Asia-Pacific Journal of Science and Technology: Volume: 28. Issue: 05. Article ID.: APST-28-05-05. Research Article

APST

Asia-Pacific Journal of Science and Technology

https://www.tci-thaijo.org/index.php/APST/index

Published by the Research and Graduate Studies Division,
Khon Kaen University, Thailand

A meta-analysis of Thailand's financial development and economic growth

Kanokporn Intharak[1], Surachai Chancharat[1,*] and Jakkrich Jearviriyaboonya[2]

[1]Faculty of Business Administration and Accountancy, Khon Kaen University, Khon Kaen, Thailand
[2]Faculty of Economics, Khon Kaen University, Khon Kaen, Thailand
[*]Corresponding author: csurac@kku.ac.th

Received 25 May 2022
Revised 9 September 2022
Accepted 17 September 2022

Abstract

Results on the studies examining the relationship between financial development and economic growth have remained inconclusive. Literature collection and meta-analysis are employed to understand whether financial development promotes economic growth. A meta-analysis of Thailand's financial growth and economic prosperity from 1990 to January 19, 2021, was conducted to determine if the financial system's expansion had a natural effect on the structures that had the most significant effect on economic development. The phrases "finance-growth nexus in Thailand," "financial development and economic growth in Thailand," and "financial development and economic growth in Thailand." A list of 771 estimates from 29 studies was analyzed using the precision-effect estimation with a standard error (PEESE) model. After eliminating the publication bias, the results revealed the importance of the banking sector, stock market, and first-incorporated bond markets, which are crucial to fostering the Thai economy with most economic entities relying on the banking sector. Policymakers can use these findings to better understand their policies' actual effects on the economy and encourage financial markets to improve the financial intermediaries' long-term viability and development.

Keywords: Corrected effect, Economic growth, Financial development, Meta-analysis, Publication bias, Thailand

1. Introduction

It is well known that financial development promotes economic growth [1,2]. However, empirical evidence suggests that the impact of financial development on economic growth varies-it either promotes growth or contributes to financial crises [3]. Financial intermediaries' growth has a natural effect on economic prosperity. However, the consequences of this are diverse. Financial development can either promote economic development or contribute to financial crises. In Thailand, policymakers harbor strong intentions to implement financial development for economic growth to fulfill the responsibility under Article VIII of the International Monetary Fund, which was agreed upon in 1990. The Stock Exchange of Thailand (SET) was restructured to be overseen by the Securities and Exchange Commission (SEC) in 1992, Bangkok International Banking Facilities (BIBF) in 1993, and the establishment of the Bond Dealers Club (BDC) in 1994.

These developments significantly increased the number of financial transactions, but the trilemma, which is impossible of trinity, finally brought about the financial crisis in 1997 [4]. Following the crisis, policymakers restructured financial institutions, policies, and regulations to withstand global pressure, financial instability, and crises, such as the subprime crisis in 2008. Increased competitive forces to address new challenges and impacts from international policy implementation, such as quantitative easing (QE), dramatically increased fund flows to generate higher returns in Asian markets. Furthermore, globalization significantly stimulates and promotes the digitalization of financial products and transactions. All current policies and regulations promoting financial development are more

likely to boost economic growth through the finance-growth nexus. The relationship between financial development and economic growth, as assessed by the growth theory, starts with the wealth of the nation. According to Adam Smith, balanced growth stabilizes the market through an invisible hand. Classical growth performance relies on the intermediary financial function, which transfers household savings to adequate investment funds in firms. Capital accumulation from savings enables greater future consumption and investment, thus driving economic growth. Thus, it is necessary to examine natural effects on the economy without publication bias.

Whether financial intermediaries' growth promotes economic prosperity has long been a fascinating research subject. On the contrary, previous empirical evidence of the financial intermediary's effect on the economy has been mixed [5-8], implying that it either fixed or exacerbated financial crises. According to the growth hypothesis, intermediary financial expansion encourages economic prosperity originating from a nation's wealth. According to Adam Smith, harmful expansion uses an invisible hand to stabilize the market. Traditional growth performance is based on the intermediary financial function, which transfers savings from households to enterprises' investment funds. Savings accumulate more capital and become the primary driver of economic growth.

