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An Investigation of Convergence Hypothesis of Price Index in Asian Stock Markets

Ali Fegheh Majidi[*] **Ahmad Mohammadi**[†]
Behnaz Nanvay Sabegh[‡]

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The capital market in each country is considered as the most important part of the economy and its fluctuations may reflect the economic situation of the country. In this paper, the hypothesis of convergence of stock market price indices in Asian countries during the period from January 2007 to February 2017 is investigated using cluster analysis method. The results show that there is no evidence of overall convergence among countries. However, there are three converging clusters between stock markets while the Jordanian stock market forms a non-convergent cluster. These findings should assist portfolio managers in the design and implementation of appropriate portfolio management strategies. Regulatory authorities can also benefit from the design of financial regulation.

Keywords: Cluster Analysis, Convergence, Price Index, Stock Market
JEL Classification: C32, C33, G15

1 Introduction

Capital markets are one of the most important economic sectors whose status is closely related to the economic structure of a country and are considered as the pulse of the economy of many countries. This is particularly evident in countries with Laissez-faire economies, where the main source of funding for the enterprises is the capital market. Powerfulness or weakness of the capital market can play an important role in the growth of the national income and welfare of countries.

There are different types of financial markets with a variety of investments and contributors. These markets are categorized based on types of investments, types of lenders and borrowers, the site of the market and types of exchanges, which are: primary and secondary markets, stock markets and over-the-counter (OTC) markets. Several factors influence financial markets

[*] University of Kurdistan, Iran; a.feghehmajidi@uok.ac.ir (Corresponding Author)
[†] University of Kurdistan, Iran; mohammadiahm@gmail.com
[‡] University of Kurdistan, Iran; behnaz.na.1370@gmail.com

and their fluctuations, which are explained using different economic theories (Mehrabian & Chegini, 2014).

Financial markets are considered to be important due to their crucial role in pooling resources through small and large savings in the national economy, optimizing the flow of financial resources, and directing those resources to consumption. The positive effects of integrated markets are so considerable that some economists believe that the difference between developed and underdeveloped economies lies not in their technology but in the presence (or absence thereof) of integrated, dynamic, and extensive financial markets. The stock exchange is one of the most important financial markets, and the total price index indicates that the total value of the market has multiplied compared to the base year.

Stock price index can be used as a reflector of the stock market fluctuations. The stock price index is also widely used both by investors to invest in specific stocks and by economists as an economic indicator. All variables that somehow affect the choice of assets portfolio by stock buyers can also affect the stock price index. On the other hand, since investing in the stock exchange is made through the purchase of shares of the companies in it, any factor that affects the stock market value of these companies at the micro or macro level can affect the price index of the stock market (Mehrabian & Chegini, 2014).

In general, the most important criterion for evaluating the performance of companies is the rate of stock return. The fact that the factors affecting stock returns are unknown has always been a reason to predict stock price changes of companies. Evaluating the convergence of stock returns makes predicting easier and more successful. Today, one of the main concerns of economists and financial analysts is to explain how stock prices of companies move and what their trends and processes are. Hence, in recent years, capital market researchers have become more interested in convergence in stock markets.

This increased focus on convergence is accompanied by removing restrictions on banking and securities transactions, reducing or eliminating capital constraints, harmonizing legal and accounting frameworks for financial reporting, and encouraging co-investment. Changes in regulations lead to a significant increase in capital flow. If there are fewer conflicts in the financial markets, capital flow of companies will yield the highest possible returns and ultimately lead to the convergence of financial markets, including stock markets.

The convergence status of stock returns can provide relatively good information to find more relevant portfolios and better investment, so that their

decisions are affected and their risk of investment diminishes. The results of this research can be useful for policy makers, various manufacturing and service companies as well as real and legal investors active in world financial markets. It also reflects capital mobility among different stock exchanges. In this research, Philips and Sul (2007) method is used for the convergence test of the price indices of stock markets. This method has many advantages compared to other methods. It does not require stationarity and is sufficiently comprehensive to cover a wide range of convergence processes. Hence, using the Philips and Sul (2007) method, convergence of the price index in the stock markets of the selected countries is investigated.

The remainder of the paper is organized as follows. Section 2 briefly reviews the existing literature on stock market convergence. Sections 3 & 4 outline the Phillips and Sul (2007) method and data, respectively. Section 5 reports the empirical findings. Section 6 provides conclusion remarks.

