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Has China Replaced the United States as the Leader of Global Financial Trends? A Leveraged Bootstrap Causality Approach for Small Capitalization Markets

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A B S T R A C T

This research examines the causal relationships among small capital markets of twelve countries—six developed and six emerging—with the small capital markets of the United States and China. We applied the Granger causality test using a leveraged bootstrap approach developed by Hacker and Hatemi-J (2006). The results indicate the returns of small capital markets in the thirteen sampled countries, including China, were influenced by returns of the United States small capital market. Meanwhile, the Chinese small capital market only influenced the Japanese and the United States small capital markets. Additionally, we found the United States small capital market was partially driven by the performance of five small capital markets (Japan, the United Kingdom, France, China, and Korea), while China's small capital market was responsive to the movement in eleven of the thirteen countries' small capital markets. Our findings indicate small capital markets may not be as independent from the influence of the United States as investors may think. Further, investors may be overvaluing the influence of China as a predictor of changes in other small capital markets. This research provides perspective for investors building investment portfolios.

Keywords: Granger Causality, Bootstrap, small capital market, MSCI

JEL classification: G15, G11, 057

1. INTRODUCTION

There is a maxim that the rest of the world catches a cold when the United States sneezes. Is this still the case or has China taken the lead position? For open economies, growth and decline are largely affected by global, rather than domestic, forces (Finley, 2018). For decades, conventional wisdom and scholarly evidence demonstrated that the United States drove those global forces, resulting in the United States influencing, at least partially, the economic health and financial market movements of other countries with open economies. The United States, with its dominant market and financial positions had an outsized impact on countries throughout the globe (Patton, 2016).

The role of primary influencer is changing. The United States' share of world GDP has dropped from highs of 40% in the 1960s to hover recently about 22% (Patton, 2016). As the United States population and economy have stagnated or marginally increased, other countries such as China have grown briskly. The sheer size of these rapidly-developing countries portends where the future primary influencers will reside. For example, since initiating market reforms in 1978 and joining the World Trade Organization in 2001, China has experienced extremely rapid economic development. Since 2008, China has been the largest contributor to world growth and, with 1.3 billion people and the 2nd largest world economy, China's role will increase even more given their annual growth rates to 2030 of 5-10% (Fensom, 2016; World Bank, 2018). This growth trajectory will easily exceed the expected 2-3% growth rates of the United States over the same horizon (Fensom, 2016).

China's rise is the "megatrend" affecting global balance (de la Torre & Rigolini, 2013). As recently as 1980, China had less than 1% share of global output. By 2005, China contributed about 5% of global output (Bussolo, De Hoyos, Medvedev, & van der Mensbrugghe, 2007) and by 2030 China will be only narrowly behind the United States as the second largest economy. This reshaping will likely occur most dramatically in the middle classes. By 2030, China is expected to add approximately 1 billion more people to the middle class; to place this number in perspective, the United States has about 170 million middle-class citizens (Kharas, 2017). This growth will be accompanied by tremendous changes in the flow of capital via household spending, total consumption, and financial investment. As of 2015, the United States contributed approximately 13% global share of middle class spending; in a short 15 years its share will drop to 7%. Meanwhile, China contributed 12% of global middle class consumption in 2015. It will not just surpass the United States by 2030, but will catapult past it with 22% share by that year (Kharas, 2017). Of course, none of the forward-looking statistics are foreordained. Policy changes, unforeseen disasters, ongoing trade disputes, conflicts, and the like could drastically alter the realization of these projections.

For investors, the reshaping global balance has consequences for a variety of financial and market strategies. The focus of this paper is how the reshaping is affecting risk-reduction strategies via international diversification. Classically, investing in overseas markets, especially small capital markets, efficiently reduced risk due to low correlations among small capital markets. Small capital markets involve stocks whose market capitalization, calculated as stock price multiplied by total number of shares outstanding, is relatively small. The market capitalization of equities referred to as small cap varies among brokerages, but is typically market capitalizations between $300 million and $2 billion. For explicit detail on the small capital designation used in this study, please consult the MSCI Index Calculation Methodology (MSCI, 2018). Generally, small-cap companies have a smaller impact on the economy than mid- or large-cap companies (Investopedia, 2018).