Improvement of financial intermediaries has the potential to boost the economy in three ways. First, financial development aids in reducing the loss percentage on a financial intermediary, thereby increasing the growth rate. Its second important function is to allocate assets to the capital with the highest marginal product, thereby promoting growth by evaluating alternative investment projects with more information and investing in risky investment projects with more productive technologies and efficient risk-sharing. Finally, financial development can influence growth by influencing savings rates; however, its impact is unclear. Through security market diversification or insurance markets, financial development can either boost or decrease saving rates, with households choosing between spending and saving based on their preferences [4,9].

Unsurprisingly, researchers and decision-makers have focused on the connection between financial development and economic growth [10-18]. However, it must be formally demonstrated that there is a causal relationship between banking sector expansion, stock market development, and economic growth,to ensure that such policies are indisputably guaranteed to be effective [19-22]. Empirical research has shown that financial development and economic growth indices have a clear long-run correlation. These publications generally imply that a robust financial sector promotes growth and is thus consistent with the axiom "more finance, more growth" [23-25].

A significant portion of the literature, including the studies cited above, has come under fire for failing to take potential endogeneity into account, which could lead to inaccurate results. Consequently, techniques based on instrumental variables have been applied to offer objective and reliable estimations. For instance, some studies using a paradigm based on the generalized method of moments find that growth positively correlates with financial development proxies [26-28]. Moreover, a practical legal and regulatory framework is essential for the effective operation of financial systems. Since the financial crisis, economists have become less optimistic about the relationship between financial development and economic growth. For instance, Arcand et al. [29] concentrated on the detrimental implications of "too much" finance. According to Rousseau et al. [30], the influence of financial development on economic growth is diminished not by "too much" finance per se, but by greater fragility and the subsequent recurrence of financial crises. An overview of how a bloated financial sector may adversely affect the actual economy [31].

Previous meta-analyses on the effects of financial system growth on economic prosperity have found a corrected effect and publication bias among worldwide and Chinese studies. When removing publication bias using meta-analysis, they showed a genuinely positive effect between financial development and economic growth in the financial sector as a whole, the banking sector, and the stock market [32-34]. In addition, the banking sector plays a more crucial role in China's economic growth than in stock market development [35]. However, no meta-analysis has been conducted to study the genuine impact of the finance-growth nexus under a long-term transition economy after a financial crisis like Thailand and another significant bond market. Accordingly, we conducted a quantitative meta-analysis to understand the effects of financial development on the Thai economy. First, does financial development promote a genuine effect on Thai economic growth? Second, does the financial market structure, including the banking sector, stock market, and bond market, play a significant role in the growth of the Thai economy? The results will allow policymakers to evaluate the genuine effects of their policy implementation on Thai economic growth. One challenge in boosting economic growth is building small-scale capital markets.

2. Materials and methods

According to a plethora of heterogeneous literature, financial growth influences economic expansion, with variations in favored financial growth and economic development steps. We began by looking up the phrases "finance-growth nexus in Thailand", "financial development and economic growth in Thailand," and "financial development

and economic growth in Thailand" for papers published on Google Scholar. The gross domestic product (GDP) and GDP per capita growth rate were focused on ensuring that the meta-analysis results were consistent across studies. All included papers were published in a peer-reviewed journal and reported standard errors or t-statistics. Finally, we assembled a total of 771 reported estimates between the independent variable (financial development) and the dependent variable (economic growth) from 29 studies undertaken between 1990 and 2021. These included different financial growth indicators, including the financial sector as a whole, banks, stock markets, and bond markets.

Publication bias occurs from researchers, referees, reviewers, and auditors' preferences in accordance with conventional theories or significant with empirical results. A previous meta-analysis revealed that publication bias is widespread in the economic context. Consequently, it is essential to determine the actual effect of financial growth on economic development without considering publishing prejudice. The calculations and standard errors should be independent if there is no publication bias.

