

Cross-Listing and Valuation Effects: Evidence From Nairobi Securities Exchange*

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The purpose of this study is to analyze the valuation effects of cross-listing. The study has conducted a univariate analysis of the Tobin's Q and the market-to-book ratio for the period before and after the cross-listing by using paired tests. Non-cross-listed firms are then included in multivariate regressions by using pooled Time Series Cross Section (TSCS) and Panel Corrected Standard Error (PCSE) regressions for a period of 13 years to find out if there is a difference in the valuations between cross-listed firms and non-cross-listed firms. The study's results indicate that the Tobin's Q of cross-listed-firms increases two years prior to cross-listing and that it continues to increase two years after cross-listing. The market-to-book ratios also show an increase two years prior to cross-listing and up to one year after cross-listing, then decrease in the second year after cross-listing. When non-cross-listed firms are included in the analysis, results indicate that cross-listed firms are valued higher than non-cross-listed firms. When data are portioned for positive earnings per share (EPS) and dividends, results indicate that valuation is the highest when EPS is positive. Since segmentation theories cannot be ruled out, the study's findings are more in support of the growth opportunity hypothesis.

Keywords: cross-listing, valuation effects, Tobin's Q, market-to-book ratio

Introduction

The valuation effects of cross-listing are perhaps the most studied aspect of the subject of cross-listing. The studies on valuation effects have however resulted in divergent findings, leading to the emergence of different hypotheses to explain the valuation effects. Alexander, Eun, and Janakiramanan (1987) proposed the segmentation hypothesis. Segmentation hypothesis predicts that due to market integration, stock prices will rise. As a result, market capitalization will increase before cross-listing, and firm assets will increase after cross-listing. Kadlec and McConnell (1994), Kadiyala and Subrahmanyam (2000), Gozzi, Levine, and Schmukler (2008), and Sarkissian and Schill (2010) found empirical evidence to support the view that

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cross-listing was accompanied by positive valuation effects. They argued that segmentation hypothesis better explained the positive valuation effects.

Merton (1987) had put forth the visibility/investor recognition hypothesis. According to this hypothesis, increased visibility and investor recognition occasioned by cross-listing increased investor base and resulted in lower expected returns, and hence increased the firm value. This view is supported by empirical studies by Mittoo (1992), Fanto and Karmel (1997), Bancel and Mittoo (2001), Baker, John, and Weaver (2002), Lang, Lins, and Miller (2003), and King and Segal (2006). Domowitz, Glen, and Madhavan (1998) put forward the analyst coverage hypothesis. The hypothesis predicted that increase in trading activity as a result of the cross-listing, induced entry of analysts. This reduced base level volatility, because opening prices were more informative positive valuation effects. Empirical findings by Brockman and Chung (1999) support this view.

Amihud and Mendelson (1988) theorized that narrower spreads following cross-listing generated improved liquidity which increased share value. This position was supported by empirical findings by Peroti and Cordfunke (1997), Bris, Cantale, and Nishiotis (2007), Eun and Sabherwal (2003), and Bris, Cantale, Hrnjic, and Nishiotis (2011). Doidge, Karolyi, and Stulz (2004), on the other hand, advanced the growth opportunities hypothesis. This hypothesis posited that the main incentive for cross-listing was the desire to exploit growth opportunities. According to this hypothesis, firms with higher prospects of growth were more likely to cross list, and they postulated that high growth firms were likely to have positive valuation effects on both pre- and post-cross-listing. This view was supported by empirical studies by Pagano, Röell, and Zechner (2002), Tolmunen and Torstila (2005), and Sarkissian and Schill (2011).

Coffee (1999, 2002)¹ advanced the bonding hypothesis in the motives of firms to cross list. He postulated that foreign firms from jurisdictions with potentially weaker investor² protection could increase their valuation by bonding themselves to the US securities regime through cross-listing. Bonding hypothesis was supported by empirical studies by Facio, Lang, and Young (2001), Reese and Weisbach (2002, 2004), Doidge et al., (2004), Doidge, Karolyi, Lins, and Stulz (2005), King and Segal (2004), and Dyke and Zingales (2004).