With the rapid rise of China and the incessant news of the United States' slipping position, we investigated the extent to which China and the United States drive movements in small capital markets in other countries. We expected that China achieved an approximate draw with the United States on global influence in small capital markets. Our findings indicate this expectation has not materialized, a conclusion of import for investors building portfolios that reduce risk through cross-border investment and investors predicting performance using knowledge of the Chinese small capital markets.

2. LITERATURE REVIEW

Previous research, including classic portfolio studies, found diversification using international securities reduced risk due to relatively lower correlations among international investments compared to domestic ones (Grubel, 1968; Levy & Sarnat, 1970; Solnik, 1974). However, the efficiency of international diversification has eroded over time as world markets have integrated, international trade has accelerated, and cross-border investments have become commonplace. As an example, Goetzmann, Lingfeng, and Rouwenborst (2005) found that international stock markets have exhibited higher positive correlations due to financial and economic integration. In this environment, investors seeking risk reduction must look specifically at the characteristics of international investment, such as differences of market capitalization.

Large capital stocks tend to be heavily affected by international factors that, at least to some extent, are shared. Large capital companies are likely exposed to international customers and global trends due to their size, customer locations, supplier bases, and cross-border investments. For example, Brooks and Del Negro (2006) revealed that increases in a firm's international sales heightens the firm's exposure to global shocks. The result is the risk-reducing benefits of diversification using international large capital stocks will likely underperform because the returns are heavily influenced by common global factors. Small capital firms, on the other hand, are less likely to be exposed to international factors due to more local orientations. Small capital firms tend to be more affected by peculiar factors, although business practices related to supply, demand, and investment have decreased this local influence in the previous decades. Still, the largely idiosyncratic nature of small-cap firms can make them superior international diversification targets (Eun, Huang, & Lai, 2008; Lee, 2014).

Small capital stocks present a precarious tradeoff: they often shine bright in rallies but fall hard during financial crises. So, while small capital investments can be useful for reducing risk via their heavily idiosyncratic nature, their volatility is concerning. Further, Gjika and Horvath (2013) found that diversification benefits decrease disproportionately during volatile periods, which undermines resulting performance if an investor is using more volatile stocks (small capital) to provide international diversification. For purposes of this research, the risk-reducing benefits of investing in international small capital stocks may underperform if there are positive correlations among the small capital markets of the countries of investment. For example, if the United States small capital market positively affects the returns of the Japanese small capital market, there may not be much benefit to this specific cross-border diversification tactic. Similarly, investors may be overvaluing the influence of the United States small capital market on overseas markets if the supposition is true that China's influence is about even with the United States.

3. DATA AND METHODOLOGY

We studied the small capital markets of fourteen countries. These included the United States

and China, six developed countries (Canada, France, Germany, Italy, Japan and United Kingdom), and six emerging countries (Egypt, India, Korea, Mexico, Russia and Turkey). We collected daily data from the MSCI Small Capital Index of these fourteen countries from October 2011 to September 2016. We calculated the daily return using the formula:

$$x_t = \frac{\left(p_{t+1} - p_t\right)}{p_t}$$

Next, we examined Granger causality using the Hacker and Hatemi-J leveraged bootstrap test (2006). This test applies the vector autoregressive model of order p, VAR (p):

$$x_t = v + A_1 x_{t-1} + \ldots + A_p x_{t-p} + e_t$$

The x is a two-dimensional vector of volatility from two countries. The lag order p is selected by minimizing an information criterion that is robust to ARCH effects and performs well when the goal of the VAR model is to conduct ex ante inference (Hatemi-J, 2006, 2009, & 2011). The information criterion is defined as:

$$HJC = \ln\left(det\hat{\Omega}_j\right) + j\left(\frac{n^2 lnT + 2n^2 \ln\left(lnT\right)}{2T}\right),\ j = 0,\ldots,\ p.$$

The $det\hat{\Omega}_j$ is the determinant of the estimated maximum likelihood variance-covariance matrix of the residuals in the VAR(j) model. The number of the variables is represented by n; T signifies the sample size. The null hypothesis is the *k*th element of σ_t does not Granger-cause the *d*th element of x_t. It is defined as:

H_0: the row *d*, column *k* element in A_r equals 0 for r = 1,…,p.