2 Literature Review

Today, a large part of the investment is made through securities and stock markets. This market, therefore, plays a major role in the economy of every country and stock returns are of particular importance. Until the past two decades, the issue of merging, acquiring and integrating stock exchanges was not a common and popular concept, but in the last twenty years, this economic transformation has become a universal phenomenon (Asgari & Salmani, 2016).

The stock price index is important in all financial markets around the world as one of the most important criteria for assessing the performance of the stock market. Perhaps the most important reason is that these indices are derived from the aggregation of the price movements of the stocks of all companies, or a specific category of companies in the market, and as a result, they make the investigation of the direction and size of the price movements in the stock market possible (Raei, 2006).

There are several stock market indices in the capital markets of different countries, such as Dow Jones Index, Baron Index, and Value line composite index. The main application of the indices is the calculation of the total market returns or certain elements of the market in a given period.

Therefore, convergence of the price index of the securities market indicates that the movement of stock market returns is in the same direction and given the importance of stock markets in the economy and their dependence on the economy and the impact of the economy on stock markets, the economies are also converging.

In their research, Boardman and Laurin (2000), Javadi (1995), Jafari Samimi et al. (2004), Brown and Yucel (2002), Bhanot and Kadapakkam (2006), and Yahyazadehfar et al. (2012) conclude that internal factors including structural, financial, marketing and management variables and external factors such as economic, political and cultural variables affect the stock price index in the stock market.

Correlation among stocks often occurs at different times. This correlation increases in periods when economic and financial integration is higher (Goetzmann et al., 2005). Low correlation among stock markets can be due to several reasons, such as domestic discrimination, country-specific factors (such as policies, laws, etc.), the difference in pricing of equity risk and the configuration of indices. Also, changes in the relative importance of industry and country over time, as the effects of the driving forces of stock returns, can explain patterns of convergence in stock markets (Caporale et al., 2015). Ferreira and Ferreira (2006), Baca et al. (2000) and Cavaglia et al. (2000) conclude that importance of the factors affecting industry in the early 2000s has increased compared to the late 1990s.

Ferreira and Gama (2005) use a fluctuation analysis method to study the behavior of stock fluctuations with time series analysis at the level of local industries, countries, and the world in most of the developed stock markets. Their findings suggest that diversity in industries has been recognized as a more effective tool for reducing risks compared to the geographic diversity existing in the late 1990s. The industry-related fluctuations have increased compared to country-related fluctuations, and the correlation among the local industries has declined globally.

To the extent that convergence occurs in stock markets, the profits from portfolio diversity will decrease. Of course, some economies maintain their unique economic, financial and national attributes and this prevents full convergence of stock markets (Adler & Dumas, 1983). The conventional wisdom argues that investors can improve the efficiency of their risk-taking through diversification of their stock portfolios. In their studies, Howell and Chaddick (1994), Erb et al. (1996), Diamonte et al. (1996) and Bekaert and Harvey (2000) argue that political instability or political risks affect capital markets negatively and lead to a reduction in investment along with an increase in political uncertainty.

Political risks usually involve numerous factors such as repayment constraints, the level of democracy, expropriation, civil wars, constraints on the transfer of money, government interventions in entrepreneurial activities, the number of votes in each political party, etc (Apergis et al., 2011).

Campbell and Hamao (1992), Bekaert and Harvey (1995), Alesina and Rodrik (1996), Djankov et al. (2010), and Barseghyan and DiCecio (2010) believe that free trade and free markets lead to the convergence of capital markets. Easterly et al. (1997) and Easterly & Levine (1997) examine the impact of ethnic diversity on the integrity of financial markets and conclude that ethnic differences are a major factor in local financial issues.

Definite and clear property rights, accredited accounting standards and legal mechanisms are key factors in the convergence process (Bekaert & Harvey, 1995; Alesina & Perotti, 1994). Also, factors that prevent the final convergence of stock markets are: barriers against the free flow of capital, and the tendency of financial investors for Home Bias, etc. (Apergis et al., 2014).

3 Research Method

3.1 The Log t Convergence Test

In the past two decades, new studies have been developed based on the concept of convergence of β and σ, introduced by Barro and Sala-i-Martin (1991, 1992). Convergence in β implies a return to mean for panel units, while convergence in σ represents a decrease in dispersion across the cross-sectional part (Caporale et al., 2015).

