



Industry co-movement and cross-listing: Do home country factors matter?



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ABSTRACT

This paper investigates the co-movement of American depository receipts (ADRs) and the industry returns of home and U.S. markets with a focus on industry co-movement by applying time-varying and constant copulas model specifications. We also examine the impacts of country-specific factors on the industry co-movement in cross-listing issue. Co-movements are found in relation to the industry returns and economic asymmetry. The industry co-movement of ADR is higher with home country than that with the U.S., supporting the fundamental view. The results pertaining to the ADR-home pairs are as follows: (1) during economic recessions, the factors of influencing industry co-movement include import and the number of listed companies; (2) in contrast, during economic booms, industry co-movement is significantly influenced by energy import, export, import, the number of listed companies, and high-tech export. The factors that impact the industry co-movement of ADR-US contain foreign direct investment, reserve, cash surplus, energy import, and the number of listed companies.

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1. Introduction

Even though the effects in terms of industries and countries are one part of the most important components of determining a successful equity portfolio strategy, previous empirical researchers have mostly focused on the aggregate measure of market correlations, rather than on industry co-movements while studying the cross-listing issue (Heston and Rouwenhorst, 1995; Ko et al., 1997; L'Her et al., 2002; Phylaktis and Xia, 2006; Pascual-Fuster and Perez-Rodriguez, 2007). This study, in contrast to them, is the first to propose a dynamic copula-based the generalized autoregressive conditional heteroskedasticity (GARCH) model to explore the American Depository Receipts (hereafter ADRs) industry co-movements with home country and the U.S. from home country

characteristics.¹ The country-specific factors are the key in explaining asset returns (e.g., Fatemi and Park, 1996; Chen et al., 2011; Corredor et al., 2013). The exiting literature is still novel regarding the relationship between structure of the cross-listing industry dynamic co-movements and country-specific effects.

This paper is motivated by the widespread use of country-specific labels. What is the tendency of cross-listing industry co-movements in cross-listing cases? Does industry co-movement behave asymmetrically between uptrend and downtrend markets? Can country-specific factors influence cross-listing industry co-movements? These questions are deserved to discuss, particularly, on the fields of diversified portfolio and risk management. Investors can regard country factors as simple and effective signs to diversify their portfolios for the firms who want to internationalize and raise capital.

Since the most preferred method of cross-listing is to issue ADRs (Jaiswal-Dale and Jithendranathan, 2009) and that ADRs has been

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¹ ADRs are interesting securities traded in the US market, where institutional characteristics, investor behavior, as well as real-time trading hours differ from those of the country of domicile of the underlying asset (Fatemi and Park, 1996).

the primary way for the non-US firms to list in the U.S. (Bianconi and Tan, 2010), there have been a number of study explored ADR co-movements. However, there is no consensus among the empirical studies of regarding ADR dependence. For example, Alaganar and Bhar (2002) support that information flows predominantly from the U.S. market to ADRs. In contrast, Fang and Loo (2002) as well as Bae et al. (2008) find that ADRs are saliently affected by its home country factors rather than by the U.S.

ADR's industry co-movements may be affected by the features of home country. In a diversified portfolio, if ADR home country factors influence the cross-listing industry co-movements, investors should consider the significant home country factors of the ADRs to achieve a required degree of diversification. Syllignakis and Kouretas (2011) indicate that macroeconomic fundamentals have been shown to have substantial explanatory power in explaining these conditional correlations. Phylaktis and Xia (2004) find that the dynamics of firms' country effects are connected to firms' listing as ADRs. Karolyi and Stulz (1996) explore the fundamental factors that affect ADR return correlations and find that U.S. macroeconomic announcements, shocks to the Yen/Dollar foreign exchange rate and Treasury bill returns, and industry effects have no measurable influence on the U.S. and Japanese return correlations. However, large shocks to the U.S. and home country broad-based market indexes positively impact both the magnitude and persistence of the return correlations. Garg and Dua (2014) find that ADRs are significantly influenced by domestic macroeconomic factors, i.e., domestic output growth and foreign output growth.

Further, Longin and Solnik (2001) explore the extreme correlation of international equity markets and find the optimal threshold values depending on the country. Li and Rose (2009) find that tail dependence of the aggregate and investable market on the world market varies across countries. Cai et al. (2009) indicate that highest correlations appear when both countries are in the contractionary phase, and lowest correlations emerge when both countries are in the expansionary phase. Fazio (2007) finds that pure contagion occurred in a limited number of country pairs. Thus, we explore whether the home country factors would impact ADR industry co-movement and extreme value dependence.

