Stock return synchronicity in a weak information environment: Evidence from African markets

Abstract

Purpose

This study investigates the level of stock return synchronicity in African markets with the aim of establishing whether, contrary to conventional wisdom, stock return synchronicity can be low in countries with relatively weak information environments.

Design/Methodology/Approach

We use a sample of five African countries (Botswana, Ghana, Kenya, Nigeria and South Africa) and a total of 616 firms over the period 2005-2015. Our main measure of synchronicity is the R^2 from a regression of stock returns on index returns. We also carry out regression analysis to investigate the main firm-level drivers of synchronicity.

Findings

On average, firms in African markets do not exhibit high levels of stock return synchronicity, providing support for the view that stock return synchronicity can be low in markets with relatively weak transparency. We, however, observe an increase in the level of synchronicity during the global financial crisis, notably for Ghana and Kenya. In our regression analysis, the main firm-level driver of synchronicity is firm size, while contrary to some previous studies, ownership structure has no impact. We also find evidence of the impact of changes in accounting regulation, notably the mandatory adoption of IFRS, on the level stock synchronicity.

Originality/value

This study contributes to our understanding of stock return synchronicity and how price discovery can vary between different information environments. We argue that stock returns in African countries may not always fit the stereotypical view that they are synchronous. The level of synchronicity among firms suggests that corporate events may carry some stock price implications.

JEL: G10, G14, G15

Keywords: Stock return synchronicity, information, stock returns, Africa

1 Introduction

Prior studies such as Morck et al. (2000) argue that stock returns in less-developed markets are synchronised with markets, implying that equity prices are driven my market-wide factors and not by firm-specific information (Morck et al. 2000, Jin and Myers 2006). The ability (or lack thereof) of stock prices to incorporate firm-specific information, particularly in developing markets, whether arising out of stock return synchronicity or not, has implications for investor protection if investors cannot rely on the protection of market efficiency and liquidity. High levels of stock return synchronicity in less developed markets is driven by opaque information environments (Feng et al. 2019). Thus, it has been the conventional wisdom that the level of stock return synchronicity is greater in developing markets. However, a study by Dasgupta et al. (2010) challenges this view by arguing that stock return synchronicity can be higher in more developed countries that have greater transparency. In such markets, stock prices react to news that has not been anticipated by the market. With widespread knowledge of companies and their expected levels of performance, owing to greater transparency, equities in such markets might exhibit higher levels of synchronicity as market effects dominate firm specific information. This raises an interesting debate as to whether stock returns can be less synchronous in less developed countries.

We contribute to this debate by using a sample of African countries to examine the general level of stock return synchronicity in African markets and test the extent to which, in a weak information environment, equity prices rely on firm-specific or market information. More specifically, we seek to answer three key questions. First, what is the level of stock return synchronicity in African markets? What firm characteristics are important in explaining stock return synchronicity? Finally, is stock return stock return synchronicity affected by ownership structure?

Our focus on African countries is motivated by four factors. Firstly, given that we investigate the level of stock return synchronicity in a weak information environment, African markets provide a suitable setting for our study as most African countries are characterised by low levels of transparency, which stem primarily from poor disclosure practices by firms (Tsamenyi et al. 2007). This will have an impact on the price discovery process. Secondly, according to Rossouw (2005) although most corporate governance codes in African countries are modelled on those of developed markets, they may not correspond to the institutional and

cultural requirements of African economies. Furthermore, the market for corporate control (Manne 1965), which acts to correct stock prices through the threat of takeover in more developed markets, is less effective in countries with weak governance and enforcement mechanisms such as those in Africa (Tsamenyi et al. 2007). Therefore, poor corporate governance may lead to a generally weaker information environment and a lack of transparency and accountability. Corporate governance practices are generally inadequate. Thirdly, despite the existence of regulatory frameworks to govern operations in African financial markets, there is also a generally weak level of enforcement, owing to weak legal systems and high bureaucracy (Kaufmann et al. 2011). In most African countries, there is a lack of capacity or unwillingness by mandated institutions to enforce rules, laws and regulations (NEPAD-OECD 2009). Moreover, corruption remains a significant socio-economic threat. For example, Transparency International consistently rank African countries amongst the lowest performing countries in their corruption perception index surveys. Finally, there is lack of comprehensive analysis on whether African markets are synchronous, and what factors dictate the level of synchronicity.

