DYNAMIC RELATIONSHIPS BETWEEN ISHARES AND COUNTRY FUNDS: THE CASE OF EUROPE AND ASIA

Rajarshi Aroskar, University of Wisconsin – Eau Claire

ABSTRACT

This study investigates whether country effects or regional effects are prominent in iShares and country funds that trade in the US. iShares and country funds from three European and three Asian countries are investigated for possible long run and short-run relationships among iShares and country funds of each country and among regional iShares and among regional country funds. Johansen's methodology is used to investigate long-run relationships, while vector autoregression is used to detect short-term effects. It is found that for both regions, iShares and country funds are related to their country counterparts but not to their regional counterparts in the short run. The reverse is true in the long run, with relationships among regional counterparts but not among country counterparts. These findings support the hypothesis that country effects are prominent in the short-run and regional effects take over in the long run.

INTRODUCTION

Diversification in international markets can be achieved by investing in various assets such as foreign stocks, mutual funds, iShares, etc. However, relationships among these assets could lead to a reduction in diversification gains. Hence, a comparison of regional or country relationships would provide immense benefit to an investor seeking diversification. An asset may show relationships with other assets of the same country or with assets of other countries in the same region. This paper hypothesizes that in the short-run, international assets may show relationships with assets of their own country, but in the long run, they are related with the regional assets. Such effects may be due to the dominance of country-related factors in the short run. However, such factors may not have any regional implications. On the other hand, in the long run, investors tend to invest on a regional basis and hence, there may be a dominance of regional factors.

To investigate this hypothesis, this paper utilizes iShares and country funds of six countries representing two regions: Asia and Europe. Only iShares and country funds have been used because they both represent a diversified portfolio in a single country. International stocks may experience an effect from company-specific (events) effects in addition to country and regional effects. This is not within the scope of this paper. iShares, which track the Morgan Stanley Capital Index (MSCI) of a specific country, comprise all the stocks included within that index. As such, they represent a passive investment in a particular country. Due to their passive nature, they have low fees. iShares can also be bought and sold at any time during a trading day for a commission. There are no early redemption fees or penalties. Closed-end country funds invest in a small sample of stocks in a specific country. Country funds are actively managed investments in a country and, hence, have higher fees than iShares. There are early redemption penalties for country funds. Regardless of their differences, they both represent a diversified portfolio that is affected by country and regional factors.

Studies in the past have investigated relationships among regional assets. For example, Dunis and Shannon (2005) investigate the diversification potential offered by the Southeast and Central Asian markets and find increased relationships with the Japanese market, but not with the US or UK markets. However, most of these relationships have been among indices representing the countries of these regions. Thus, these studies have not been able to utilize investible assets such as iShares and country funds. Studies that have investigated iShares and country funds and the effects of a country or region on them have looked at them separately, not in unison. A few studies have looked at the relationship between iShares and country funds of a specific country, but have not extended their study to include regional

factors. The contribution of this paper arises from the fact that it provides investors an indication of the factors that may affect assets of a country. It compares country effects with regional effects. It also provides investors guidance regarding diversification gains or the lack thereof, depending on their investment time window.

Investigation of three countries each in Europe and Asia show that in the short-run for all the countries (except Singapore) there is a relationship among a country's iShare and its country fund. However, few relationships are found among regional iShares and among regional country funds. Long-run relationships show a different picture in that iShares and country funds separately are more often related to their regional counterparts than to their country counterparts. The following section reviews the literature on this topic. It is followed by the data and methodology used in this paper. Next, a discussion of results is presented and then the paper concludes with some insights.

LITERATURE REVIEW

Investors are well served by investing and thus diversifying in international markets. Dunis and Shannon (2005) show that a portfolio consisting of emerging stocks outperformed one consisting of only US stocks. A major impediment in diversification gains would be relationships or effects among various assets included in a portfolio. Such relationships might arise in international assets for, but not limited to, two reasons: their relationship to the economic factors affecting the countries that they represent and/or their relationships to the regional countries.

Studies in the past such as Pennathur, Delcoure and Anderson (2002) and Patro (2001) have investigated the effect on iShares and country funds from their countries. While Khorana and Nelling (1998) test and compare how accurately the iShares and CECFs track the index of the countries they represent. On the other hand, Pennathur, Delcoure and Anderson (2002) investigate the relationship that iShares and country funds have with both their respective home countries and the U.S., the market in which they trade. They show that, while country funds follow the U.S. market, iShares show more exposure to home country returns. Both these studies investigate the effects of country indices on iShares and country funds and not the effect of iShares on country funds or vice versa. The only study, to a limited extent, that tries to investigate the latter relationship is Patro (2001). He investigates the effect the listing of iShares has on country funds. However, this study falls short of investigating the short-term and long-term relationships between these assets—the focus of this study.