However, the valuation effects of cross-listing had been put by Licht (2003) to question who had put forth divergent theoretical views on the bonding hypothesis. He argued that the bonding hypothesis was completely unfounded and contended that instead of bonding most issuers of foreign securities might actually be avoiding better governance. Litvak (2007, 2008) reported that both Tobin's Q and market-to-book ratios of cross-listed companies in the US declined significantly, which were relative to non-cross-listed companies during 2002. She found a positive correlation between the cross-listing premia of cross-listed firms subjected to the US and the indices of National Association of Securities Dealers Automated Quotation (NASDAQ) and of the Standard and Poor 500 and proposed the mimicry hypothesis to explain the observed correlation.

One clear trend coming out of these studies on valuation effects is their concentration on cross-listing in the US exchanges and European exchanges. Alexander et al. (1987), Sarkissian and Schill (2004), Litvak (2007), and Gozzi et al. (2008) had included some cross-listed African firms in these exchanges. However,

¹ Though, extant literature attributed bonding hypothesis to Coffee (1999), Fuerst (1998) presented a formal model analyzing the investor protection regulations argument for cross-listing, which was the basis of the bonding hypothesis. The model lent credence to the bonding hypothesis.

² Though, not offering an alternative explanation for cross-listings, Jordan (2006) regarded the bonding hypothesis as unfounded. She questioned the main assumption of the bonding hypothesis that the American legal system was superior to others, such as the UK or Canada in the protection of shareholders. She regarded this assertion as "the classic blunder of the amateur comparativist, confounding difference with deficiency".

these studies lack an in-depth investigation of cross-listing within Africa. Adelegan (2009), on the other hand, studied the valuation effects for cross-listed firms in Africa. This study employed the announcements effects methodology, which had been criticized for its inability to provide a long-term view. This study contributes to cross-listing literatures by providing empirical evidence on the long-term valuation effects of cross-listing within East Africa.

Methodology

This study uses two types of analysis techniques: a univariate analysis and a multivariate analysis.

Univariate Analysis

The aim of the univariate analysis is to investigate whether the valuation of cross-listed firms changes as a result of the cross-listing. Following Litvak's (2007) approach, the univariate analysis is done for each of the cross-listed firms by comparing their Tobin's Q and market-to-book ratios two years prior to the cross-listing and two years after the cross-listing.

Multivariate Analysis

Given that the univariate analysis was not free from selection bias, the study conducted multivariate regression analysis by using pooled Time Series Cross Section (TSCS) data. TSCS designs had long been considered as one of the best designs for the study of causation, which was next to a purely random experiment (Stimson, 1985). Campbell and Stanley (1967), for example, referred to TSCS designs as "excellent quasi-experimental designs", perhaps the best of more feasible designs. Lempert (1966) stated that TSCS designs were "par excellence" research designs. In addition to their potential of detecting causal relationships, TSCS designs offered a number of distinct advantages. Pennings, Keman, and Kleinnijenhuis (1999) contended that TSCS designs were superior in capturing not only the variation of what emerged through time or space, but also the variation of these two dimensions simultaneously. Hsiao (1986) added that, by utilizing information on both the inter-temporal dynamics and the individuality of the entities being investigated, one was better able to control the effects of missing or unobserved variables in a more natural way.

However, several complications have attributed to TSCS designs. Hicks (1994) contended that TSCS often violated the standard ordinary least square (OLS) assumptions about the error process³. The OLS regression estimates are likely to be biased, inefficient, and/or inconsistent, when they are applied to the pooled data⁴. In particular, Hicks (1994) argued that errors tended to be serially and contemporaneously correlated⁵. The errors also tended to be heteroskedastic⁶.