We measure stock return synchronicity as the R^2 from the regression of the stock returns of each stock in each country on the corresponding market index. Consistent with the view expressed by Dasgupta et al. (2010), our findings reveal a low average level of R^2 implying lower synchronicity in our sample of African companies. Synchronicity also appears to have remained persistently low over the sample period. Thus, contrary to conventional wisdom, on average firms in African markets do not exhibit high levels of synchronicity and synchronicity can be relatively low in a weak information environment. We, however, find evidence of an increase in the level of synchronicity during the Global Financial Crisis (hereafter GFC) period, notably for Ghana and Kenya. Further, cross-sectional results show that the main driver of synchronicity within firms and across all sample countries is firm size. Larger firms are associated with higher levels of synchronicity, consistent with the argument that large firms act as leading market indicators by signaling macroeconomic trends which have the potential to trigger similar aggregate markets movements to smaller firms in a market (Piotroski and Roulstone 2004). We also find evidence of the impact of changes in accounting regulation, specifically the mandatory adoption of IFRS in Ghana and Nigeria as both countries adopted IFRS after the start of our sample period. Finally, no evidence is found to support the view that synchronicity is influenced by ownership structure.

Our study contributes to the literature on stock return synchronicity by providing evidence in support of the theoretical arguments by Dasgupta et al. (2010) that developing markets, usually characterised by weak information efficiency, may not always fit the stereotypical view that stock prices are synchronously priced with markets. In a poor information environment, market valuations may be highly inaccurate, the cost of capital would be expected to increase to reflect greater risk and valuable investment will be discouraged. Nonetheless, we argue that in a low synchronicity environment, stock market reactions to corporate events which carry new information about the firm value will be the primary source of price efficiency in these markets. Hence, although such news events may be rare in these markets, they are also likely to be more value relevant.

The rest of the paper is organised as follows: We review the literature and develop our hypotheses in Section 2. We present our research design in Section 3. We conduct univariate and multivariate analyses in sections 4 and 5 respectively and carry out additional analysis and robustness checks in Section 6. Section 7 concludes.

2 Literature review and hypothesis development

Stock return synchronicity is a measure of the extent to which stock prices are influenced by market-wide forces and has been the subject of significant discussion in the academic literature (eg. Wurgler 2000, Durnev et al. 2003, Durnev et al. 2004, Chan and Hameed 2006, Dasgupta et al. 2010, Chan et al. 2013, Chan and Chan 2014). The concept of stock return synchronicity suggests that stock prices are mainly driven by two factors— market factors and factors that are idiosyncratic to the firm (Li et al. 2004). The former indicates how individual stock prices move in response to movements of the market index whilst the latter, on the other hand, are idiosyncratic factors which relate to how individual stock prices move in response to firm - specific corporate information. Put more simply, stock return synchronicity is concerned with how and why stock prices move in the same direction over time (Morck et al. 2000). Both preceding definitions relate to the ability of stock prices to incorporate firm-specific information. Indeed, Roll (1988) argues that the ability of stock prices to move together is determined by the relative quantities of firm-specific and market-wide information are available to be absorbed into market prices. Empirically, the classical measure of stock return synchronicity was introduced by (Morck et al. 2000) and involves computing the ratio of the number of stocks that move in the same direction over a period to the total number of stock movements within the same periods. This measure, however, is more concerned with giving

an indication of the level of synchronicity within markets. A more popular measure, which captures synchronicity for individual firms, developed by Roll (1988), uses the R^2 from a regression of the return of a stock on the returns of the market. A larger R^2, which indicates higher synchronicity, implies that most of the variation in the returns to individual stocks is driven by variation in the market return.