Further, the null hypothesis of non-Granger causality is

$$H_0 : CB = 0$$

To test the hypothesis, we conducted a Wald test. First, we reformulated the VAR(p) model as:

$$Y = DZ + \varepsilon$$

and tested the null using the following Wald test statistics:

$$Wald = \left(C\beta\right)' \left[C\left(\left(Z'Z\right)^{-1} \otimes S_U\right)C'\right]^{-1} \left(C\beta\right) \sim \chi_p^2$$

where $\beta = vec\left(D\right)$ and *vec* is the column-stacking operator. The ⊗ notation represents the Kronecker product and C is an indicator matrix. S_U represents the variance-covariance matrix of the unrestricted VAR model. That is, $S_U = \left(\hat{\varepsilon}'_U \hat{\varepsilon}_U\right)/\left(T - c\right)$ where c is the amount of estimated parameters.

Emerging markets' financial data commonly exhibit non-normality and time-varying volatilities. Therefore, a Wald test based on asymptotic critical values would not perform accurately. Thus, we used the causality method developed by Hacker and Hatemi-J (2006), a method that is robust to non-normality and time-varying volatility. It includes the following steps:

1. Estimate the VAR model using the selected lag order, p, and obtain the estimated residuals $(\hat{e}_t)$.
2. Generate simulated data, denoted by x_t^*:

$$x_t^* = \hat{A}_0 + \hat{A}_1 x_{t-1} + \cdots + \hat{A}_p x_{t-p} + \hat{e}_t^*$$

   where the circumflex represents estimated values. The residuals are adjusted in each independent draw to generate an expected mean value of zero for the residuals. Raw residuals are modified using *leverages* to have constant variance (Hacker and Hatemi-J, 2006).
3. Simulate the process 10,000 times and calculate the *W* test statistic after each simulation. Performing this procedure generates an approximate distribution for the bootstrapped *W* test statistic, including estimates for the (α)th upper quintile of the distribution, and enables finding the α-level of significance "bootstrap critical value" (c_α^*). We conducted the simulation using the module written in Gauss by Hacker and Hatemi-J (2009).
4. Compare the calculated W statistic of the original data (not the data generated via bootstrap simulation) to the bootstrap critical values. If the calculated W statistic is higher than the bootstrap critical value c_α^* reject the null hypothesis of non-Granger causality at the α-level of significance. A rejection indicates the existence of Granger causality.

4. RESULTS

Table 1 displays the summary results of the calculated W statistics for the causal effect of the small capital markets of twelve sampled countries with the United States and China. For instance, in Table 1-A, the calculated W statistic for Canada is 5.13 which is greater than the 5% and 10% estimated critical values, 3.904 and 2.672, indicating changes in the United States small capital market affect the Canadian small capital market. The W statistics in the remaining twelve countries are higher than the 1% critical values, revealing that the United States influences all other sampled countries.

The findings for China's influence on the small capital markets of other countries are less overwhelming. Small capital markets in only two of the 13 sampled countries are driven by China's small capital market. As shown in table 1-B, the calculated W statistics in Japan and the United States (20.068 and 5.426) are higher than the critical values (at 1% for Japan and 5% for the United States). A review of the W statistics for the non-significant countries reveals those countries did not even approach the critical values at 10% significance.

As shown in Table 1-C, the small capital markets of France, Japan, United Kingdom, Korea, and China have some influence on the United States small capital market. Yet, as shown in Table 1-D, eleven of the thirteen countries, excluding Egypt and Korea, have W statistics indicating an influence on China's small capital market. Thus, movements in the Chinese market are affected by most of the other sampled countries.