In view of these complications, it is not practical to use OLS regression for TSCS data. Parks (1967) and Kmenta (1986) recommended an application of the generalized least squares (GLS) estimation on the assumption that the variance-covariance matrix was known. However, since this assumption did not usually hold, Kmenta (1986) recommended the use of feasible generalized least squares (FGLS). However, Beck and

³ For OLS to be optimal, it is necessary that all the errors have the same variance (homoskedasticity) and that all of the errors are independent of each other.

⁴ An unbiased estimator is the one that has a sampling distribution with a mean equals to the parameter to be estimated. An efficient estimator is the one that has the smallest dispersion (i.e., the one whose sampling distribution has the smallest variance). An estimator was said to be consistent, if its sampling distribution tended to become concentrated on the true value of the parameter as sample size increased to infinite (Kmenta, 1986).

⁵ Serially correlated errors tend to be independent form one period to the next.

⁶ Contemporaneously correlated errors tend to across individual observations.

Katz (1995, 1996) reviewed FGLS and claimed that the FGLS was not optimal⁷. Instead of FDLS, they recommended the application of Panel Corrected Standard Errors (PCSE). In line with Beck and Katz's recommendation, this study has applied PCSE to TSCS data. Unlike previous studies employing OLS regressions, this study is different in this respect.

Multivariate Model Specification

The study uses the following model for the multivariate analysis:

$$\ln MPS_t = \alpha_0 + \alpha_3 D_t + \alpha_1 DPS_t + \alpha_2 EPS_t + \alpha_3 BVPS_t + \alpha_4 \ln MC_t + \varepsilon_t$$

where:

$\ln MPS_t$ is the natural log of market price per share of equity;

D_t is the cross-listing dummy (takes the value of one for cross-listed firms, and zero if otherwise);

DPS_t is the dividend per share;

EPS_t is the accounting earning per share;

$BVPS_t$ is the book value per share;

$\ln MC_t$ is the natural log of market capitalization.

The model is borrowed from Adjaoud, Chkir, and Saadi (2006). However, the study's approach differs from Adjaoud et al. (2006) in several respects. Firstly, they do not control size. Baker et al. (2002) contended that market capitalization might be used to control size⁸. In fact, Ruland and Zhou (2006) used market capitalization to control size. Following Baker et al. (2002), the study controls size through the incorporation of the log of market capitalization in the model. Secondly, this study uses TSCS pooled panel data and controlled its limitations by using PCSE regressions. Lastly, Adjaoud et al. (2006) conducted their study on Canadian financial firms that were cross-listed from Canada in the US. This study examines all firms of the National Stock Exchange (NSE) that are cross-listed in East African countries.

Data and Summary Statistics

Fifty eight firms are listed on the NSE, among which seven firms are cross-listed. Based on the need to provide adequate data to be included in the study, the firms must have listed in or before the year 2006 and must not have been suspended from trading in the NSE for the period from 1998 to 2010. Six of the seven cross-listed firms met the data requirements of a univariate analysis. For the multivariate analysis, only 40 firms including the six cross-listed firms met these requirements. After the removal of outliers, 36 firms and 512 firm observations were used. Firms in the study came from the following sectors: agriculture (17.5%), automobiles and accessories (10%), banking (22.5%), commercial (12.5%), construction and allied (12.5%), energy and petroleum (7.5%), insurance (7.5%), investment (2.5%), and manufacturing and allied (7.5%).

Results

Univariate Analysis

Following Gozzi et al. (2008), the study investigates evolution of Tobin's Q, which is defined as the

⁷ Beck and Katz (1995, 1996) claimed that, although FGLS used an estimate of the error process, the FGLS formula for standard errors assumed that the variance-covariance matrix of the errors was known, yet had not been estimated. This is a problem for TSCS models, because the error process has a large number of parameters. This oversight causes estimates of standard errors of the estimated coefficients to understate their true variability.

