J. of Multi. Fin. Manag. 31 (2015) 126–145

Contents lists available at ScienceDirect

Journal of Multinational Financial Management

journal homepage: www.elsevier.com/locate/econbase

The law of one price, arbitrage opportunities and price convergence: Evidence from cross-listed stocks

Imen Ghadhab [a,*], Slaheddine Hellara [b]

[a] Faculty of Science Economics and Management of Tunis (FSEG Tunis), University of Tunis El Manar, Tunisia
[b] Higher Institute of Management of Tunis (ISG Tunis), Bardo 2000 Tunis, Tunisia

ARTICLE INFO

Article history:
Received 25 November 2014
Received in revised form 14 April 2015
Accepted 6 May 2015
Available online 18 May 2015

JEL classification:
F32
G15

Keywords:
Cross-listing
Arbitrage
Law of one price
STAR model

ABSTRACT

The purpose of this study is to analyze price deviations, arbitrage opportunities and price convergence for cross-listed stock. Using a unique and comprehensive sample of dual-listed firms as well as firms with multiple foreign listings, we show that markets of cross-listed stocks are not efficient. We also show that the dynamic of price adjustment is correctly modeled by a multivariate STAR model for which the transition between regimes is affected by both transaction costs and cross-listing.

1. Introduction

With the enhanced globalization of financial markets, an increasing number of companies choose to cross-list their shares in overseas market. Since prices of cross-listed stocks are the prices of the same security, a higher degree of financial integration is expected to improve market efficiency and ensure

* Corresponding author. Tel.: +216 21114447.
E-mail addresses: ghadhabimen@yahoo.fr (I. Ghadhab), slaheddine.hellara@isg.rnu.tn (S. Hellara).

http://dx.doi.org/10.1016/j.mulfin.2015.05.002
1042-444X/

price equality. Even if prices diverge, such discrepancy must be eliminated by arbitrage activities that bring prices toward equilibrium.

In this paper we examine the following three questions involving the efficiency of market for cross-listed stocks. The first is whether price discrepancy exists. The second question concerns the existing of arbitrage opportunities. Finally, we address the issue of the dynamic of price convergence.

Earlier empirical evidence on whether or not markets for cross-listed stocks are indeed fully efficient was mixed. Rosenthal (1983), Kato et al. (1991), Park and Tavakkol (1994) and Miller and Morey (1996) show that price deviations are not significant and arbitrage opportunities are infrequent. More recent studies like Suarez (2005), Gagnon and Karolyi (2010), Alsayed and McGroarty (2012) and Ansotegui et al. (2013) show that prices of cross-listed stocks may significantly deviate and that investors may make arbitrage profit by trading on these price differences.

Those earlier studies focus on stocks listed on two countries or dual-listed stocks and are concentrated on the cross-listing on the US. Therefore, those previous results provide a non-conclusive answer to the question of whether markets for cross-listed stocks are efficient given that earlier studies do not consider further possible foreign listing for the same security.

The purpose of this study is to contribute to the literature on the dynamic of price behavior of cross-listed stocks by providing the first empirical analysis of price deviations, arbitrage opportunities and price convergence for firms with multiple foreign listing. Furthermore, our new context allows us to provide a new empirical analysis on the effect of cross-listing (or multiple foreign listing) on the dynamic of price convergence. We study for the first time the non-linear effect of simultaneously the transaction costs and the cross-listing on stock prices based to both the transaction cost hypothesis and the limit to arbitrage hypothesis initiated by Lyons (2001).

In addition to dual-listed stocks, our sample includes stocks with multiple foreign listing. We focus on highly traded European and Canadian firms cross-listed on major American and European exchanges. Using a high frequency intraday data for a shorter period of trading overlap, we show that markets for cross-listed stocks are not completely integrated and not fully efficient. In fact, price discrepancies exist and provide the opportunity to make a significant arbitrage profit. Our results also show that larger price deviations occur at the beginning and the ending of the trading overlap which is consistent with the finding of Werner and Kleidon (1996) and Miller and Morey (1996).

To the best of our knowledge, the STAR model was only applied by Koumkwa and Susmel (2008) and Mehanaoui et al. (2012) to the price difference of cross-listed stocks. In contrast to these studies, I allow for a multivariate STAR model in which the transition function depend on two transition variables, in order to study the non-linear effect of multiple exogenous variables. The choice of these transition variables is motivated by the transaction cost hypothesis and the limit to arbitrage hypothesis. The linearity tests show that the determined exogenous variables are valid transition variables. We then estimate a STAR model with linear combination of these transition variables and show that this model is an adequate specification of price difference for stocks with multiple foreign listing. The estimation of STAR model supports the idea of smooth transition between regimes.

This paper is organized as follows. Section 2 presents data and price deviation construction. Section 3 tests the presence of arbitrage opportunities. Section 4 analyses price convergence and estimates STAR models. Finally, Section 5 concludes.

2. Data and price discrepancy construction

2.1. Data description

The aim of this paper is to study price deviations for cross-listed stocks that trade on U.S. and European exchanges. Our exercise is based on quotes prices from “Tickdatamarket” for the period from August 7, 2013 to October 31, 2013.[1] This dataset is collected directory from exchanges and includes the best bid and ask quotes along with the time to the nearest even second. We also obtain

[1] Due to the lack of available data on high frequency quote prices, and in order to have the same period for all firms considered in our paper, our sample period start from August 7 rather than from the first of August.