The the precision-effect estimation with a standard error (PEESE) or precision effect estimate with the standard error model is a nonlinear quadratic approximation. The model yields a lower average bias and minimum mean square error (MSE) when publication bias exists compared to conventional alternatives and small estimates of availability [36]. Using this model, the precision effect and publication bias was estimated as:

$$e_{ij} = e_0 + \beta_0 \cdot Se_{ij}^{\ 2} + \varepsilon_{ij} \tag{1}$$

where Se_{ij} is the standard deviation of the estimate and ε_{ij} the equation is heteroscedastic. To correct for heteroscedasticity, we applied weighted least-squares $1/Se_{ij}$.

$$e_{ij} / Se(e_{ij}) \equiv t_{ij} = \beta_0 \cdot Se(e_{ij}) + e_0 \cdot 1 / Se(e_{ij}) + \zeta_j + \varepsilon_{ij} \tag{2}$$

e_{ij} : Reported estimate *i* and study *j*
t_{ij} : Reported *t*-statistics of estimates *i* and *j*
β_0 : Publication bias,
$Se(e_{ij})$: Estimate *i* and study *j* standard errors
$1/Se(e_{ij}$: Estimate precision.
e_0 : Publication-bias-corrected effect
ζ_j : Specific random component following [37] and
ε_{ij} : Idiosyncratic random error

The model was run separately using four models: the financial sector as a whole, the bank, the stock market, and the bond market. The null hypothesis testing was $e_0 = 0$ and $\beta_0 = 0$ when analyzing the corrected effect and existence of publication bias. We would anticipate positive e_0 to be positively significant if publication bias is present, with the significant impact of the financial system on economic development (β_0)when positive β_0 is positively significant by PEESE. As GDP growth rate and financial development measures differ in finance-growth nexus studies; therefore, the partial correlation coefficient (r), constructing a consistent measure without units, was used to compare the relationship across the literature.

$$r_{ij} = t_{ij} / \sqrt{t_{ij}^{\ 2} + df_{ij}} \tag{3}$$

Equation (2), when reported with partial correlation, becomes:

$$r_{ij} / Se(r_{ij}) = \beta_0 \cdot Se(r_{ij}) + r_0 \cdot 1 / Se(r_{ij}) + \zeta_j + \varepsilon_{ij} \tag{4}$$

where,
r_{ij} : Partial correlation coefficient of estimate *i* and study *j*
t_{ij} : Reported *t*-statistics of estimates *i* and *j*
$t_{ij}^{\ 2}$: Squared reported *t*-statistics of estimates *i* and *j*
df_{ij} : Corresponding degrees of freedom of estimates *i* and *j* (*k*-1), and

$Se(r_{ij})$: Partial correlation coefficient of estimate *i* and study *j* standard error

where $se\left(r_{ij}\right) = r_{ij} / t_{ij}$

3. Results and discussion

Before estimating a full meta-analysis, we used a funnel plot as a subjective and visual method to study the existence of publication bias through a plot of reported estimates, partial correlation coefficient against their precision, or the opposite of standard error. Figure 1 shows four different graphs that describe the measure of financial growth in inclusive and different markets. Figure 1(A) depicts the bank, capital, and bond markets as indicators of financial growth in an inclusive market, whereas Figures 1(B), 1(C), and 1(D) depict the banking sector, capital market, and bond market as distinct indicators of financial growth. The dashed line represents the zero-partial correlation. As shown in the funnel plot, most estimates are clustered on the right-hand side of the dashed line (inverse of the standard error). The estimated coefficients, however, are not directly comparable to each other due to the different proxies of financial development used. Thus, any inference based on these estimates is erroneous. They convert the estimated coefficients in the literature to partial correlations. As unitless measures, partial correlations enable us to compare the relationship between financial variables and growth across the literature. A positive partial correlation indicates the positive impact of financial development on economic growth, while a negative partial correlation indicates the negative impact of financial development. The data reveal significant publication bias in supporting the positive impact of financial development on economic growth in all four figures. However, funnel plots are only indications and do not provide conclusive evidence. A more formal analysis, PEESE, was used based on the PEESE regression model (4).

Statistical methods or meta-analyses were used to detect publication bias and correct for effect. Table 1 shows the publication bias in the previous literature at the 1% significance level for all data and the banking sector, with 5% for the stock market. No significant impact was found while using the bond market as a measure of financial development, possibly because of limited sample data.

The significant positive values of the financial market, bank, and stock market confirmed the existence of publication bias in accordance with the funnel plot above; the negative values of bond market did not confirm the existence of publication bias. The corrected effect in column 1 was 1.241, suggesting a real influence of financial system growth on Thai economic prosperity according to partial correlation coefficients. This result was in accordance with [33, 34, 38] on the world average level. Additionally, we examined the financial growth of three separate markets: bank, capital, and bond markets. The banking sector-corrected impact was 1.334, that of the stock market was 0.970, and that of the bond market was 1.077, both of which were significant at the 1% significance level. According to the facts, bank, stock, and bond market development are important in fostering economic growth, concurring with [9, 39, 40]. Valickova, Havranek [34] emphasized the significant role of stock markets in raising the global average economic growth, while Guo and He [35] highlighted the superior function of banking sector development in supporting the economy's growth over the stock market in China.