⁸ Vaughan and Williams (1998) and Lang, Lins, and Miller (2003) used total assets to control firm size.

market value of equity plus the book value of debt (computed as the book value of assets minus the book value of equity) divided by the book value of assets. Results are presented in Table 1 for two years before and after cross-listing. The mean of Tobin's Q before cross-listing is 1.21, which increases to 1.6 after cross-listing. The evolutions of Tobin's Q are 1.15, 1.31, 1.40, 1.41, and 1.78 for Years -2, -1, 0, 1, and 2 respectively, where Year 0 represents the year of cross-listing. There is a clear increasing trend in mean of Tobin's Q from the second year prior to cross-listing to the second year after cross-listing.

Table 1

Descriptive Statistics for Tobin's Q Two Years Before and Two Years After Cross-Listing

		Mean	Std. deviation	Std. error mean
Pair	-2, -1	1.2141	0.18462	0.06527
	1, 2	1.5958	0.24155	0.08540

The study has conducted paired tests of significance on the mean of Tobin's Q for the two years before the cross-listing year and two years after the cross-listing year. Table 2 reports the *t*-test statistics. The paired *t*-test for the years indicates that the increase in Tobin's Q for the years before and after cross-listing is significant at the level ($t = -7.275$, p -value = 0.000) of 1%. When the Wilcoxon test is conducted, the increase in Tobin's Q for the years before and after cross-listing is significant at the level ($z = -2.521$, p -value = 0.012) of 5%.

Table 2

Paired Test Statistics for Tobin's Q Two Years Before and Two Years After Cross-Listing

Pair	Mean	Std. deviation	Std. error mean	Paired difference		<i>t</i>	<i>Df</i>	Sig. (2-tailed)
				95% confidence interval of the difference				
				Lower	Upper			
-2, -1; 1, 2	-0.41977	0.16320	0.05770	-0.55621	-0.28333	-7.275	7	0.000

As a robustness check, the study also investigated evolution of the market-to-book ratio. Results are presented in Table 3 for the two years before and after cross-listing. The mean of market-to-book ratio is 1.1 before cross-listing and increases to 2.38 after cross-listing. The evolutions of the mean of market-to-book ratio are 1.05, 1.58, 2.04, 2.44, and 2.33 respectively for Years -2, -1, 0, 1, and 2 respectively, where Year 0 represents the year of cross-listing. Similar to the Tobin's Q, there is a clear increasing trend in mean of market-to-book ratio from the second year prior to cross-listing to the first year after cross-listing. In the second year after cross-listing, there is a decline in the market-to-book ratio.

Table 3

Descriptive Statistics for Market-to-Book Ratio Two Years Before and Two Years After Cross-Listing

		Mean	Std. deviation	Std. error mean
Pair	-2, -1	1.0550	0.69642	0.24622
	1, 2	2.3775	1.76797	0.62507

The paired tests of significance on the mean of market-to-book ratio for the two years before the cross-listing year and two years after the cross-listing year indicate that, the increase in market-to-book ratio for the years before and after cross-listing is not significant at the level ($t = 2.271$, p -value = 0.057) of 5%. Table 4 reports the *t*-test statistics. However, when the Wilcoxon test is conducted, the increase in

market-to-book ratio for the years before and after cross-listing is significant at the level ($z = -1.96$, p -value = 0.050) of 5%.

