	*TRADE*
Australia	0.27	1.73	4.02	2.03	6.12
Israel	0.80	2.86	4.20	2.77	5.79
Japan	−0.15	3.58	1.78	3.39	7.23
South Korea	0.15	2.21	3.02	5.49	10.41
New Zealand	0.93	2.95	5.61	2.05	5.55
High-income countries	0.40	2.68	3.74	3.15	7.02
China	0.23	4.59	2.43	6.74	6.04
India	1.30	2.24	3.55	3.08	6.11
Indonesia	1.05	3.12	4.88	3.62	6.94
Malaysia	0.04	3.67	5.44	3.83	4.97
Nepal	0.66	5.05	8.56	1.37	5.67
Philippines	0.74	2.27	2.30	1.44	5.96
Pakistan	0.97	0.45	1.80	2.59	3.89
Sri Lanka	1.70	1.06	4.00	3.20	2.73
Thailand	0.23	3.67	4.93	4.43	6.91
Middle-income countries	0.80	2.76	4.25	3.36	5.47
All countries	0.65	2.73	4.06	3.29	6.02

data enables more observations to be taken by pooling the time series data across countries and leads to higher power for the Granger causality test (Pao and Tsai, 2010). Furthermore, in contrast to time series and cross-sectional data, panel data controls for individual heterogeneity and thus allows for "more informative data, more variability, less collinearity among the variables, more degrees of freedom, and more efficiency" (Baltagi, 2005).

The study first examines the stationarity of the data. This study follows the procedures of Maddala and Wu (1999) that propose a more straightforward, nonparametric unit root test using the Fisher-type statistics. Maddala and Wu (1999) have shown that Fisher-type statistics (Fisher–PP) are superior to the LLC test by Levin et al. (2002) and IPS test by Im et al. (2003). Specifically, the Fisher test is non-parametric. As such, *p*-values are always obtainable, whatever test statistic is used for testing for a unit root for each sample. In addition, the Fisher test can be used with any unit root test. Furthermore, the Fisher test does not require a balanced panel. It can be conducted on unbalanced panels, which is the case of this study. There is no restriction of the sample sizes for different samples. They can vary according to data availability.

This study employs the inverse normal *Z* statistic as recommended by Choi (2001) since this statistic offers the best trade-off between size and power. Under the null hypothesis, all panels contain a unit root. Under the alternative, at least one panel is stationary. This is applied for a finite number of panels, as in this study.

The second step involves investigating the long-run relationships between *TRADE, FINANCE* and *OUTPUT*. Panel cointegration tests are performed on the three following sub-samples. The first sub-sample includes all the 14 countries in the AP sample. The second sub-sample consists of only high-income countries and the third panel includes only middle-income countries. This study uses the panel cointegration tests developed by Westerlund (2007) and Persyn and Westerlund (2008). Two different classes of tests including group-mean tests and panel tests could be used to evaluate the null hypothesis of no cointegration and the alternative hypothesis. Four panel cointegration test statistics (*Ga, Gt, Pa* and *Pt*), that are normally distributed, are developed by Westerlund (2007) based on the Error Correction Model (ECM). The two tests (*Gt, Pt*) are

computed with the standard errors of the parameters of the Error Correction (EC) estimated in a standard way, whereas the other statistics (*Ga, Pa*) are based on Newey and West (1994) standard errors, adjusted for heteroscedasticity and autocorrelations.

By applying an ECM in which all variables are assumed to be I(1), the tests proposed by Westerlund (2007) test the absence of cointegration, by determining whether error-correction is present for individual panel members and for the panel as a whole. The long-run parameters in the cointegrating vector are then estimated, depending on whether there is cointegration relationship existing among the variables.

In cross-sectional analysis, the error variance is likely to vary across the groups impacting the consistency of the estimators. Using the generalized least squares method (GLS) in the estimation could solve this issue. However, other sources of variance variability might still exist, which are represented by the correlation of the squared residuals with the regressors in each group. There are two sources of within-group heteroscedasticity, which could be given either by differences in the unconditional variance of the residual terms while or by differences in the variance of the residual terms conditioned on the regressors. A more efficient estimator which uses the generalized method of moments (GMM) can control for both heteroscedaticity sources.

Using a restrictive matrix that assumes no conditional heteroscedacticity, GLS is equivalent to GMM. As such, it could be inferred that the superiority of GMM (that uses a non-restrictive matrix) on GLS (that uses a restrictive matrix) in the case of heteroscedasticity depends on the presence of regressors.