There are two main schools of thought regarding its implications of stock price synchronicity for stock price informativeness. The first school of thought suggests that stock return synchronicity is inversely associated with stock price informativeness. Firms with lower R^2 exhibit higher levels of stock price informativeness. Durnev et al. (2003) for example, find that for firms with lower R^2, current stock prices are more informative about future earnings. Lower synchronicity implies that the activities and trading of arbitrageurs facilitate higher firm-specific variability. Alternatively, there may be a positive relationship between synchronicity and stock price informativeness. Piotroski and Roulstone (2004) use analyst data to show that stocks with higher synchronicity are more informative because analysts are able to increase the amount of industry information impounded into stock prices though industry information transfers. Chan et al. (2013) provide some support for this view. They argue that stocks with higher synchronicity are associated with higher price informativeness because market participants are able to infer more information about the company when it has a higher co-movement with the market. This also implies that such stocks will be more liquid.

2.1 Are stock returns in African markets synchronous?

For most studies that examine stock return synchronicity in a cross-country context, the consensus has generally been that stock returns in more developed markets are associated with less synchronicity than in less developed countries (Morck et al. 2000, Jin and Myers 2006). At the forefront of this strand of literature is Morck et al. (2000), who argue that weak protection of property and investor rights adversely affect how investors react to corporate information which leads to lower incorporation of firm-specific information into stock prices. Jin and Myers (2006) attribute higher synchronicity in less developed countries to opacity or lack of transparency i.e. a weak information environment. Generally, poor corporate governance systems which encourage such practices as controlling shareholders (Boubaker et al. 2014) and director interlocks (Khanna and Thomas 2009), could bring about reduced firm-level transparency leading investors to rely on higher levels of stock return synchronicity.

Dasgupta et al. (2010), however, depart from these previous studies by arguing that stock prices react to news that has not been anticipated by the market. Thus, in an improved information environment, the market is able to make predictions about future events due to the availability of information. Consequently, when these events occur, there is little surprise and thus lower firm-specific variation. Conversely, in a weak information environment, the inability to accurately value firms leads to greater information shocks from new information and can lead to higher firm-specific variation i.e. lower synchronicity. Despite the presence of market regulation and codes of corporate governance, African markets are still challenged by problems of enforcement and a lack of transparency. Given the two opposing views in the literature, we formulate two alternative hypotheses as follows:

H1a: Stock returns of African firms exhibit high levels of stock return synchronicity.

H1b. Stock returns of African firms exhibit low levels of stock return synchronicity.

2.2 Determinants of synchronicity: Do firm size and age matter?

In examining the factors that account for stock return synchronicity among firms, two factors have been the focus of academic attention due to their theoretical and intuitive significance - firm size and age. These factors can greatly affect the firm's information environment which in turn has implications for stock return synchronicity. For example, Atiase (1985) argues that the amount of information production and dissemination is a function of firm size. Based on his 'differential information' hypothesis, he argues that the amount of unexpected information conveyed to the market by corporate information such as earning reports is related to the market capitalisation of firms. According to this view, size will have implications for stock return synchronicity as it is itself a function of a firm's information environment. The impact of firm size on stock return synchronicity, however, may be quite ambiguous. On the one hand, larger firms may be associated with more shareholders and investors who could trade more often to incorporate firm-specific information into stock prices (Roll 1981). Thus, larger firms may be associated with lower synchronicity. On the other hand, Roll (1988) observes a positive relationship between firm size and R^2 arguing that larger firms may be less susceptible to systematic risks that do not arise from the market as a whole. In a more recent study, Gassen et al. (2020) show that the a larger firm size leads to a higher level of stock market synchronicity in a large study involving fifty countries. Correspondingly, one may expect a significant and positive relationship between firm size and synchronicity. Most African markets are relatively

small, and most firms are also small. Therefore, larger firms in African markets are more likely to act as leading market indicators by signalling market movements which means that their returns are more likely to be synchronous.