The above literature along with this study differ from past studies in that they investigate investible assets rather that indices. Regional relationships among indices have been investigated by, among others, Climent, Menue and Pardo (2001), Dekker, Sen, and Young (2001) and Chelly-Steeley, Steeley, and Pentecost (1998). Respectively, these studies find linkages among the regional Asia Pacific markets and between German, Swiss and French markets. While not investigating similar regions, Morck, Young and Yu (2000) suggest that regional markets could be related due to property rights.

Some studies such as Ratanopkorn and Sharma (2002) and Illueca and Lafuente (2002) have not limited themselves to one specific region but have investigated regional relationships throughout the world. They find that the type of relationship changes depending on the time period. No relationships were found during pre-crisis, long-run relationships were found during crisis, and increased short-run relationships were found during post-crisis.

This study does not segregate the data into various time periods but tries to investigate short-term and long-term relationships over the entire time span. It maintains the regional approach, even while considering regions across the world. Thus, it separates itself from studies that investigate relationships across world markets without regional focus such as Hamao, Masulis and Ng (1990). This study's

regional approach also excludes the dominant effect that major markets such as Japan and the U.S. have on regional indices as found in Ghosh, Saidi and Johnson (1999) Ng (2000) and Chowdhary (1994). Such an approach helps this study to be applicable to any global investor rather than any single country's investor.

DATA

The iShares and country funds used in this study represent Germany, Spain and Switzerland for Europe and Japan, Malaysia, and Singapore for Asia. The span of this weekly closing price data ranges from March 18, 1996 through August 31, 2004 and includes 433 observations. Lipper provided data for country funds and data for iShares was obtained from Yahoo finance.

iShares started trading on March 18, 1996. Country funds for the countries discussed in this paper have been trading even before that date. However, to be consistent and be able to compare the results of iShares with country funds, the start date of country fund data is also selected as March 18, 1996. There is a possibility that there are multiple country funds trading for the same country. In such cases, the country funds with the longest history are selected. Not all iShares that trade today started trading on March 18, 1996. To incorporate the entire history of iShares (consistent with the longest trading history for country funds), the subset consists of Australia, Austria, Belgium, Canada, France, Germany, Hong Kong, Italy, Japan, Malaysia, Mexico, Netherlands, Singapore, Spain, Sweden, Switzerland, and the U.K. This leads to the selection of Germany (a major economy in the Euro zone), Spain (a relatively smaller economy in the Euro zone), and Switzerland (a non-Euro zone economy). This study differs from previous studies in that it does not include only major economies in Europe, but also looks at the smaller economies in Europe. Though there is no monetary union in Asia, the selection criteria in Asia tries to mimic the one in Europe by selecting Japan, Singapore and Malaysia.

METHODOLOGY

Investigation of long-run relationships using cointegration methodology needs the determination of the presence of unit roots (non-stationarity) of variables. The presence of unit roots is investigated using Dickey Fuller (1981) and Phillips Perrone (1988) tests. The null hypothesis in these tests is the presence of unit roots. Rejection of the null hypothesis indicates stationarity in variables.
Johansen's methodology is used to investigate cointegration among variables. The lag length is chosen such that errors are reduced to white noise based on the Box-Ljung Q-statistic for serial correlation in the residuals. Johansen's trace statistic:

$$\text{Trace statistic} = -T\sum_{i=r+1}^{p}\ln(1-\lambda_i) \tag{1}$$

and maximum Eigen value test:
$$\lambda_{\max} = -T\ln(1-\lambda_{r+1}) \tag{2}$$

are used to identify cointegrating vectors. The null hypothesis is that there are at most r cointegrating relationships. When either the trace or λ-max statistic is significant, then the null hypothesis is rejected in favor of r+1 cointegrating vectors. In the case where there are two variables, such as the country fund and iShare of a single country, there can be a maximum of two cointegrating vectors. However, in the case of regional relationships, there can be at most three cointegrating vectors. First, the null hypothesis of zero cointegrating vectors is tested. If this is rejected, then there is at least one cointegrating vector. Next, the null hypothesis of one cointegrating vector is tested. This sequential testing is continued until no additional cointegrating vectors are found.