Considering the model:

$$Y_{it} = \alpha + X'_{it}\beta + \delta_i + \gamma_t + \varepsilon_{it} \tag{2}$$

where $i \in \{1, 2,..., N\}$, $t \in \{1, 2,..., T\}$, Y is a dependent variable, α is a constant, X is a vector of explanatory variables, β represents a vector of coefficients to be estimated, δ_i and γ_t are the fixed and random effects respectively, and ε_{it} represents the classical residual terms. The GLS estimator is based on the following moments:

$$g(\beta) = \sum_{i=1}^{N} g_i(\beta) = \sum_{i=1}^{N} Z'_i \hat{\Omega}^{-1} \varepsilon_i(\beta) \tag{3}$$

where Z'_i is the instrument matrix for the i-th cross-section, $\varepsilon_i(\beta) = (Y_{it} - \alpha - X'_{it}\beta)$ and $\hat{\Omega}$ is a consistent estimation of the variance-covariance matrix Ω.

The GMM estimator is computed based on the following equation:

$$g(\beta) = \sum_{i=1}^{N} g_i(\beta) = \sum_{i=1}^{N} Z'_i \varepsilon_i(\beta) \tag{4}$$

and solves the following minimization problem, function of β:

$$S(\beta) = \left(\sum_{i=1}^{N} Z'_i \varepsilon_i(\beta) \right)' W \left(\sum_{i=1}^{N} Z'_i \varepsilon_i(\beta) \right) = g(\beta)' W g(\beta) \tag{5}$$

This study first conducted three tests under three different assumptions about the error process in order to explore the Feasible Generalized Least Squares (FGLS) model with the best fitted error process for the data. Three assumptions include: (i) contemporaneous correlation; (ii) serial correlation; and (iii) heteroscedasticity which are tested using the Breusch and Pagan (1980)'s LM test, the Wooldridge's (2002) test and the Modified Wald test as proposed by Greene (2008), respectively. The null hypotheses in the first, second and third tests are that there is no contemporaneous correlation, there is no serial correlation and there is homoscedasticity, respectively. Table A1 in the Appendix reports the test results of these three assumptions, which confirm the existence of serial correlation and heteroscedasticity at the 1% level of significance. Given this result, this study estimated the FGLS model with an error process that assumes contemporaneous correlation, serial correlation and heteroscedasticity (Greene, 2008).

In addition, a weakness of the GMM and system GMM estimators is that their desirable properties only hold asymptotic for large N. Thus, in samples with a small number of cross-sectional units, as in this study, the estimates can be biased and inefficient (see Bun and Kiviet, 2006). This gives rise to an important reason for choosing the GLS method as the main method in this study as T (=50) in this case is much greater than N (=14). GLS estimator is also consistent and asymptotically efficient, as compared to GMM. The GMM approach is more suitable when $N > T$.

The final step is conducting panel short-run and long-run causality tests. To determine the direction of Granger causality among the variables in both the long-run and the shot-run, a panel-based ECM is employed, following the two steps of Engle and Granger (1987). The study first estimates the long-run parameters in Eq. (1) via the fully modified ordinary least squares (FMOLS) estimator to obtain the residual. It then defines the first-lagged residual as the error correction term and estimates the following dynamic error correction models:

Table 2
Summary statistics and results of principal component analysis.

Country (data availability)	*FINANCE* (principal component), %	Component matrix		
		DB	*LL*	*PC*
Indonesia (1981-2011)	65.63	0.507	0.500	0.701
India (1961-2011)	96.09	0.571	0.580	0.581
Japan (1961-2011)	60.28	−0.164	0.726	0.668
Korea (1971-2011)	89.75	0.571	0.585	0.576
Malaysia (1961-2011)	71.10	0.349	0.667	0.658
Philippines (1961-2011)	69.58	0.516	0.584	0.626
Thailand (1966-2011)	91.51	0.561	0.585	0.586
China (1987-2011)	92.36	0.559	0.587	0.586
New Zealand (1961-2010)	86.42	0.570	0.585	0.576
Australia (1961-2011)	81.37	0.524	0.587	0.617
Pakistan (1961-2011)	76.62	0.524	0.596	0.609
Israel (1961-2009)	89.11	0.540	0.588	0.602
Nepal (1964-2011)	67.98	0.207	0.690	0.694
Sri Lanka (1961-2011)	82.20	0.565	0.573	0.593

Note: Data for the individual finance indicators is taken from the updated and expanded version of Financial Development and Structure Database (FDSD). The column *FINANCE* contains the value of the initial eigenvalues as a percentage of the total variance the first principal component contains (percentage of variance criterion) that represents the composite indicator of financial development.