Islam (2003) shows that convergence β, though it has a true interpretation of the growth model, is the necessary but not sufficient condition for convergence σ. He also points out some problems during the empirical test of convergence (Durlauf & Quah, 1999; Bernard & Durlauf, 1996). First, the concepts of growth models for absolute "convergence" and convergence “clubs” are not explicit. Second, different tests, such as ‘the null hypothesis’ test, are not necessary and, therefore, are not directly comparable. Third, most tests are based on specific and limited hypotheses about the structure of the panel.

In this study, a new approach, that is the panel club convergence and the clustering method recommended by Philips and Sul (2007), is used to overcome the deficiencies mentioned in other methods. This method has several advantages. First, it does not need specific hypotheses about the stationarity of the variables in question or the existence of common factors. Second, this method uses a general form of nonlinear variable operating models with time.

Third, this approach involves the experience of countries in transitional dynamics, while the hypothesis of homogeneous technological progress - which is widely accepted in many studies of growth- is not taken into account.

This issue is of paramount importance because in technological heterogeneity, studying growth convergence or growth determinants by standard panel stationarity tests is not valid (Philips & Sul, 2009). Some researchers, such as Fritsche and Kuzin (2011) and Caporale et al. (2015), have used this method to examine convergence patterns within different markets, including the labor market and productivity.

The econometric approach proposed by Phillips and Sul (2007) uses a nonlinear time-varying factor model and provides the framework for modeling the transitional dynamics as well as the long-run behavior. Assuming that we have panel data for a variable X_{it}, where i = 1,..., N and t = 1, ..., T, with N and T are the number of units and the sample size, a simple linear factor model can be expressed as follows:

$$X_{it} = \delta_i \mu_t + \varepsilon_{it} \quad (1)$$

Where μ_t and ε_{it} are unobservable components. Phillips and Sul (2007) reformulate Equation (1), allowing for time variation in the loading coefficients. They allow δ_{it} to have a random component, which absorbs ε_{it}. The new model has the following representation:

$$x_{it} = \delta_{it} \mu_t \quad (2)$$

Phillips and Sul (2007) separate the common factors from idiosyncratic components, as follows:

$$x_{it} = g_{it} + a_{it} \quad (3)$$

Where g_{it} represents systematic components and a_{it} transitory components. Equation (3) is transformed to the form of Equation (2), as follows:

$$X_{it} = \left(\frac{g_{it} + a_{it}}{\mu_t}\right) \mu_t = \delta_{it} \mu_t \quad (4)$$

Where μ_t is a single common component and δ_{it} is a time-varying idiosyncratic element which measures the economic distance between the common trend, μ_t, and X_{it}. To test whether the components of δ_{it} are converging, Phillips and Sul (2007) define the transition coefficient as h_{it}:

$$h_{it} = \frac{X_{it}}{\frac{1}{N}\sum_{i=1}^{N} X_{it}} = \frac{\delta_{it}}{\frac{1}{N}\sum_{i=1}^{N} \delta_{it}} \quad (5)$$

The relative transition parameter h_{it} measures δ_{it} in relation to the panel average at time t, and describes the transition path for country i compared to the panel average. Therefore, h_{it} measures country i's relative departure from the common steady-state growth trend, μ_t. The transition curve average for all countries is equal to one for each set of data at any time. Consequently, convergence among all countries is achieved when $h_{it} \rightarrow 1$ for all i, as $t \rightarrow \infty$. In the case of convergence within the clubs, the transition paths narrow to different steady-state equilibria, which can be above or below the cross-section average of one.

Phillips and Sul (2007) propose the log t regression to test the null hypothesis of convergence. However, it should be noted that Phillips and Sul (2007) define two notions of convergence: in rates or relative convergence (i.e. the studied variable has the same rate of change across the cross sectional units) and in levels or absolute convergence (i.e. the studied variable converge to the same value across the cross sectional units). For relative convergence, the null hypothesis is expressed as follows:

H_0: $\delta_i = \delta$ and $\alpha \geq 0$ against the alternative H_1: $\delta_i \neq \delta$ for all i or $\alpha < 0$

For absolute converge, the null hypothesis is:

H_0: $\delta_i = \delta$ and $\alpha \geq 1$

The difference between the two concepts of convergence is given by the value of α. When μ_t follows either a nonstationary or trend stationary process, Phillips and Sul (2007) show that it diverges at $O_p(t)$ rate as t goes to infinity. Hence, if δ_{it} converges at a faster rate than $O_p(t)$ to the constant δ (i.e. when $\alpha \geq 1$) there is convergence in levels. If δ_{it} converges at a slower rate than $O_p(t)$ to the constant d (i.e. when $0 < \alpha < 1$) the relative convergence holds.