First, the relationship of each country's iShare is investigated with respect to that same country's country fund. Next, the relationship among regional iShares is investigated, followed by that of the relationships among regional country funds. Short-term relationships are investigated using vector autoregression (VAR). Bidirectional causality between the country funds and iShare of the source country are tested by alternatively treating each variable as a dependent variable. To test the effect of the country fund on the iShare of that country, all lags of the country fund are equated to zero. To test the effect of the iShare on the country fund, all the lags of the iShare are equated to zero. If we reject these hypotheses individually, then the country fund affects the iShare and the iShare affects the country fund respectively. The equation is as follows

$$Y_t = \sum_{i=1}^{i=r} Y_{t-i} + \sum_{i=1}^{i=r} X_{t-i} \tag{3}$$

Where,
Y_t = log returns of dependent variables (iShare/country fund)
X_{t-i} = log returns of independent variables (country fund/iShare)
i = number of lags

To investigate the effect of a country fund (independent) on another country fund (dependent) within that same region, the lags of the independent variable are equated to zero. Rejection of this hypothesis implies an effect of that country fund on the dependent variable. The effect of all other regional country funds taken as group on a particular country fund within that region is investigated by equating the sum of all the lags of these regional country funds (except the lags of the dependent country fund) equal to zero. If this hypothesis is rejected, then all the other country funds of the region as a group affect the country fund in question. The above procedure is repeated for each country fund in either region. Similar tests are also performed for iShares from both the regions. The equation to test these hypotheses is as follows:

$$Y_t = \sum_{i=1}^{i=r} Y_{t-i} + \sum_{n=1,i=1}^{n=k,i=r} X_{n,t-i} \tag{4}$$

Where,

Y_t = log returns of dependent variables (country fund)
$X_{n,t-i}$ = log returns of independent variables (country fund)
i = number of lags
n = number of countries
Similar tests are also performed for iShares using the same equation with iShares being replaced by country funds.

RESULTS

Long-term Relationships

Variables are investigated for stationarity using Dickey Fuller (1981) and Phillips Perrone (1988) tests. As evident from Table 1, the null hypothesis of presence of unit root cannot be rejected for variables in levels. However, this hypothesis is rejected for variables in first differences. Thus, all variables are I (1).

The possibility of a long-run relationship is investigated using Johansen's cointegration tests. First, long run relationships are investigated between country funds and iShares of a single country. The optimal number of lags are obtained using Box Ljung statistic. Lags are increased until errors are reduced to white noise. Using Johansen's test, cointegrating vector is recognized when at least the λ-max or trace statistic

4

(as described in equations 1 and 2 respectively) is significant and, hence, reject the hypothesis of absence of cointegrating vector. This is a sequential test starting with zero cointegrating vectors. As evident from Table 2, the null hypothesis of zero cointegrating vectors cannot be rejected in the case of the German country fund and iShare. Thus, there is no long-run relationship in the case of Germany. Similar results are found in the case of Switzerland and Spain in Europe.

Table 1: Unit Root Tests in Levels

| | Levels | | First Difference | |
	DFunit	PPunit	DFunit	PPunit
CF Germany	-0.80385	-0.80051	-20.02991*	-20.06540*
CF Spain	-1.49453	-1.40881	-22.35602*	-22.44336*
CF Switzerland	-1.73984	-1.77076	-19.64180*	-19.66226*
CF Japan	-2.31336	-2.27954	-21.55091*	-21.62612*
CF Singapore	-2.27347	-2.26908	-23.75345*	-23.61336*
CF Malaysia	-2.17952	-2.18457	-22.39493*	-22.38174*
IS Germany	-1.47140	-1.48504	-20.91546*	-20.96324*
IS Spain	-2.12440	-2.14917	-21.77813*	-21.80147*
IS Switzerland	-2.18924	-2.13894	-2.18924*	-22.13787*
IS Japan	-1.84002	-1.79083	-23.12280*	-23.12793*
IS Singapore	-2.19116	-2.18854	-22.76928*	-22.73384*
IS Malaysia	-1.90082	-1.98416	-21.49008*	-21.55670*

1% level of significance

Table 2: Johansen's Co integration Test Results for Prices of Country Fund and I-Shares of the Individual Countries of Europe and Asia[a,b,c]

| | Europe | | | | Asia | | |
	$H0= r$	λ-max	Trace		$H0= r$	λ-max	Trace
Germany				Japan			
	0	4.18	5.0		0	11.21*	16.64*
	1	0.82	0.82		1	5.43*	5.43*
Spain				Malaysia			
	0	4.58	6.06		0	5.35	7.92
	1	1.48	1.48		1	2.57	2.57
Switzerland				Singapore			
	0	6.10	9.33		0	7.21	12.18
	1	3.23	3.23		1	4.97	4.97