$$\Delta FINANCE_{i,t} = \gamma_{i,t} + \sum_{k=1}^{p} \gamma_{11i,kt} \Delta FINANCE_{i,t-k} + \sum_{k=1}^{p} \gamma_{12i,kt} \Delta TRADE_{i,t-k} + \sum_{k=1}^{p} \gamma_{13i,kt} \Delta OUTPUT_{i,t-k} + \varphi_{1i} ECT_{i,t-1} + \varepsilon_{1it} \quad (6)$$

$$\Delta TRADE_{i,t} = \gamma_{i,t} + \sum_{k=1}^{p} \gamma_{21i,kt} \Delta FINANCE_{i,t-k} + \sum_{k=1}^{p} \gamma_{22i,kt} \Delta TRADE_{i,t-k} + \sum_{k=1}^{p} \gamma_{23i,kt} \Delta OUTPUT_{i,t-k} + \varphi_{2i} ECT_{i,t-1} + \varepsilon_{2it} \quad (7)$$

$$\Delta OUTPUT_{i,t} = \gamma_{i,t} + \sum_{k=1}^{p} \gamma_{31i,kt} \Delta FINANCE_{i,t-k} + \sum_{k=1}^{p} \gamma_{32i,kt} \Delta TRADE_{i,t-k} + \sum_{k=1}^{p} \gamma_{33i,kt} \Delta OUTPUT_{i,t-k} + \varphi_{3i} ECT_{i,t-1} + \varepsilon_{3it} \quad (8)$$

where the term Δ denotes the first difference, m is the lag length set at three, which is based on Akaike information criterion. *ECT* is the error-correction term, φ_{ji} $(j = 1, 2, 3)$ is the adjustment coefficient, and ε_{jit} is the disturbance term presumed to be uncorrelated with zero means. The Wald test is used to determine the short-run and long-run causality.

4. Empirical results and discussion

4.1. Empirical results

First, the principal component analysis is performed. Table 2 gives an overview of the results of the principal component analysis and a descriptive overview of the investigated countries. The index *FINANCE* used in this study is usually the only component to show fitting characteristics. In all the cases, this index exhibits at least 60% of the initial variance of the considered series and an eigenvalue that is significantly larger than one. Thus, the first principal component captures adequately the three components of the *FINANCE* index.

The results of conducting Fisher-type panel unit root test are reported in Table A2 in the Appendix. The finding is that for the variables in level, there is not enough evidence to reject the null hypothesis of a unit root at 1% level of significance. Meanwhile, in first difference, there is not enough evidence to accept the null hypothesis of a unit root at 1% level of significance. These conclusions apply to all the variables. We may thus conclude that all the variables are I(1).

The next step of the empirical study involves investigating the long-run relationship between *TRADE, FINANCE* and *OUTPUT*, using the panel cointegration tests developed by Westerlund (2007) and Persyn and Westerlund (2008). As these results in Table 3 strongly indicate the presence of common factors affecting the cross-sectional units, the study bootstraps robust

Table 3
Westerlund (2007) cointegration test results.

Statistic	All countries		High-income countries		Middle-income countries	
	Intercept and no time trend	Intercept and trend	Intercept and no time trend	Intercept and trend	Intercept and no time trend	Intercept and trend
Gt	−2.661***	−2.946**	−2.759**	−3.115*	−2.606**	−2.851
Ga	−9.663	−11.886	−10.241	−11.685	−9.317	−12.006
Pt	−10.297***	−12.973***	−5.233*	−6.233*	−8.668***	−10.977***
Pa	−10.42***	−15.484***	−9.189*	−10.391*	−10.756***	−16.038***

Note: Null Hypothesis: No cointegration. *,** and *** denote significance, i.e. rejection of the null hypothesis at 10%, 5% and 1% levels, respectively. With lags 1, 2 and leads 0, 2 to be included in the error-correction equations, sets 1 the width of the Bartlett kernel window used in the semiparametric estimation of long-run variances.

critical values for the test statistics. Table 3 reports the within and between dimension results of the panel cointegration tests. The results indicate that there is not enough evidence to accept the null hypothesis of no cointegration at conventional significance levels. We thus conclude that the variables *TRADE, FINANCE* and *OUTPUT* move together in the long run. This result holds across different income groups of countries.

The implication of the cointegration test results is that there is a long-run relationship between *TRADE, FINANCE* and *OUTPUT* for a cross section of the countries. Given the presence of cointergration, this study estimates the long-run parameters in the cointegrating vector using FGLS panel estimation techniques that allow for estimating heterogeneous cointegrated vectors. The results are shown in Table 4. The results show that, increased openness to trade benefits financial and economic development for the whole panel as well as the panel of middle-income countries. For the panel of middle-income countries, the results indicate that economic development benefits financial modernization and trade liberalization. For the panel of high-income countries, however, we find that economic development significantly and positively impacts trade liberalization. These findings are consistent with what are expected from theory.