In order to estimate the log t test first, a measure for the cross-sectional variance ratio $\frac{H_1}{H_t}$ is computed:

$$H_t = \frac{1}{N}\sum_{i=1}^{N}(h_{it} - 1)^2 \quad (6)$$

Second, the following OLS regression is performed:

$$\log\left(\frac{H_1}{H_t}\right) - 2\log(\log(t)) = \hat{\alpha} + \hat{b}\log t + \hat{\mu_t} \quad (7)$$

for $t = [rT], [rT] + 1. \ldots . T$ with some r > 0 and $\hat{b} = 2\hat{\alpha}$, where $\hat{\alpha}$ is the estimate of α in H_0.

The test statistic $t_{\hat{b}}$ is normally distributed and at the 5% level the null hypothesis of convergence is rejected. Phillips and Sul (2007) recommend starting the regression at some point $t = [rT]$, with some r > 0. Based on their simulations, Phillips and Sul (2007) suggest r = 0.30 when T is small or moderate (for example, T ≤ 50), and r = 0.20 when T is large (for example, T≥100). By employing the conventional t-statistic t_b, the null hypothesis of convergence is rejected if t_b<-1.65. The rejection of full convergence does not imply the absence of convergence in the subgroups of the panel, and therefore Phillips and Sul (2007) propose a club clustering algorithm to classify units in convergent clusters. The procedure is flexible and allows all possible configurations: overall convergence, overall divergence, converging subgroups and diverging units.

3.2 Clustering Algorithm for Determining Club Convergence

Philips and Sul (2007) propose a simple algorithm, based on the log t test, for sorting the panel into converging subgroups according to certain cross-sectional values. This algorithm consists of four steps, briefly described below:

Step 1: Sorting the sections according to the last observation:

When $T \to \infty$, club convergences usually appear in the last views. The panel unit X_{it} should then be ranked in descending order based on the last X_{it} observation.

Step 2: Formation of k* core group:

By choosing the first K units (2 ≤K< N), log t regression is fitted and the convergence test of the statistics (k) $t_{\hat{b}}$ is calculated for each k. If $t_{\hat{b}}$ is greater than -1.65 for k values, other units are added one by one, then, the value of $t_{\hat{b}}$ is calculated. This process continues until the value of $t_{\hat{b}}$ is greater than -1.65 (5% significance level). After obtaining values smaller than -1.65 for $t_{\hat{b}}$, it is concluded that the core of the group is composed of k*=k-1 members. If $t_{\hat{b}}$ greater than -1.65 is not available for the first two units, the first unit is separated and the regression log t is fitted for the second and third units.

This process continues until the second member of the group and $t_{\hat{b}} \geq -1.65$. After finding the second member of the group, the other stock exchanges are added to the first two members one by one, until the resultant t is less than -1.65; in this case the addition of the stock exchanges is stopped and, from the resultant t_s the maximum of all of which are larger than -1.65 is selected as the core group. If there are no same conditions for each pair and units, then there is no convergence cluster in the panel.

Step 3: Sifting the data for new club members:

After the core group is formed, the test is performed for the next units. That is, the remaining units are separately added to the core group and log t regression is executed. This continues for all units outside the core group. If the statistical test for $t_{\hat{b}}$ is greater than the selected critical value (C), the unit will be included in the current subgroup. After forming the first sub convergence group, log t test is run for this group. If $t_{\hat{b}} > -1.65$, it means that the group is converged and formation of the first group sub convergence ends. The remaining units form a new group, and the above process is repeated for them and their convergence is determined. If there is no other value of $t_{\hat{b}} > -1.65$, then the convergent set only include the core group.

Step 4: Stop and return rule:

After forming a subgroup of converging units, all remaining units will be tested jointly for convergence. In other words, the second group consists of all units outside the first group. If the null hypothesis is not rejected ($t_{\hat{b}} > -1.65$), there is an additional convergence subgroup in the panel. In case the null hypothesis ($t_{\hat{b}} > -1.65$) is rejected, steps 1, 2 and 3 are repeated for the remaining units. If no other subgroup is observed, it is concluded that the remaining units are divergent.

4 Data

The statistical population consists of 22 Asian stock exchange markets selected from Pakistan, Iran, Hong Kong, India (Bombay Stock Exchange of India and National Stock Exchange of India), Japan, Qatar, the Philippines, Saudi Arabia, Oman, Kuwait, Sri Lanka, Indonesia, the UAE, China, Singapore, Jordan, South Korea, Malaysia, Thailand, Lebanon, and Bahrain. Selection of the countries are based on data limitation. Price index information is extracted from the stock markets.