10% level of significance

[a]*Johansen's methodology is used to detect the number of cointegrating vectors. The optimal number of lags are obtained using Box Ljung statistic. Lags are increased until errors are reduced to white noise.*

[b]*Cointegrating vector is recognized when at least one of the two statistics reject the hypothesis.*

[c]*This is a sequential test starting with zero cointegrating vectors.*

Asian results also depicted in Table 2 indicate two cointegrating vectors in the case of Japan. However, there is no cointegration in the case of Malaysia and Singapore. Thus, in both Asia and Europe, there is no cointegration and, hence, no long-run relationship among country funds and iShares, except in the case of Japan. Japanese markets have been depressed over the span of the study. This may affect both the iShare and country fund of Japan. This may explain the long-run relationship between the Japanese iShare and country fund. Further investigation is made in the case of long-run relationships among regional iShares and among regional country funds separately.

Results, as indicated in Table 3, show one cointegrating vector among European iShares and one vector among European country funds. The table also indicates that, while there is no cointegration among Asian iShares, there is the presence of one cointegrating vector among Asian country funds. Thus, there is a long-run relationship within European iShares, European country funds and Asian country funds, but no relationship among Asian iShares.

Table 3: Johansen's Co integration Test Results for Europe and Asia[a,b,c]

Europe			Asia		
Country Fund Prices			Country Fund Prices		
H0= r	λ -max	Trace	H0= r	λ -max	Trace
0	20.55*	26.40	0	18.15*	29.18*
1	5.18	5.85	1	5.94	11.03
2	0.67	0.67	2	5.09	5.09
i-Share Prices			i-Share Prices		
H0= r	λ -max	Trace	H0= r	λ -max	Trace
0	17.08*	24.46	0	12.12	19.92
1	6.41	7.38	1	5.57	7.80
2	0.97	0.97	2	2.24	2.24

*10% level of significance

[a]*Johansen's methodology is used to detect the number of cointegrating vectors. The optimal number of lags are obtained using Box Ljung statistic. Lags are increased until errors are reduced to white noise.*

[b]*Cointegrating vector is recognized when at least one of the two statistics reject the hypothesis of r cointegrating vector(s) in favor of r+1 cointegrating vector(s).*

[c]*This is a sequential test starting with zero cointegrating vectors.*

The above results indicate that, in most cases, in the long run, both iShares and country funds in Asia and Europe are related with regional assets rather than specific country assets. Hence, regional factors play a more significant role than country factors in the long run.

Short-term Relationships

Short-term relationships are investigated beginning with the bidirectional relationship between each country's iShare and country fund and followed by the investigation of regional relationships among iShares and among country funds. VAR is used to analyze the short-run relationship between the dependent and independent variable. The optimal number of lags is such that the errors are reduced to white noise based on Box Ljung statistic.

First, the country fund of a specific country is treated as a dependent variable and the iShare of the same country as the independent variable. Next, the iShare of the same country is treated as the dependent variable while treating the country fund as the independent variable. To test the effect of the independent variable on the dependent variable, all the lags of the dependent variable are equated to zero. If this null hypothesis (i.e., independent variable has no effect on the dependent variable) is rejected, then the dependent variable is affected by the independent variable.
As indicated in Table 4, both the German and Spanish iShares affect their own country funds respectively. However, their country funds do not affect their own respective iShares. Switzerland is the exception in that there is a bidirectional effect between the Swiss country fund and its iShare.

Table 4: Short-run Relationships between Assets of Single Countries of Europe and Asia[a,b,d]

Panel A: Country Fund Prices as Dependent Variables							
	F-Values for Dependent Variables				*F-Values for Dependent Variables*		
Independent Variables[c]	GER	SPA	SWI	Independent Variables[c]	JAP	MAL	SIN
IS GER	7.23***			IS JAP	4.65*		
IS SPA		12.15***		IS MAL			3.18**
IS SWI			10.95**	IS SIN			1.65
Panel B: iShare Prices as Dependent Variables							
	F-Values for Dependent Variables				*F-Values for Dependent Variables*		
Independent Variables[c]	GER	SPA	SWI	Independent Variables[c]	JAP	MAL	SIN
CF GER	0.55			CF JAP	1.32		
CF SPA		0.83		CF MAL			0.52
CF SWI			3.39**	CF SIN			1.65