The existence of a long-run cointegration vector necessitates the exploration of Granger causality. Table 5 summarizes the causality estimates for the whole sample and separately for middle-income and high-income countries.

For the whole sample, the results indicate no short-run relationship running from economic development ($\Delta OUTPUT$) to financial modernization ($\Delta FINANCE$) and trade liberalization ($\Delta TRADE$). Based on the statistically significant coefficients of $\Delta FINANCE$ in the $\Delta OUTPUT$ and $\Delta TRADE$ equations of the region and both sub-samples, one may conclude that there is a short-run transitory relationship running from $\Delta FINANCE$ to $\Delta OUTPUT$ and $\Delta TRADE$. However, if considering at 5% significance level, the causality from $\Delta FINANCE$ to $\Delta OUTPUT$ is no longer significant. This suggests that financial development had been a negligible factor for economic development in middle-income economies. This finding may not be surprising. A possible explanation for the lack of causal linkage between economic development and financial depth (defined as formal finance) could be that informal finance could be important for economic development, especially for developing economies.

For the subpanel of high-income economies, the results reveal relatively strong causality from financial modernization to economic development. The findings supports for the supply-leading hypothesis. The results fit in reasonably well, thanks to generally continuous improvements in financial depth and related institutions in developed AP countries. Overall, it appears reasonable to find that for the considered AP high-income countries, financial sectors had contributed to the development of real sectors quite significantly. The findings thus suggest that for high-income countries in this region, a policy focus on deepening financial sector to stimulate economic development seems to be justified.

The results also suggest that there is a feedback effect, i.e., bidirectional causal relations between trade liberalization and financial modernization for the subpanel of high-income countries. The findings thus offer support for theoretical and empirical considerations on financial deepening – trade openness linkages. Policies that are targeted at strengthening a country's financial development are thus likely to significantly shape trade structures as a by-product. Along the line of this argument, policies that aim to increase the levels of trade openness can be expected to possess substantial finance-promoting effects. Furthermore, there is a unidirectional causality running from trade openness to economic development in the sample of high-income countries.

However, for the groups of middle-income countries, the effect of financial deepening – trade openness linkages on general economic development appears to be rather marginal. The influence of trade openness on financial depth has not translated into economic development, as shown by the previous results. In other words, there is rather limited evidence of an indirect effect of trade openness on economic development via the channel of financial development for this group of middle-income countries.

Furthermore, neither does this study find strong evidence of the hypothesis that finance-induced advances in trade liberalization have led to enhanced economic performance. This is apparent from the causality results of middle-income countries. The evidence is only significant for the subpanel of high-income countries at 10% significance level. The results indicate that in all cases, no indirect effect of financial deepening on economic development through the channel of trade openness can be demonstrated.

In addition, the presence of a long-run causality is indicated by the statistical significance of the estimated coefficient for one period of lagged error correction term *ECT*. The consistent finding across the region sample and sub-samples of

Table 4
Estimation results.

All countries						
	FGLS (1) ΔFINANCE	SCC (2) ΔFINANCE	FGLS (3) ΔTRADE	SCC (4) ΔTRADE	FGLS (5) ΔOUTPUT	SCC (6) ΔOUTPUT
ΔTRADE	−0.085	−0.093			0.041***	0.033***
	(−1.09)	(−0.76)			(4.37)	(4.10)
ΔOUTPUT	0.732**	0.652**	0.106	0.142		
	(3.09)	(3.31)	(1.07)	(1.06)		
ΔFINANCE			−0.011	−0.011	0.011**	0.012**
			(−0.79)	(−0.72)	(3.25)	(3.38)
_cons	0.089***	0.089**	0.048***	0.046**	0.025***	0.027***
	(5.70)	(3.29)	(7.99)	(2.90)	(13.46)	(7.37)
N	633	633	633	633	633	633
High-income countries						
	FGLS (1) ΔFINANCE	SCC (2) ΔFINANCE	FGLS (3) ΔTRADE	SCC (4) ΔTRADE	FGLS (5) ΔOUTPUT	SCC (6) ΔOUTPUT
ΔTRADE	0.021	−0.079			0.028	−0.067
	(0.14)	(−0.29)			(1.47)	(−1.24)
ΔOUTPUT	0.102	0.017	0.272**	−0.203		
	(0.33)	(0.05)	(2.58)	(−1.53)		
ΔFINANCE			−0.005	−0.012	0.012	0.001
			(−0.20)	(−0.29)	(1.55)	(0.05)
_cons	0.096***	0.106***	0.065***	0.066***	0.024***	0.032***
	(3.68)	(4.08)	(7.91)	(3.72)	(7.02)	(3.91)
N	237	237	237	237	237	237
Middle-income countries						
	FGLS (1) ΔFINANCE	SCC (2) ΔFINANCE	FGLS (3) ΔTRADE	SCC (4) ΔTRADE	FGLS (5) ΔOUTPUT	SCC (6) ΔOUTPUT
ΔTRADE	−0.138	−0.204			0.049***	0.066**
	(−1.51)	(−1.99)			(4.33)	(3.01)
ΔOUTPUT	1.579***	1.948***	0.875***	0.826***		
	(4.56)	(4.87)	(5.12)	(4.50)		
ΔFINANCE			−0.021	−0.0199	0.011**	0.015*
			(−1.28)	(−1.78)	(2.89)	(2.72)
_cons	0.070***	0.054***	0.016	0.019	0.026***	0.026***
	(3.40)	(3.19)	(1.90)	(1.20)	(11.71)	(7.32)
N	396	396	396	396	396	396