H2: Stock returns of larger firms in African markets exhibit higher levels of synchronicity.

The age of a firm also plays an important role in its information environment as older firms have less information uncertainty due to greater historical performance records available to the market (Lu et al. 2010). This longer trading history and reduced uncertainity also makes it easier for the market to estimate the asset value of such firms. Dasgupta et al. (2010) posit that the market learns more about the intrinsic qualities of a firm as it grows older. Hence, based on their framework, it should be easier for market participants to accurately predict future events about older firms leading to less surprise when these events eventually occur. Older firms should thus be associated with higher stock return synchronicity. Most African stock markets are relatively young, with the exception of the South African and Egyptian stock exchanges. For example, the stock markets of Ghana and Botswana are around 30 years old, having both been established in 1989. Since listing at least, African firms will be correspondingly young. Based on the preceding discussion, we expect that returns to African firms to be less synchronous as the market knows little about such firms and would therefore act with greater surprise when corporate information is released. However, as these firms grow older and information uncertainty about them reduces, the level of surprise from new information would be expected to be lower, and synchronicity higher.

H3: Stock returns of older firms in African markets exhibit higher levels of synchronicity.

3 Research design

Our sample is based on firms listed on the stock exchanges of Botswana, Ghana, Kenya, Nigeria and South Africa. Based on the arguments of La Porta et al. (2000), we focus on a set of common law countries where the cornerstone of governance is more likely to be the stock market as it plays a greater role within the financial system, compared to civil law countries that are generally considered bank-based systems. Governance in market-based systems relies on the market for corporate control as the "court of last resort" (Fama and Jensen 1983 p.17) which in turn depends on the information efficiency of stock prices to inform investors decisions. Thus, we focus on countries where the informational efficiency of stock prices is of

greater relevance to investors. Data availability also limits our ability to include some markets in the sample. Nonetheless, we consider five countries for which sufficient data is available and we analyse the sample on a country-by-country basis.

We begin by collecting a list of all firms in these countries from DataStream. We then exclude firms for which data on at least one of our variables cannot be obtained. This procdeure results in a total of 616 unique firms and 4728 firm-year observations. Table 1 provides a summary of firms in the sample by country and by industry. South Africa has the highest number of firms in the sample while Botswana has the lowest number of firms. The number of sample firms in each country is reasonably representative of the total number of listed firms. For example, between 2005 and 2014, the average number of listed firms was 205 for Nigeria and 56 for Kenya. Thus, our sample size of 121 and 49 respectively for these countries is representative. We obtain daily returns for each firm and the various market indexes also from DataStream.

[Insert Table 1 here]

To measure stock return synchronicity for each firm, we determine R^2 from a regression of a firm's return on a market index as proposed by Roll (1988) and further developed by Morck et al. (2000). This is a widely used measure of stock return synchronicity in previous studies and shows the variation in stock returns that are explained by variations in market returns (eg. Morck et al. 2000, Gul et al. 2010, Chan and Hameed 2006). [1]The idiosyncratic variation is therefore represented by $1 - R^2$. We use three versions of this estimation in our paper. The first is based on Chan and Hameed (2006) where synchronicity is determined from the $R^2$of a market model regression as follows;

$$R_{it} = \alpha_i + \beta_i RM_t + \varepsilon_{it} \qquad 1$$

where for each firm i, R is the return on day t and RM is the corresponding contemporaneous market return on day t.

[1] Gassen et al (2020) argue that using an R^2 based measure of synchronicity may be problematic for illiquid markets. One of their main measures of liquidity is the proportion of zero returns. In our cross-sectional analysis we also account for the impact of liquidity using the proportion of non-zero returns. Our average level of liquidity for Kenya, Nigeria and South Africa, are fairly consistent with the average values of the African sub-sample reported in Gassen et al (2020). But we observe higher levels of illiquidity in Botswana and Ghana. Whilst this may suggest that synchronicity values for these two countries should be interpreted with caution, our cross-sectional analysis shows that the level of illiquidity does not impact synchronicity in these two countries.