*10% level of significance, ** 5% level of significance, *** 1% level of significance

[a]*VAR is used to analyze the short-run relationship between the dependent and independent variable. The optimal number of lags is such that the errors are reduced to white noise based on Box Ljung statistic.*

[b]*This table investigates the bidirectional effect of a single country's iShare and country fund.*

[c]*The null hypothesis that the dependent variable is not affected by the independent variable is tested by equating all the lags of independent variables equal to zero. Rejection of the null would imply the independent variable affects the dependent variable individually.*

[d]*The following abbreviations are use: Germany (GER), Spain (SPA), Switzerland (SWI), Japan (JAP), Malaysia (MAL), Singapore (SIN).*

In the case of Asia, also shown in Table 4, there is an effect from the Japanese iShare to its country fund and from the Malaysian iShare to its country fund. However, there is no effect in the reverse direction for either country. There is no relationship in either direction in the case of Singapore.
Short-term results for each country indicate that there is at least a unidirectional relationship in most cases, with the exception of Singapore.

The individual effect of regional iShares on a specific country's iShare is investigated by equating the lags of individual iShares (independent variable) to zero. The group effect is investigated by equating the sum of the lags of all the country's iShares (except the dependent variable) equal to zero. In Europe, as shown in Table 5, only the Swiss iShare affects the German iShare. There is no other individual relationship from any iShare to another iShare nor is there any group effect on any of the regional iShares, except in the case of Germany.

For country funds, the Swiss country fund individually affects both the German and Spanish iShares. There is no other individual effect. Additionally, there is a group effect from regional country funds on the German and Spanish country funds. Hence, there is a minimal relationship among country funds in Europe in the short run.

Of all the relationships possible among Asian iShares and among Asian country funds, as depicted in Table 5, the only individual effect is that of the Singaporean country fund to the Malaysian country fund. Additionally, the only group effects are found from regional iShares to the Malaysian and Singaporean iShares and from regional country funds to the Malaysian country fund. Thus, there are very few relationships in Asia in iShares or country funds in the short run.

Table 5: Short-Term Regional Relationships among a Single Asset Class of European and Asian Countries[a,b,e]

Panel A: Country Fund Prices

Independent Variables[c]	*F-Values for Dependent Variables*			Independent Variables[c]	*F-Values for Dependent Variables*		
	GER	SPA	SWI		JAP	MAL	SIN
CF GER		0.08131	1.34	CF JAP		1.70	1.66
CF SPA	0.20		1.58	CF MAL	0.36		0.13
CF SWI	3.58**	2.65*		CF SIN	1.07	6.12***	
All EURO except dep.	4.77**	6.99***	1.36	All ASIA except dep.	2.33	16.05***	1.20

Panel B: iShare Prices

Independent Variables[c]	*F-Values for Dependent Variables*			Independent Variables[c]	*F-Values for Dependent Variables*		
	GER	SPA	SWI		JAP	MAL	SIN
IS GER		0.55	0.13	IS JAP		0.87	1.40
IS SPA	0.02		0.77	IS MAL	1.61		0.43
IS SWI	3.25**	1.75		IS SIN	0.86	1.71	
All EURO except dep.	4.04**	1.44	0.15	All ASIA except dep.	1.02	10.96***	2.77*

* 10% level of significance, ** 5% level of significance, *** 1% level of significance

[a]VAR is used to analyze the short-run relationship between the dependent and independent variable. The optimal number of lags is such that the errors are reduced to white noise based on Box Ljung statistic.

[c] The null hypothesis that the dependent variable is not affected by the independent variable is tested by equating all the lags of independent variables equal to zero. Rejection of the null would imply the independent variable affects the dependent variable individually.

[d]The null hypothesis that all the independent variables as a group affect the dependent variable is tested by equating the sum of all lags of all variables equal to zero. Rejection of the null would imply that all the independent variables as a group affect the dependent variable.

[e]The following abbreviations are use: Germany (GER), Spain (SPA), Switzerland (SWI), Japan (JAP), Malaysia (MAL), Singapore (SIN).

The above results indicate that the majority of short-term relationships are found between the iShares and country funds of a single country rather than among regional iShares and among regional country funds. These relationships are not a function of a specific region. Thus, it is safe to say that in the short run, individual country effects play a more significant role than regional effects.