Note: *t* statistics in parentheses. *,** and *** denote significance at 10%, 5% and 1% levels, respectively.

different income groups suggests long-rum causality running from Δ*OUTPUT* and Δ*TRADE* to Δ*FINANCE*. It also indicates long-run causality from Δ*TRADE* to Δ*FINANCE* to Δ*OUTPUT* in the whole panel as well as the subpanel of high-income countries.

4.2. Robustness check

To test the robustness of our findings with the FGLS method, the study also estimated the models using the robust standard errors proposed by Driscoll and Kraay (1998) for panel regressions with cross-sectional dependence (SCC). Driscoll–Kraay standard errors are well calibrated when cross-sectional dependence is present. Driscoll and Kraay (1998) rely on large-*T* asymptotics and demonstrate that the standard nonparametric time-series covariance matrix estimator can be modified to be robust to general forms of cross-sectional and temporal dependence. Driscoll and Kraay's approach loosely applies a Newey–West-type correction to the sequence of cross-sectional averages of the moment conditions. When the standard error estimates are adjusted in this way, the covariance matrix estimator is guaranteed to be consistent, independently of the cross-sectional dimension *N* (i.e., also for $N \to \infty$). Therefore, with the approach proposed by Driscoll and Kraay (1998), the deficiencies of other large-*T* consistent covariance matrix estimators such as the Parks–Kmenta and the PCSE approach are eliminated. Note that the Parks–Kmenta and the PCSE estimators typically become inappropriate when the cross-sectional dimension *N* of a panel gets large.

Furthermore, erroneously ignoring cross-sectional correlation when estimating panel models can lead to severely biased statistical results. As such, this study used the xtscc program presented in Hoechle (2007) which produces Driscoll and Kraays' (1998) standard errors for linear panel models. Besides being heteroscedasticity consistent, these standard error

Table 5
Panel short-run and long-run causality test results.

All countries				
Dependent variables	Sources of causation			
	$\Delta FINANCE$	$\Delta TRADE$	$\Delta OUTPUT$	Long run
				$ECT(-1)$
$\Delta FINANCE$	–	4.22	4.79*	24.10***
$\Delta TRADE$	16.55***	–	2.92	3.81*
$\Delta OUTPUT$	15.53***	1.55	–	1.35
High-income countries				
Dependent variables	Sources of causation			
	$\Delta FINANCE$	$\Delta TRADE$	$\Delta OUTPUT$	Long run $ECT(-1)$
$\Delta FINANCE$	–	7.85**	3.15	7.89***
$\Delta TRADE$	7.14**	–	0.27	5.72**
$\Delta OUTPUT$	9.25***	5.69*	–	0.19
Middle-income countries				
Dependent variables	Sources of causation			
	$\Delta FINANCE$	$\Delta TRADE$	$\Delta OUTPUT$	Long run $ECT(-1)$
$\Delta FINANCE$	–	2.58	1.14	12.63***
$\Delta TRADE$	8.95**	--	2.67	0.93
$\Delta OUTPUT$	5.12*	0.88	–	0.74

Note: *,** and *** denote significance at 10%, 5% and 1% levels, respectively.

estimates are robust to very general forms of cross-sectional and temporal dependence. In contrast to Driscoll and Kraay's (1998) original covariance matrix estimator which is suitable for balanced panels only, the xtscc program works well with both balanced and unbalanced panels, which is the case of this study. Indeed, we found that overall the GLS results are consistent with those estimated using the Driscoll and Kraay's approach. The econometric models were estimated using STATA. In general, the robustness findings as presented in Table 4 confirm the previous results.