The study period is from January 2007 until February 2017 and the data is monthly. By dividing the stock market index by the consumer price index of each country, the effect of inflation on the index is controlled. Since convergence is a long-term concept, based on Philips and Sul (2007) recommendation, Hodrick-Prescott filter is used to derive the trend component from the set, then the general data trend is used to allow the convergence between the price indices of different stock markets. Also, the number of periods is 122, so based on of Phillips and Sul experience, r is 0.2.

5 Results

Convergence, in general, is a long-term concept, which means it is meaningful in the long run. Obviously, reliable results can only be obtained if the available time series to perform statistical inferences are sufficiently long-term. Sometimes, the section variance is very helpful in this regard. According to Philips and Sul (2007), the cross-sectional variance measures the distance between panel and the joint limit. After calculating the relative transference parameter for the stock exchanges, the cross-sectional variance ratio is calculated for the overall estimation of convergence. Then the log t regression equation is fitted to generally estimate the convergence. Its results are given in the table below:

Table 1
The Results of the Overall Convergence of Asian Stock Exchanges

	coefficient	t statistic	S.E
Log t	-0.5718	-45.7602	0.0125

Source: Research Findings

Table 1 shows the results of the overall convergence estimation of the price index of stock exchanges. The coefficient b is smaller than zero (b<0), and the null hypothesis of the convergence in the whole sample is rejected at a 5% level, and also $t_{\hat{b}}$<-1.65, which indicates non-convergence of the price index of the studied stock exchanges.

Due to non-convergence of stock markets, the possibility of club convergence between different stock markets, using four-step Philips and Sul's method (2007), is examined.

Table 2 shows the results of the clustering test for the selected stock markets price indices of Asian countries. First, the stock markets are sorted in descending order according to the last observation. Accordingly, the stock market in Pakistan is selected as the base market and t log regression is executed between the stock markets of Pakistan and Iran. The obtained t statistic is larger than the critical value -1.65 and indicates the convergence of these two stock markets. Then, other stock markets are added respectively and t statistic is recorded. This will continue until the value of t is smaller than the critical value of -1.65. By adding Qatar's stock market, the value of t statistic is smaller than the critical value, so adding of stock markets is stopped.

According to the table, the t value obtained from the regression among the stock markets of Pakistan, Iran and Hong Kong is the highest; therefore, these three stock markets are selected as the first core group. Then, all stock markets

are added one by one to the first core group and log t regression is performed. In this step, if the value of the t statistic is greater than zero, the stock market is put in the first cluster, thus forming the first cluster. Next, log t regression is estimated among the remaining stock markets. If the value of t statistic is greater than -1.65, the remaining stock exchanges will form the second cluster. Otherwise, the steps are repeated.

The results are illustrated in Table (2). The results of the club clustering algorithm for the index of Asian stock markets indicate that there are three converging clubs during the period under study. The first club includes 6 stock markets (India, Hong Kong, Iran, Japan, Pakistan and the Philippines), the second club includes 13 stock markets (Saudi Arabia, China, the UAE, India, Indonesia, South Korea, Kuwait, Malaysia, Oman, Qatar, Singapore, Sri Lanka and Thailand), and the third club includes 2 stock markets (Bahrain and Lebanon). Also, the Jordanian stock market is not put in any cluster and it forms a non-converging group by itself.

Table 2
Results of the Cluster Algorithm of the Price Index of Asian Stock Markets

Last T Order	Countries	Club1		Club2			Club3		
		Step1	Step2	Step1	Step2	Step3	Step1	Step2	Step3
1	Pakistan	Base	Core						
2	Iran	2.76	Core						
3	Hong Kong	16.86	Core						
4	India*	15.50	15.50						
5	Japan	3.32	3.39						
6	Qatar	-4.52	-16.63	Base		26.97			
7	Philippines		3.54						
8	India**		-93.89	-37.78	Base	Core			
9	Saudi Arabia		-59.69		8.10	Core			
10	Oman		-21.85		9.64	Core			
11	Kuwait		-16.71		3.92	Core			
12	Sri Lanka		-6.41		12.35	Core			
13	Indonesia		-11.49		19.48	Core			
14	UAE		-0.75		16.82	Core			
15	China		-100.83		30.16	Core			
16	Singapore		-23.37		49.61	49.61			
17	Jordan		-18.87		-3.49	-0.26	Base		-11.43
18	South Korea		-55.42			31.60			
19	Malaysia		-41.03			29.34			
20	Thailand		-59.43			80.92			
21	Lebanon		-180.60			-29.30	-6.21	Base	Core
22	Bahrain		-17.00			-29.38		-1.17	Core