The second estimation includes a lagged value of the market index, RM, to address potential problems associated with non-synchronous trading (Boubaker et al. 2014, Brockman and Yan 2009, Feng et al. 2016, Chan and Chan 2014). The second estimation is as follows:

$$R_{it} = \alpha_i + \beta_i RM_t + \beta_2 RM_{t-1} + \varepsilon_{it} \quad 2$$

The third estimation includes the world market return following Hasan et al. (2014). WorldReturn is the return on the MSCI World Index on day t.

$$R_{it} = \alpha_i + \beta_i RM_t + \beta_2 RM_{t-1} + \beta_3 \text{WorldReturn}_t + \varepsilon_{it} \quad 3$$

Previous studies often include industry indices in their estimations to determine synchronicity (Piotroski and Roulstone (2004). But as argued by Chan and Hameed (2006), including an industry index is problematic in the case of developing and emerging markets because these markets are usually dominated by few industries, which makes the disentangling of the industry effect from the market effect challenging. They further argue that industry returns are more likely to reflect firm-specific information rather than industry information when the industry is made up of a few firms. Moreover, industry indices for African firms in our sample are not available.

In multivariate analysis, we ascertain the firm-level determinants of synchronicity by estimating the following pooled OLS regression in equation 4. Our choice of a pooled OLS regression is consistent with previous studies of stock return synchronicity as (eg. Gul et al. 2010, Hasan et al. 2014, Feng et al. 2016, Devos et al. 2015).[2] We control for year and industry effects and adjust standard errors for heteroskedasticity.

$$\begin{aligned} Synch_{it} = \ & \alpha_i + \beta_1 \text{FirmSize}_{it} + \beta_2 \text{Age}_{it} + \beta_3 \text{Leverage}_{it} + \beta_4 \text{Profitability}_{it} \\ & + \beta_5 \text{Non zero return days}_{it} + \beta_6 \text{Firms in industry}_{it} + \beta_7 \text{Trading Volume}_{it} \\ & + \text{Industry} + \text{Year} + \varepsilon_{it} \quad 4 \end{aligned}$$

where *Synch* is the R^2 obtained from estimating equation 1, 2 or 3. The computation and interpretation of R^2 implies that it is bounded within an interval of [0, 1], which can make it problematic when using it as a dependent variable in multiple regression analysis. Hence, in the spirit of Morck et al. (2000), and consistent with most previous studies on synchronicity,

[2] In unreported results, we also use alternative regression models like quantile regressions. Our results remain the same.

we perform a logistic transformation to the R^2 such that *Synch* ranges from negative infinity to positive infinity. We transform R^2 using the equation below:

$$Synch = \log\left(\frac{R^2}{1-R^2}\right) \qquad 5$$

where R^2 is derived from estimating equation 1 (denoted $Synch_1$); equation 2 (denoted $Synch_2$) and equation 3 (denoted $Synch_3$).

For each firm, *Firm Size* is measured as the natural logarithm of the firm's market value at the beginning of the year. *Age* is the natural logarithm of the number of years since a firm's base date in DataStream. *Leverage* is computed as total debt divided by total assets at the beginning of the year. *Profitability* is measured as earnings scaled by total assets. *Non-zero return days* is the number of days a firm has non-zero returns in the previous year. *Firms in industry* is the log of the number of firms in the industry to which a firm belongs. *Trading Volume* is the total trading volume of a firm in each year scaled by the number of shares outstanding at the year-end.