Finally, we also check the robustness of the results with the use of other proxies for financial modernization. Specifically, we conducted the main regressions in Tables 4 and 5 using separately the three variables which are used to construct the financial modernization, including: the ratio of liquid liabilities to GDP (*LL*), the ratio to GDP of credit issued to the private sector by banks and other financial intermediaries (*PC*), and the ratio of the commercial bank assets to the sum of commercial bank assets and central bank assets (*DB*). We found that the results are qualitatively similar to our findings in Tables 4 and 5.[2] As such, we may conclude that our findings are relatively robust to different proxies of financial modernization.

4.3. Policy implications

In summary, the findings of this study indicate (1) the existence of a nexus between financial development and trade liberalization, and an indirect effect of trade openness on economic development via the channel of financial development for selected high-income countries in the AP region, (2) no indirect effect of financial deepening on economic development through the channel of trade openness for the whole sample, (3) unidirectional causality running from financial modernization to trade liberalization in selected middle-income countries in the region, and (4) stable long-run causality from economic development and trade liberalization to financial development for the whole panel as well as subpanels and from economic development and financial modernization to trade liberalization for the region panel and the subpanel of high-income countries.

The findings support the empirical studies that find strong linkages between financial depth and economic development (e.g., King and Levine, 1993; Robinson, 1952; Berthelemy and Varoudakis, 1996). Still, other studies do not find significant links (e.g., Chandavarkar, 1992). It might be concluded that the different findings of studies on financial deepening-economic output causality are attributable to different country samples rather than differences in methodology. This is because the robustness check indicates that the findings in this study are not random, so different methodologies are less likely to account for varying results than different country samples. Generally, the findings of this study support the view that 'one size does not fit all' when analysing financial deepening-economic development interactions (Rioja and Valev, 2004). That is, the actual effect of financial depth on economic development (and vice versa) seems to depend on the level of financial

[2] The results are not reported here to conserve space. However, they are available upon request.

development. When the level of financial development is low, the effect of finance on economic development is uncertain (Rioja and Valev, 2004).

The analysis of this study suggests that selected middle-income AP countries in the sample have not actually benefited directly from financial modernization or trade liberalization though the impact of financial development on economic development is somewhat more pronounced compared to trade. As a consequence, development strategies for this selected middle-income country group that unilaterally focus either financial or trade sector development do not appear to be feasible. Though the findings suggest that finance and finance-related policies have not mattered significantly in the past, they do not imply that finance is irrelevant to development in the future. This is because evidence from other parts of the world does reveal that financial deepening promotes economic development.

One possible explanation for the lack of causal linkage between financial depth (defined as formal finance) and real sectors in this case could be that, especially for the low-income countries, informal finance plays an important role. Much like trade, financial development (or the state of the financial sector in a country) is an outcome, in large parts, of policies such as financial reforms. In other words, obstacles to economic development such as poor institutions or political instability are also obstacles to the development of financial markets. As such, economic policies that aim at removing development obstacles may also be helpful in promoting financial development, thereby helping to overcome financial system deficiencies and benefiting finance-output dynamics. Possible promising development strategies are greater political and macroeconomic stability or improved institutional quality, all of which could in turn positively impact financial development (e.g., Montiel, 2003; Demetriades and Law, 2006). Hence, a general approach taking into account fundamental determinants of development seems to be more appropriate for middle-income countries in the region. At the same time, these countries could gain more from trade by implementing such policies.

5. Concluding remarks

This study examines conflicting considerations about the relationships between financial modernization, economic development and trade liberalization by testing for the causal relationships for 14 selected AP countries. In particular, this study conducts a principal component analysis to obtain a broad indicator of financial modernization.

The research employs advanced panel unit root and cointegration tests to analyze the properties of the investigated variables and to identify possible long-run relationships between them. FGLS method is used to estimate the models due to its methodological advantages over GMM method. The study then conducts Granger causality tests to identify patterns of causation among the variables of interest.

The main findings of this study include: (1) the existence of a nexus between financial development and trade liberalization and an indirect effect of trade openness on economic development via the channel of financial development for selected high-income countries in the AP region, (2) no indirect effect of financial deepening on economic development through the channel of trade openness for the whole sample, (3) unidirectional causality runs from financial modernization to trade liberalization in selected middle-income countries in the region, and (4) stable long-run causality from economic development and trade liberalization to financial development for the whole panel as well as subpanels and from economic development and financial modernization to trade liberalization for the region panel and the subpanel of high-income countries.

This study is unable to find sufficient evidence to suggest that either financial deepening has promoted economic development indirectly via influencing trade openness for the entire panel as well as two subpanels or that trade openness has contributed to economic development as a by-product of its impact on financial development for the subpanel of middle-income countries.