Comparing short-term results with long-term results indicates that while short-term relationships are dominated by country relationships (effects), long-term relationships are affected more by regional relationships. These results support the theory that in the short term, country effects are dominant in asset markets of iShares and country funds. However, in the long run, the regional effects are more dominant in the iShare and country fund markets. Thus, investors interested in these assets should be aware of these relationships. This information would help them diversity efficiently depending upon the time horizon of the investment.

CONCLUSION

This paper analyzes the relationships among each country's iShare and country fund and compares these relationships with those found within regional iShares and within regional country funds. Both iShares and country funds represent assets of a single country. By this fact, they should be related to one another.

However, as part of a geographical region, iShares and country funds may also have a regional effect. This study investigates such effects in terms of long run and short-run relationships.

Three countries each from Europe and Asia are investigated for short-term and long-term relationships among iShares and among country funds. In the short run, all countries in Europe and all but Singapore in Asia show relationships among their iShares and country funds. However, in the long run no relationships are maintained. Only in the case of Japan do we see both short-run and long run relationships. In both regions, there are minimal regional effects in the short run. But, long-run regional relationships are formed despite the lack of short-run relationships.

The above results indicate the influence of country factors in the short run and regional factors in the long run. Hence, investors considering investing in these assets should look at the country relationships and regional relationships between these assets. Also, depending on their time horizon, investors should inspect which factor is more relevant.

REFERENCES

Chelley-Steeley, P.L., Steeley, J.M., & Pentecost, E.J. (1998). Exchange controls and European stock market integration. *Applied Economics*, 30(2), 263-267.

Chowdhury, A.R. (1994). Stock market interdependencies: Evidence from the Asian NIEs. *Journal of Macroeconomics*, 16(4), 629-651.

Climent, F.J., Meneu, V., & Pardo, A. (2001). Information flows among the major stock market areas. *Journal of Asset Management*, 2(3), 284-292.

Dekker, A., Sen, K., & Young, M.R. (2001). Equity market linkages in the Asia Pacific region: A comparison of the orthogonalised and generalized VAR approaches. *Global Finance Journal*, 12(1), 1-33.

Dickey, D., & Fuller, W. (1981). The likelihood ratio statistic for autoregressive time series and a unit root. *Econometrica*, 49, 1057-1072.

Dunis, C.L. & Shannon, G. (2005). Emerging markets of South-East and Central Asia: Do they still offer a diversification benefit? *Journal of Asset Management*, 6(3), 168-190.

Ghosh, A., Saidi, R., & Johnson, K.H. (1999). Who moves the Asia-Pacific stock markets – US or Japan? Empirical evidence based on the theory of cointegration. *The Financial Review*, 34(1), 159-170.

Hamao, Y., Masulis, R.W., & Ng, V. (1990). Correlations in price changes and volatility across international stock markets. *The Review of Financial Studies*, 3(2), 281-307.

Illueca, M. & Lafuente, J.A. (2002). International stock market linkages: A factor analysis approach. *Journal of Asset Management*, 3(3), 253-265.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian Vector Autoregressive models. *Econometrica*, 59, 1551-1580.

Khorana, A., & Nelling, E. (1998). The emergence of country index funds. *Journal of Portfolio Management*, 24(4), 78-85.

Morck, R., Yeung, B., & Yu, W. (2000). The information content of stock markets: Why do emerging markets have synchronous stock price movements? *Journal of Financial Economics*, 58(1,2), 215.

Ng, A. (2000). Volatility spillover effects from Japan and the US to the Pacific-Basin. *Journal of International Money and Finance*, 19(2), 207-233.

Patro, D.K. (2001). Market segmentation and international asset prices: Evidence from the listing of world equity benchmark shares. *The Journal of Financial Research*, 24(1), 83-98.

Pennathur, A.K., Delcoure, N., & Anderson, D. (2002). Diversification benefits of iShares and closed-end country funds. *The Journal of Financial Research*, 25(4), 541-558.

Phillips, P., & P. Perron. 1988. Testing for a Unit Root in Time Series Regression. *Biometrica*, 74: 335-346.

Ratanapakorn, O., & Sharma, S.C. (2002). Interrelationships among regional stock indices. *Review of Financial Economics*, 11(2), 91-108.

BIOGRAPHY

Rajarshi Aroskar teaches at the University of Wisconsin – Eau Claire in the field of Investments and International Finance. His research interests are in similar areas. This project was funded by the Office of Research and Sponsored Programs at UW-Eau Claire.