The study-level random-effect variance of study-level errors was -0.008 and a standard error of 0.003 in between-study heterogeneity (column 1 of Table 1). The individual-level random-effect variance of the estimate-level errors was 0.010, with a standard error of 0.003. Both were statistically significant and smaller than the publication bias-corrected effects, suggesting a slight association between the study and estimate-level heterogeneities. Similar results are recorded in Columns 2-4.

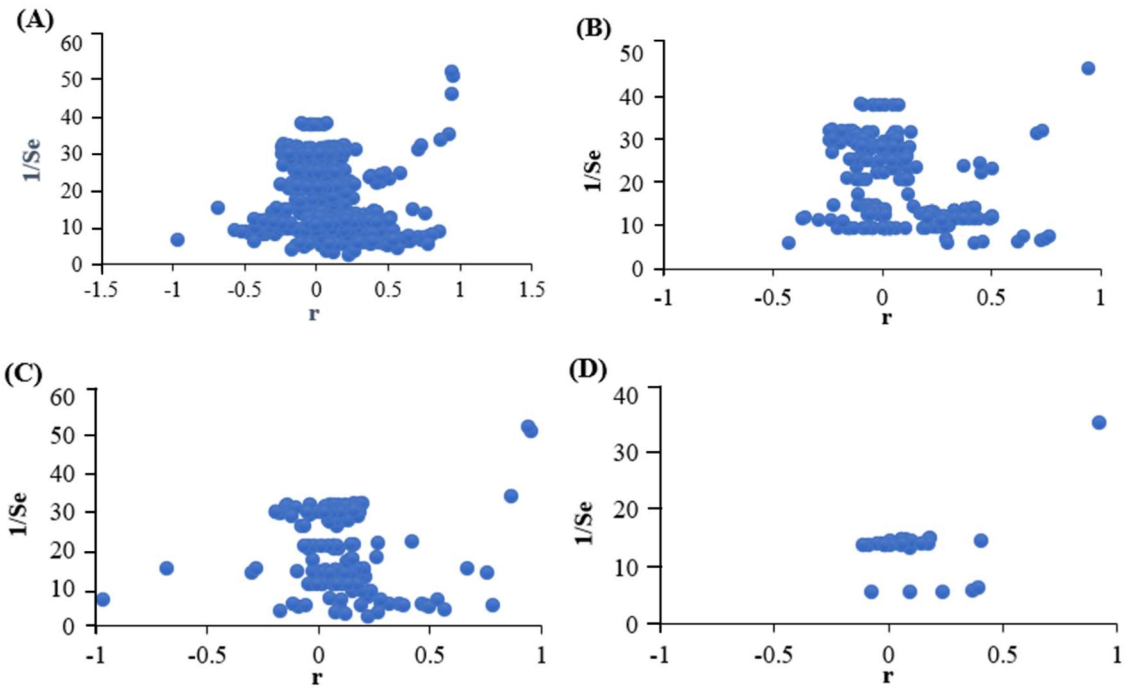

Figure 1 Funnel plots of partial correlation coefficients using financial development as a measure in the inclusive and different markets, including (A) all markets, (B) banking sector, (C) stock market, and (D) bond market.

Table 1 Publication bias and corrected effects.

Measurement	FD (All)	FD (Bank)	FD (Stock)	FD (Bond)
Publication bias: *Se*(*r*)	8.962***	10.660***	5.297*	-5.284
	(1.352)	(2.300)	(2.902)	(4.172)
Corrected effect: 1/*Se*(*r*)	1.241***	1.334***	0.970***	1.077***
	(0.082)	(0.136)	(0.174)	(0.292)
The study-level random-effect	-0.008**	0.010*	0.010	0.001
variance of study-level errors	(0.003)	(0.006)	(0.009)	(0.004)
The individual-level random-effect	0.010***	-0.015**	0.002	-0.004
variance of estimate-level errors	(0.003)	(0.006)	(0.006)	(0.012)
Observations	771	275	165	28
Studies	29	17	14	3

Standard error in parentheses.
***, **, and * indicate that the parameter estimates are significant at the 1%, 5%, and 10% levels, respectively.