Source: Research Findings
* Bombay Stock Exchange of India
** National Stock Exchange of India

5.1 Results of Convergence Test among the Clusters of Stock Markets

The clustering algorithm has a remarkable flexibility, which makes it possible to identify clusters in the entire panel. But since Philips and Sul (2007) have very conservative recommendations about the critical value of C, to an extent that to reduce the risk of mistakenly putting a false member in a convergence group they set it equal to zero (C=0); therefore the clustering method becomes also conservative. For this reason, Philips and Sul (2009) propose a convergence test between convergence clusters. In the proposed test, if the null hypothesis is not rejected, then the corresponding clusters can be merged into a larger cluster.

The results of the estimates for the convergence test between the clusters identified in the stock markets of Asian countries are shown in Table (3). For testing, adjacent clubs are considered and estimates are made. As it is shown in the table, there is no evidence that cluster integration is possible.

Table 3
Convergence Test Results among the Clusters of Asian Stock Markets

	t statistic	$\widehat{b}$	S.E
Club 1+2	-42.18	-0.35	0.00
Club 2+3	-29.54	-0.33	0.01
Club 3+ group 4	-11.43	-0.66	0.05

Source: Research Findings

Therefore, the final clustering will be as Table (4). Given the values in the table, the regression coefficients in all cases are less than 2, indicating a relative convergence in each cluster.

Table 4
Final Clustering of Asian Stock Markets

Club	Countries	$\widehat{b}$	S.E
Club1(6)	India*, Hong Kong, Iran, Japan, Pakistan, Philippines	0.1861	0.0232
Club2(13)	Saudi Arabia, China, UAE, India**, Indonesia, South Korea, Kuwait, Malaysia, Oman, Qatar, Singapore, Sri Lanka, Thailand	0.0098	0.0068
Club3(2)	Bahrain, Lebanon	-1.8647	1.5866
Diverging(1)	Jordan	-	-

Source: Research Findings

The results of the table show that stock markets in different countries show different reactions to economic turmoil. For example, the stock markets of Iran, Japan and Pakistan tend to behave the same way. The stock markets in the first cluster enjoy a commercial boom due to their access to international liquidities. Gulf countries like Saudi Arabia, Kuwait, the UAE, Qatar, and Oman have a deep political and friendly relationship and are immune from foreign threats and party rivalry.

Despite the differences in the size of the economy and industrialization level of countries such as China, Indonesia, Oman and Sri Lanka, the stock markets of these countries are in the same cluster. Geographic proximity also seems to affect the convergence of financial markets. During the research period, Bahrain and Lebanon suffered from internal conflicts. Also, Jordan was involved with the recent insecurity by terrorist groups operating in

neighboring countries such as Syria and Iraq, which has affected investors and, consequently, the stock exchanges of these countries. Obviously, the reasons for the convergence of the stock markets of countries are not limited to these and there may be other reasons and identifying the relevant reasons is for future research.

6 Conclusion

In this study, convergence of 22 selected stock markets in Asia during the period of January 2007 to February 2017 is investigated, and a new mechanism for economic modeling and analysis, that is cluster analysis presented by Philips and Sul (2007), is used. The results indicate the overall non-convergence of the stock markets. The results of the clustering algorithm to determine club convergence for the stock market index show that there are three converging clusters during the period under study.

However, the Jordanian stock market is not in any cluster and forms a non-converging group by itself. These results are important for policy makers and investors, especially portfolio managers. Divergence of financial markets is a sign of a non-homogeneous financial area. Investors benefit from divergence of stock markets through benefits of portfolio diversification, especially in countries with a significant deviation from the mean of the panel. Thus, divergence of the stock markets causes capital transfer and arbitrage. Convergence of the stock market index increases the effects of overflow among capital markets.

During periods of financial convergence, shocks created by a particular industry or country expand rapidly into other industries and countries. Financial convergence is a gradual process and requires time. In this case, policy makers should take steps to achieve a high level of financial convergence. These steps include increasing financial transparency, improving corporate management, reinforcing the legal framework, and increasing cooperation among financial authorities.

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