As a result, this research does not advocate development strategies that prioritize unilaterally either financial or trade sector development for middle-income countries in the AP region. Instead, it supports a more balanced policy approach that considers other fundamental development factors, for instance political or macroeconomic stability, or institutional quality. A general approach toward strengthening of these factors may also help to reduce deficiencies in financial systems, so developing and emerging countries in the region may benefit from financial deepening in the future. Such an approach should also help countries to gain more from trade openness.

Appendix

Table A.1, Table A.2.

Table A.1
Diagnostics test results.

All countries					
Test name	Error process	Test statistic	(1) *FINANCE*	(3) *TRADE*	(5) *OUTPUT*
Modified Wald	Heteroscedasticity	χ^2	1275.31***	8.39	1737.47***
Breusch–Pagan LM Test	Contemporaneous correlation	χ^2	162.317***	–	–
Serial correlation	Wooldridge test	F	37.550***	0.418	41.055***
High-income countries					
Test name	Error process	Test statistic	(1) *FINANCE*	(3) *TRADE*	(5) *OUTPUT*
Modified Wald	Heteroscedasticity	χ^2	1.73	3.86	1112.45***
Breusch–Pagan LM Test	Contemporaneous correlation	χ^2	17.873*	174.524***	34.797***
Serial correlation	Wooldridge test	F	23.401***	1.523	69.090***
Middle-income countries					
Test name	Error process	Test statistic	(1) *FINANCE*	(3) *TRADE*	(5) *OUTPUT*
Modified Wald	Heteroscedasticity	χ^2	1520.37***	6.84	81.66***
Breusch–Pagan LM Test	Contemporaneous correlation	χ^2	45.019	273.013***	-
Serial correlation	Wooldridge test	F	29.507***	0.006	4.126*

Note: *,** and *** denote significance at 10%, 5% and 1% levels, respectively.

Table A.2
Fisher-type unit-root test – Panel unit root test results.

With Intercept				
Variables	ADF		Phillips–Perron	
	Level (Z statistic)	1st difference (Z statistic)	Level (Z statistic)	1st difference (Z statistic)
FINANCE	0.1910	−9.6412***	0.1065	−15.0389***
TRADE	2.7705	−8.3503***	3.9008	−19.4328***
OUTPUT	2.6259	−6.8605***	1.6278	−16.8692***

Note: *** indicates rejection of the null hypothesis 1% significance level. ADF regressions: lags = 3, Phillips–Perron regressions: lags = 3

References

Ang, J.B., McKibbin, W.J., 2007. Financial liberalization, financial sector development and development: evidence from Malaysia. J. Dev. Econ. 84, 215–233.
Baltagi, B.H., 2005. Econometric Analysis of Panel Data. John Wiley, New York.
Beck, T., 2002. Financial development and international trade: Is there a link? J. Int. Econ. 2, 107–131.
Bencivenga, V.R., Smith, B.D., 1998. Economic development and financial depth in a model with costly financial intermediation. Res. Econ. 52, 363–386.
Berthelemy, J.C., Varoudakis, A., 1996. Economic development, convergence clubs, and the role of financial development. Oxf. Econ. Pap. 48, 300–328.
Blackburn, K., Hung, V.T.Y., 1998. A theory of development, financial development and trade. Economica 65, 107–125.
Breusch, T., Pagan, A., 1980. The LM test and its application to model specification in econometrics. Rev. Econ. Stud. 47, 237–254.
Bun, MauriceJ.G., Kiviet, JanF., 2006. The effects of dynamic feedbacks on LS and MM estimator accuracy in panel data models. J. Econom. 132 (2), 409–444.
Calderon, C., Lin, L., 2003. The direction of causality between financial development and economic development. J. Dev. Econ. 72, 321–334.
Casselli, F., Esquivel, G., Lefort, F., 1996. Reopening the convergence debate: a new look at cross-country development empirics. J. Econ. Dev. 1, 363–389.
Chandavarkar, A., 1992. Of finance and development: neglected and unsettled questions. World Dev. 20, 133–142.
Choi, I., 2001. Unit root tests for panel data. J. Int. Money Financ. 20, 249–272.
Demetriades, P.O., Law, S.H., 2006. Finance, institutions and economic development. Int. J. Financ. Econ. 11, 245–260.
Do, Q.T., Levchenko, A.A., 2004. Trade and Financial Development. World Bank, Washington DC *Working Paper 3347*.
Driscoll, J.C., Kraay, A.C., 1998. Consistent covariance matrix estimation with spatially dependent panel data. Rev. Econ. Stat. 80, 549–560.
Edwards, S., 1998. Openness, productivity and development: what do we really know? Econ. J. 108, 383–398.
Engle, R.F., Granger, C.W.J., 1987. Cointegration and error correction: representation, estimation and testing. Econometrica 55, 251–276.
Ghirmay, T., 2004. Financial development and economic development in sub-Saharan African countries: evidence from time series analysis. Afr. Dev. Rev. 16, 415–432.
Greene, W.H., 2008. Econometric Analysis, 6th ed. Prentice Hall, Upper Saddle River, NJ.
Gries, T., Kraft, M., Meierrieks, D., 2009. Linkages between financial deepening, trade openness, and economic development: causality evidence from sub--Saharan Africa. World Dev. 37, 1849–1860.
Hakkio, C.S., Rush, M., 1991. Cointegration: how short is the long run? J. Int. Money Financ. 10, 571–581.
Harrison, A., 1996. Openness and development: a time-series, cross-country analysis for developing countries. J. Dev. Econ. 48, 419–447.
Hoechle, Daniel, 2007. Robust standard errors for panel regressions with cross-sectional dependence. Stata J. 7, 281–312.
Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testing for unit roots in heterogeneous panels. J. Econom. 115, 53–74.
Kim, D., Lin, S., Suen, Y., 2010. Dynamic effects of trade openness on financial development. Econ. Model. 27 (1), 254–261.
King, R., Levine, R., 1993. Finance and development: Schumpeter might be right. Q. J. Econ. 108, 717–737.
Kletzer, K., Bardhan, P.K., 1987. Credit markets and patterns of international trade. J. Dev. Econ. 27, 57–70.
Krugman, P.R., 1979. Increasing returns, monopolistic competition and international trade. J. Int. Econ. 9, 469–479.
Krugman, P.R., 1980. Scale economies, product differentiation, and the pattern of trade. Am. Econ. Rev. 70, 950–959.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2002. Government ownership of banks. J. Financ. 57, 265–301.