4. Conclusion

A meta-analysis of financial growth on Thai economic prosperity was conducted from 1990 to January 19, 2021. The funnel plots revealed publication bias in the past literature, in accordance with the PEESE model, which also highlighted that the growth of Thailand's financial sector had a substantial real effect on economic prosperity. Furthermore, when publication bias was corrected, the results revealed that the banking intermediary, capital market, and bond market growth all played significant roles in promoting Thai economic expansion following [33,34,38] world average studies. Additionally, the banking sector played a more crucial role in economic growth than stock market development, in accordance with a study in China [35]. Households and several kinds of businesses rely heavily on banking intermediaries, while policymakers and the government use the banking sector as a macroprudential transmission and fiscal policy stimulation pass-through channel. Stock and bond markets are smaller than those in the banking sector. They are imperfect and highly speculative, but have played significant roles in promoting economic growth through institutional channels and investment entities and raising funds for large businesses. Our results will inform policymakers about the genuine impact of their policy implementation on the Thai

economy. As a challenge, related parties should develop small-scale stock and bond markets to improve the financial intermediary's long-term viability to increase the growth of financial systems and, finally, increase economic growth through consumption and investment. Since the stock market and bond market development have a significant positive impact on economic growth, these markets are not as developed as the banking sector; Thai society relies mainly on the latter, as shown by the corrected effect in Table 1. For example, the way to improve stock and bond markets is by promoting access to investment and fundraising through stock and bond market mechanisms; for fundraisers, particularly the business sector in the targeted industries is the new engine of the Thai economy. Furthermore, optimization and competitiveness of Thai markets should be carried out by upgrading the standard on par with global and regional markets with interesting financial investment products to meet the diverse needs of investors. Furthermore, digital technology for capital markets should be utilized by focusing on digital infrastructure development. Doing so will help businesses function more effectively and transparently. Similarly, a sustainable stock and bond market should be developed for environmental social and corporate governance (ESG), along with business operations, to help achieve sustainable development in the future.

5. Acknowledgments

We wish to extend our appreciation to the Faculty of Business Administration and Accountancy, Khon Kaen University for their generous support. We would also like to thank the participants who helped with the early version of this paper presented at the SIBR Conference, Tokyo, Japan, January 7-8, 2021.

6. References

[1] Beck T, Demirguc-Kunt A, Martinez Peria MS. Reaching out: Access to and use of banking services across countries. J Financ Econ. 2007;85(1):234-266.
[2] Levine R, Zervos S. Stock markets, banks, and economic growth. Am Econ Rev. 1998;88(3):537-558.
[3] Bumann S, Hermes N, Lensink R. Financial liberalization and economic growth: a meta-analysis. J Int Money Financ. 2013;33:255-281.
[4] Majid S. Does financial development and inflation spur economic growth in Thailand? Chulalongkorn J Econ. 2007;19(2):161-184.
[5] Cave J, Chaudhuri K, Kumbhakar SC. Do banking sector and stock market development matter for economic growth?. Empirical Economics. 2020;59:1513-1535.
[6] Ng A, Dewandaru G, Ibrahim MH. Property rights and the stock market-growth nexus. N Am J Econ Finance. 2015;32:48-63.
[7] Samargandi N, Fidrmuc J, Ghosh S. Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle-income countries. World Dev. 2015;68:66-81.
[8] Shen C-H, Lee C-C. Same financial development yet different economic growth: Why? J Money Credit Bank. 2006;38(7):1907-1944.
[9] Wongpiyabovorn O. Financial development and economic growth: the cases of Thailand, Malaysia, and the Philippines. Int J Econ Policy Emerg Econ. 2016;9(2):103-126.
[10] Cheng S-Y, Ho C-C, Hou H. The finance-growth relationship and the level of country development. J Financ Serv Res. 2014;45(1):117-140.
[11] Chung PT, Sun S, Vo DTH. How does financial development interact with economic growth in five ASEAN countries?. Singapore Econ Rev. 2019;64(3):441-460.
[12] Demetriades PO, Rousseau PL. The changing face of financial development. Econ Lett. 2016;141:87-90.
[13] Doumbia D. Financial development and economic growth in 43 advanced and developing economies over the period 1975–2009: Evidence of non-linearity. Appl Econ Int Dev. 2016;16(1):13-22.
[14] Gaur M, Kant R, Verma NMP. Macro-economic determinants of high technology exports. Eur J Bus Manag Res. 2020;5(5):1-6.
[15] Jiranyakul K. Temporal causal relationship between stock market capitalization, trade openness and real GDP: Evidence from Thailand. Int J Appl Bus Econ Res. 2015;13(4):1525-1534.
[16] Khadraoui N, Smida M. Financial development and economic growth: static and dynamic panel data analysis. Int J Econ Financ. 2012;4(5):94-104.
[17] Rousseau PL, Yilmazkuday H. Inflation, financial development, and growth: a trilateral analysis. Econ Syst. 2009;33(4):310-324.
[18] Said RM. East Asian bond markets and economic growth. J Pengur. 2013;39:65-72.