Wu et al. (2012) suggest that GARCH models offer a means for estimating time-varying dependence structures based on severe restrictions to guarantee a well-defined covariance matrix. The VAR model and multivariate GARCH models assume that the asset returns follow a multivariate normal or Student-*t* distribution with linear dependence. Most studies suggest that negative returns are more correlated than positive returns (e.g., Ang and Chen, 2007; Aloui et al., 2011). For instance, Longin and Solnik (2001) demonstrate that stock markets commove in bear markets but not in bull markets. However, Demirel and Lien (2005) find that stock correlations are significantly higher during up markets, rather than during down markets; while the financial industry is contrary. In addition, Patton (2006) presents that equity return has the pattern deviating from multivariate normality and exhibits an asymmetric or excess kurtosis (or fat tails) and skewness in univariate distributions. Thus, applying a simple linear correlation and/or GARCH model fails to capture the effect of asymmetric dependences on ADRs between the U.S. and home countries. To address these limitations, we further use dynamic copula-based GARCH models to examine the industry co-movements of ADRs with their home country and the U.S., as well as whether the relations are asymmetric during up and down markets.² Copulas help to extract the dependence structures from the joint distribution function of a set of random variables and

to isolate such a dependence structure from univariate marginal behavior.³

The efficient market hypothesis suggests that in the absence of external shocks prices will converge to a steady-state path that is completely determined by fundamentals, and there are no opportunities for consistent speculative profits (Gauersdorfer, 2000; Lee et al., 2014). Under perfect market integration, the pricing of a cross-listing should be mainly driven by fundamental information (Chen et al., 2009), signifying that, under the fundamental view, ADR industry co-movement should be integrated with the industry index of the home country. Under partial market segmentation, non-fundamental factors may have salient influences on cross-listing returns (Bodurtha et al., 1995), named as the friction view or behavior view. If the behavior view is supported, then ADR returns should more relate with the U.S. industry index than that of the home country. Our findings not only help to gauge future ADR return changes but also contribute to solve the debate between the fundamental view and behavior view.

This paper uses two-step investigations. First, we apply time-varying parameter (TVP) copula models to examine the industry dynamic dependence structures between ADRs and their home countries (i.e., Australia, China, France, Germany, Hong Kong, Japan, Netherlands, Russia, Singapore, South Africa, and UK) as well as ADRs and the U.S.⁴ Second, since our copula results present a rationale that industry co-movement might correlate with the country-specific factors (i.e., economic policy, energy, financial sector, private sector, and other factors) and control with the ADR-specific factors (i.e., regions and industry), which is much different from prior studies that concentrate mainly on a comparison of the U.S. and home country effects. Specifically, using the results of industry co-movement from copulas, this study aims to explain specific determinants of ADRs' industry dynamic dependences with their home countries and the U.S. to provide market participants innovative information.

This paper represents two advances over previous studies. First, the novelty of the analysis is the focus on the industry interdependence of ADRs with the home countries and the U.S. Among prior studies that discuss the being concerned importance of industry and country factors, to the best of our knowledge, no study has specifically investigated industry co-movement in the ADR sector with the home country and the U.S. Our empirical findings are critical since the knowledge of comprehensive co-movement factors refers directly to simplifying stylized investments. Our finding reveals a more significant industry co-movement between ADR-home countries than that of the ADR-US pairs, by which the fundamental view for ADR industry co-movements is supported.⁵

Second, we break down the country factors to analyze which specific country factors can affect ADR industry co-movements. Our results provide strong evidence that several ADR home country factors (e.g., foreign direct investment (FDI), cash surplus, inflation, reserve, energy import, the number of listed company, import, export, and high-tech exports) saliently influence the ADR industry interdependence of home country and the U.S. European

³ Copula is a dependence structure that allows for, but do not impose different dependences during bear markets than bull markets, and allow for changes in this dependence structure through time (Patton, 2004). A detailed introduction to the copula theory can see, for example, Schweizer and Sklar (1983), Joe (1997), and Nelsen (1999).

⁴ In unreported results, we also employed the Clayton, Gumbel, SJC introduced by Patton (2006), TVP Student-*t* by Mashal and Zeevi (2002), TVP SJC copulas, and find that the TVP-SJC for ADR-home country pairs and TVP Gaussian copulas for ADR-US pairs outperform others. We select the best copula model to fit the data according to the AIC (Ning, 2010).

⁵ ADR-home country pairs and ADR-US pairs mean industry dependences of ADR and home country as well as ADR and U.S.

² We conduct both dynamic and invariate copula models, whereby the results of dynamic copula outperform those of invariant copula.

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