Table 1 results of test for causality using the leveraged bootstrap test

(1-A) Affected by US

	Calculated W statistics	bootstrap critical value 1%	5%	10%
Canada	5.13	6.638	**3.904**	2.672
France	82.804	**6.829**	3.796	2.706
Germany	92.59	**6.754**	3.897	2.741
Italy	30.315	**6.651**	3.877	2.694
Japan	226.841	**6.529**	3.874	2.767
UK	61.248	**6.83**	3.839	2.7
Egypt	20.496	**6.997**	3.821	2.689
India	53.441	**6.633**	3.876	2.707
Korea	136.75	**6.345**	3.816	2.673
Mexico	8.991	**7.05**	3.818	2.75
Russia	32.154	**6.829**	3.846	2.699
Turkey	11.941	**6.845**	3.896	2.722
China	115.995	**6.654**	3.892	2.75

(1-B) Affected by China

	Calculated W statistics	bootstrap critical value 1%	5%	10%
Canada	0.894	6.702	3.718	2.634
France	0.027	6.655	3.91	2.702
Germany	0.067	6.568	3.917	2.7
Italy	0.109	6.666	3.8	2.688
Japan	20.068	**6.717**	3.736	2.616
UK	0.135	6.789	3.843	2.657
Egypt	0.503	7.176	3.959	2.716
India	0.172	6.887	3.895	2.707
Korea	0.262	6.661	3.764	2.661
Mexico	0.063	6.352	3.785	2.686
Russia	0.281	7.193	3.944	2.731
Turkey	0.02	6.902	3.866	2.688
US	5.426	6.405	**3.802**	2.652

(1-C) Affect US

	Calculated W statistics	bootstrap critical value 1%	5%	10%
Canada	1.085	6.415	3.784	2.704
France	2.754	6.806	3.882	**2.725**
Germany	0.591	6.491	3.812	2.726
Italy	0.282	6.517	3.944	2.74
Japan	11.866	**6.862**	3.931	2.749
UK	7.716	**6.726**	3.954	2.76
Egypt	0.131	6.832	3.894	2.726
India	0.774	6.805	3.904	2.695
Korea	7.602	**6.766**	3.846	2.716
Mexico	1.797	6.514	3.821	2.635
Russia	0.022	6.451	3.862	2.753
Turkey	2.05	6.57	3.797	2.653
China	5.426	6.405	3.802	2.652

(1-D) Affect China

	Calculated W statistics	bootstrap critical value 1%	5%	10%
Canada	71.918	**6.659**	4.012	2.817
France	56.694	**6.908**	3.856	2.731
Germany	54.84	**6.738**	3.855	2.759
Italy	59.289	**6.93**	3.794	2.725
Japan	6.782	6.849	**3.939**	2.761
UK	39.536	**7.184**	3.861	2.693
Egypt	1.166	6.939	3.886	2.65
India	6.023	6.714	**3.799**	2.62
Korea	0.359	6.768	3.782	2.65
Mexico	53.642	**6.845**	3.985	2.794
Russia	18.955	**7.521**	4.162	2.744
Turkey	22.531	**6.781**	3.945	2.725
US	115.995	**6.654**	3.892	2.75

Notes: Bolded number indicated that the null hypothesis is rejected at 1% and 5% and 10%.

5. CONCLUSION

We examined the causal relationships of small capital markets of six developed and six emerging countries with the small capital markets of the United States and China. The results provide evidence that the returns of small capital markets in all thirteen sampled countries, including China, were affected by the returns of the United States small capital market. On the other hand, only two of the thirteen countries, Japan and United States, were influenced by China. We also found the United States small capital market was driven by the performance of small capital markets in just five of thirteen countries (38%), while the Chinese small capital market was responsive to movements in eleven countries (85%).

Our findings indicate that small capital markets may not be as independent as investors might assume; thus, the risk-reducing benefits of cross-border small capital investments may be overstated. Further, due to the plethora of press about China's rise and the United States' decline, investors may unwittingly undervalue the influence of the United States small capital market and overvalue the influence of the Chinese small capital market. This research found that the United States small capital market exhibits significant influence on the movements of other countries' markets, even in small capital markets that are supposed to be less exposed to global forces. Despite the rapid economic growth in China, our results show that the United States still leads global financial trends in small capital markets. Similar to Mark Twain's statement regarding a printed obituary of him while he was still living: reports of the demise of the United States have been exaggerated.

This research provides an approach for investors building an investment portfolio. For international investors seeking the risk-reducing benefits of cross-border investments, the United States small capital market significantly affects small capital markets in other countries; thus, those other countries may not provide as large of a hedge as expected. Additionally, investors may benefit from using the performance of the United States small capital market to predict performance in other countries' small capital markets. At this juncture, predicting changes in other countries based on knowledge of the Chinese small capital market is not as reliable.

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