Table 4

Paired Test Statistics for Market-to-Book Ratio Two Years Before and Two Years After Cross-Listing

	Paired difference							<i>t</i>	<i>Df</i>	Sig. (2-tailed)
	Mean	Std. deviation	Std. error mean	95% confidence interval of the difference						
				Lower	Upper					
Pair	-2, -1; 1, 2	0.92250	1.14896	0.40622	-0.03805	1.88305	2.271	7	0.057	

Multivariate Analysis

The study's model stated that the slope for cross-listed firms was $\alpha_0 + \alpha_5$, while the slope for non-cross-listed firms was α_0 . Rejection of the hypothesis that cross-listed firms were valued at a premium, would require that $\alpha_5 = 0$. Table 5 reports summary statistics from PCSE regressions linking equity value to accounting information with a dummy variable on the intercept term only. The study partitions data based on dividends payout to study the effects of valuation. Panel B represents firms with increasing dividends; panel C on the other hand, represents firms with stable dividends; while panel D represents firms with decreasing dividends. The results indicate that α_5 is consistently positive for panels A, B, C, and D (0.187, 0.114, 0.258, and 0.225 respectively). The t -scores are 10.21, 3.22, 5.14, and 2.04 respectively. The results for panel A, B, and C are significant at the level of 1%, while for Panel D, the results are significant at the level of 5%. However, they point to a positive relationship between dividends and firm valuations. The study interprets these findings as evidence to support the view that cross-listing is accompanied by a cross-listing premium.

Table 5

Summary Statistics From PCSE Regressions Linking Equity Value to Accounting Information Hand and Landsman (2005) With a Dummy Variable on the Intercept Term

Coefficient	α_0	α_1	α_2	α_3	α_4	α_5	R^2	N
Panel A: Full sample 1998-2010	1.776 4.86***	0.042 4.14***	0.004 1.08	0.002 5.91***	0.331 8.15***	0.187 10.21***	0.595	36
Panel B: Dividend (increased) 1998-2010	2.01 3.71**	0.0505 2.44***	0.001 0.18	0.002 4.27***	0.353 6.11***	0.114 3.22***	0.652	10
Panel C: Dividend (stable) 1998-2010	1.926 4.79**	0.033 2.43***	0.006 1.37	0.002 5.79***	0.347 7.72***	0.258 5.14***	0.606	19
Panel D: Dividend (decreased) 1998-2010	1.644 4.47	0.020 1.61***	0.012 3.67***	0.003 6.98***	0.315 8.24***	0.225 2.04**	0.669	7

Notes. (1) The model estimated is $\ln MPS_i = \alpha_0 + \alpha_5 D_i + \alpha_1 DPS_i + \alpha_2 EPS_i + \alpha_3 BVPS_i + \alpha_4 \ln MC_i + \varepsilon_i$; (2) Variable definition for the model is given in Methodology: Multivariate Model Specification section; (3) For each PCSE regression, the first row reports the estimated coefficient; the corresponding T/Z statistic is reported in the second row; and the corresponding levels of significance are in the third row; and (4) **, *** indicate significance at the levels of 5% and 1% respectively.

Similar to Adjaoud et al. (2006), the hypothesis that cross-listed firms are valued at a premium is repeated for partitioned data, where EPS is positive. The results presented in Table 6 confirm the view that cross-listed firms are valued at a premium relative to non-cross-listed firms. The highest valuation effect is for cross-listed firms with dividend increases (Panel B) of $2.146 + 0.128 = 2.274$. Results also indicate that the cross-listing premium is the highest, when EPS is positive for all the panels apart from the decrease of dividend, where the output for t -score and p -value is not possible due to the small number of observations. Additionally, the findings point to a positive relationship between dividends and firm valuations.

Table 6

Summary Statistics From PCSE Regressions Linking Equity Value to Accounting Information Hand and Landsman (2005) With a Dummy Variable on the Intercept Term Where EPS Is Positive

Coefficient	α_0	α_1	α_2	α_3	α_4	α_5	R^2	N
Panel A: Full sample	1.873	0.039	0.009	0.001	0.323	0.197	0.5858	30
	4.50***	3.68***	2.19**	3.18***	7.81***	7.74***		
1998-2010								
Panel B: Dividend (increased)	2.146	0.039	0.013	0.001	0.367	0.128	0.6805	10
	4.13***	2.09**	0.026**	2.07**	6.61***	2.99***		
1998-2010								
Panel C: Dividend (stable)	1.863	0.0258	0.016	0.001	0.340	0.289	0.6105	18
	4.56***	1.70*	1.48	2.53**	7.75***	3.80***		
1998-2010								
Panel D: Dividend (decreased)	1.514	0.025	0.008	0.003	0.30	0.232	0.4166	2
	-	-	-	-	-	-		
1998-2010								