[19] Andriansyah A, Messinis G. Equity markets and economic development: does the primary market matter? Econ Rec. 2014;90(s1):127-141.
[20] Donou-Adonsou F, Sylwester K. Growth effect of banks and microfinance: evidence from developing countries. Q Rev Econ Finance. 2017;64:44-56.
[21] Haini H. Examining the relationship between finance, institutions and economic growth: evidence from the ASEAN economies. Econ Chang Restruct. 2020;53(4):519-542.
[22] Hassan MK, Sanchez B, Yu J-S. Financial development and economic growth: new evidence from panel data. Q Rev Econ Finance. 2011;51(1):88-104.
[23] Law SH, Singh N. Does too much finance harm economic growth? J Bank Finance. 2014;41:36-44.
[24] Thumrongvit P, Kim Y, Pyun CS. Linking the missing market: the effect of bond markets on economic growth. Int Rev Econ Finance. 2013;27:529-541.
[25] Naik PK, Padhi P. On the linkage between stock market development and economic growth in emerging market economies. Rev Account Finance. 2015;14(4):363-381.
[26] Hailemariam A, Guotai C. Stock market development and economic growth: empirical evidence for emerging market economies. Int J Econ Finance Manag Sci. 2014;2(2):171-181.
[27] Hou H, Cheng SY. The dynamic effects of banking, life insurance, and stock markets on economic growth. Japan World Econ. 2017;41:87-98.
[28] Levine R. Law, finance, and economic growth. J Financ Int. 1999;8(1):8-35.
[29] Arcand JL, Berkes E, Panizza U. Too much finance?. J Econ Growth. 2015;20(2):105-148.
[30] Rousseau PL, Wachtel P. What is happening to the impact of financial deepening on economic growth? Econ Inq. 2011;49(1):276-288.
[31] Beck T, Degryse H, Kneer C. Is more finance better? Disentangling intermediation and size effects of financial systems. J Financ Stab. 2014;10:50-64.
[32] Adjasi CKD, Biekpe NB. Stock market development and economic growth: the case of selected African countries. Afr Dev Rev. 2006;18(1):144-161.
[33] Bijlsma M, Kool C, Non M. The effect of financial development on economic growth: a meta-analysis. Appl Econ. 2018;50(57):6128-6148.
[34] Valickova P, Havranek T, Horvath R. Financial development and economic growth: a meta-analysis. J Econ Surv. 2015;29(3):506-526.
[35] Guo F, He S. The finance-growth nexus in China: a meta-analysis. Appl Econ Lett. 2019:1-5.
[36] tanley TD, Doucouliagos H. Meta-regression approximations to reduce publication selection bias. Res Synth Methods. 2014;5(1):60-78.
[37] DerSimonian R, Kacker R. Random-effects model for meta-analysis of clinical trials: an update. Contemp Clin Trials. 2007;28(2):105-114.
[38] Arestis P, Chortareas G, Magkonis G. The financial development and growth nexus: a meta-analysis. J Econ Surv. 2015;29(3):549-565.
[39] Fu X, Lin Y, Molyneux P. The quality and quantity of bank intermediation and economic growth: evidence from Asia Pacific. Appl Econ. 2018;50(41):4427-4446.
[40] Le QH, Ho HL, Vu TD. Financial depth and economic growth: empirical evidence from ASEAN+3 countries. Manag Sci Lett. 2019;9(6):851-864.