Levin, A., Lin, C.-F., Chu, C.-S.J., 2002. Unit root tests in panel data: asymptotic and finite-sample properties. J. Econom. 108, 1–24.
Loizides, J., Vamvoukas, G., 2005. Government expenditure and economic development: evidence from tri-variate causality testing. J. Appl. Econ. 8, 125–152.
Maddala, G.S., Wu, S., 1999. A comparative study of unit root tests with panel data and a new simple test. Oxf. Bull. Econ. Stat. 61, 631–652.
Montiel, P.J., 2003. Development of financial markets and macroeconomic policy. J. Afr. Econ. 12, 12–52.
Newey, W., West, K., 1994. Autocovariance lag selection in covariance matrix estimation. Rev. Econ. Stud. 61, 631–653.
Odhiambo, N.M., 2008. Financial depth, savings and economic development in Kenya: a dynamic causal linkage. Econ. Model. 25, 704–713.
Pagano, M., 1993. Financial markets and development: an overview. Eur. Econ. Rev. 37, 613–622.
Pao, H.T., Tsai, C.M., 2010. CO_2 emissions, energy consumption and economic development in BRIC countries. Energy Policy 38, 7850–7860.
Persyn, D., Westerlund, J., 2008. Error correction based cointegration tests for panel data. Stata J. 8, 232–241.
Rioja, F., Valev, N., 2004. Does one size fit all? A reexamination of the finance and development relationship. J. Dev. Econ. 74, 429–447.
Robinson, J., 1952. The Rate of Interest, and Other Essays. Macmillan, London.
Romer, P.M., 1990. Endogenous technological change. J. Political Econ. 98, S71–S101.
Sakyi, D., Villaverdeb, J., Mazab, A., 2015. Trade openness, income levels, and economic growth: the case of developing countries, 1970–2009. J. Int. Trade Econ. Dev.: Int. Comp. Rev. 24, 860–882.
Schumpeter, J.A., 1934. The Theory of Economic Development. Harvard University Press, Cambridge, MA (New York: Oxford University Press, 1961.) First published in German, 1912.
Schumpeter, J.A., 1942. Capitalism, Socialism, and Democracy. Harper, New York (Harper Colophon edition, 1976).
Shahbaz, M., 2012. Does trade openness affect long run development? Cointegration, causality and forecast error variance decomposition tests for Pakistan. Econ. Model. 29, 2325–2339.
Sundaresan, S., 2010. Development of financial markets in Asia and the Pacific: the international financial crisis and policy challenges. The International Financial Crisis and Policy Challenges in Asia and the Pacific, 52. Bank for International Settlements (BIS), Hong Kong, pp. 83–96.
Westerlund, J., 2007. Testing for error correction in panel data. Oxf. Bull. Econ. Stat. 69, 709–748.
Wooldridge, J.M., 2002. Econometric Analysis of Cross Section and Panel Data. MIT Press, Cambridge, MA.
Yanikkaya, H., 2003. Trade openness and economic development: a cross-country empirical investigation. J. Dev. Econ. 72, 57–89.