Notes. (1) The model estimated is $\ln MPS_i = \alpha_0 + \alpha_1 D_i + \alpha_2 DPS_i + \alpha_3 EPS_i + \alpha_4 BVPS_i + \alpha_5 \ln MC_i + \varepsilon_i$; (2) Variable definition for the model is given in Methodology: Multivariate Model Specification section; (3) Panel D variance matrix is non-symmetric or highly singular, thus there is no output for the t -test values or P -values; (4) For each PCSE regression, the first row reports the estimated coefficient; the corresponding T/Z statistic is reported in the second row; and corresponding levels of significance are in the third row; and (5) *, **, *** indicate significance at the levels of 10%, 5%, and 1% respectively.

Discussions

Similar to studies by Doidge et al. (2004), Gozzi et al. (2008), and Litvak (2007), this study measures the cross-listing premia in terms of Tobin's Q. The study's findings are similar to those of Doidge et al. (2004) that the action of cross-listing was accompanied with significant valuation effects. The Tobin's Q of cross-listed firms in East Africa rises from the second year prior to cross-listing and up to the second year after cross-listing. Gozzi et al. (2008) found that Tobin's Q of cross-listed firms put forth one or two years prior to cross-listing, but then fell after cross-listing. A comparison of cross-listed firms and non-cross listed firms at the NSE reveals that cross-listed firms are more valued than non-cross-listed firms. This finding is in line with Gozzi et al. (2008). Adjaoud et al. (2006) found statistically insignificant cross-listing premium. By using event study methodology, Adelegan (2009) found that cross-listing was accompanied by significant valuation effects. The results from the study provided long-term evidence of the valuation effects.

While the results of study are consistent with the predictions of the bonding hypothesis, they should not be construed as supports for the bonding hypothesis, because the theoretical predictions underlying the context of the cross-listings within East Africa should produce contrary results, if bonding hypothesis is to hold true.

Findings of this study are more in support of Sarkissian and Schill's (2011) growth opportunities hypothesis that cross-listing is conducted by firms that already have high valuations several years before cross-listing. However, market segmentation theories which state that cross-listing increases firm size cannot be ruled out. A robust check revealing the cross-listing is also accompanied by an almost insignificant increase in the market-to-book ratio.

Conclusions

This study has analyzed the valuation effects of cross-listing. The study conducts a univariate analysis of the Tobin's Q and the market-to-book ratio for the period before and after cross-listing by using paired tests. Non-cross-listed firms are then included in multivariate regressions by using pooled TSCS and PCSE regressions for a period of 13 years, in order to find out if there is a difference in the valuations between cross-listed firms and non-cross-listed firms. The study's results indicate that the Tobin's Q of cross-listed firms increases two years prior to cross-listing and continues to increase two years after cross-listing. The market-to-book ratios also show an increase two years prior to cross-listing up to one year after cross-listing, then decrease in the second year after cross-listing.

When non-cross-listed firms are included in the analysis, results indicate that cross-listed firms are valued higher than non-cross-listed firms. When data are portioned for positive EPS and dividends, results indicate that valuation is the highest when EPS is positive. There is also a positive relationship between dividends and firm valuation. Since segmentation theories cannot be ruled out, the study's findings are more in support of the growth opportunity hypothesis. However, the bonding hypothesis is ruled out. The results of this study do not discriminate the effects of market timings. Consequently, this may not be ruled out. Future studies may be designed to control overvaluations and the effects of market timings.

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