4 Univariate analyses

4.1 Summary statistics

Table 2 presents summary statistics for the variables used in the study. We report, on a country-by-country basis, firm-year observations (count), mean, standard deviation and minimum, median and maximum values. Panel A reports descriptive data for Botswana, Panel B provides statistics for Ghana and Panels C, D and E report are for Kenya, Nigeria and South Africa respectively. For brevity, we focus on summarising statistics of our synchronicity measures. For all firm-year observations in all five countries, the mean synchronicity value for all three measures of synchronicity is below 10%, implying that firms in these countries exhibit low levels of synchronicity. This is consistent with Dasgupta et al. (2010) who argue that synchronicity in less developed countries can be lower compared to more developed markets. Maximum values for synchronicity across five countries suggest that some firms may exhibit high synchronicity with market movements. In Botswana, the maximum value is approximately 70% for all three measures. In the case of Ghana, the maximum value is approximately 83% for all three measures whilst in Kenya, Nigeria and South Africa, the maximum values are 69%, 75%, and 74% respectively. We are also check for the stability of our synchronicity measures for the full sample using bootstrap approach where we replicate the sample distribution a hundred times. The mean values for the each synchronicity measures lies within the 95% confidence interval.

[Insert Table 2 here]

4.2 Synchronicity over time

We next examine the pattern of synchronicity over time for the sample countries. Figure 1 depicts a set of time series plots of mean synchronicity values for each country over the sample period. The diagrams indicate the evolution of synchronicity for $Synch_1$, $Synch_2$, and $Synch_3$ for each country. For these plots, we use the non-log-transformed variables for synchronicity. We only use the log-transformed version of synchronicity in regressions where synchronicity is a dependent variable. Across all countries in Figure 1, the average synchronicity values per year are less than 10%, with noticeable spikes between 2007 and 2009 for Kenya. Similar increases in synchronicity are visible for Ghana and Nigeria but less pronounced downturns follow these spikes. This most likely reflects spillovers and contagion from the Global Financial Crisis (GFC). Movements in developed markets, which these developing markets are exposed to, would be expected to trigger significant movements in stock prices giving rise to increasing synchronicity over that period. Figure 1 also shows that the level of synchronicity, although relatively low, has varied quite significantly over time in each country, notably for Kenya, Nigeria and South Africa, with notable upwards drift for Ghana and Nigeria after 2012. We investigate this further in section 6.2 in which we carry out additional tests on how synchronicity is impacted by changes in accounting regulation.

[Insert Figure1 here]

4.3 Synchronicity: pre and post financial crises

Due to globalisation and the increasing interdependence of financial markets, the GFC spread quickly from more developed to emerging and developing markets (Covitz et al. 2013, Bekaert et al. 2014). An and Zhang (2013) argue that the GFC led to increases in market volatility and stock crash risk which resulted in higher synchronicity in the GFC period relative to the non-GFC period. Hence, we check whether synchronicity decreases or increases as a result of market instability generated outside of African markets. Panel A of Table 3 shows the mean synchronicity values for all three measures of synchronicity in the Pre-Crisis (2005-2006), during the GFC (2007-2009), and Post-Crisis periods (2010-2015) for each country. Due to the lack of firm return data available for the Botswana sample, synchronicity, for the Pre-Crisis period is not displayed. Using $Synch_1$ as a reference point, the mean synchronicity value for the Ghana sample is 1%, 1.2% and 3.47% in the Pre-GFC, GFC and Post-GFC periods

respectively. In the case of Kenya, synchronicity is 0.5%, 3.6% and 5.4% for the three periods respectively indicating a notable increase in synchronicity over the period. This may be due either to the impact of the crisis or may result from institutional and financial development over time. The mean $Synch_1$, $Synch_2$ and $Synch_3$ figures for the Nigeria sample is 6.7%, 6.5% and 6.1% respectively while that of the South Africa sample are 5.8% 5.9% and 5.4%. For these latter two countries, synchronicity does not change substantially with the advent of the GFC although synchronicity is lower in the latter period for both countries. The last three columns of Panel A shows the average level of synchronicity during the European Debt Crisis (EDC) period (2010-2012). Compared to the GFC period, synchronicity is lower in this period for Nigeria and South Africa, but higher for Ghana and Kenya. It appears relatively the same for Botswana.

Panel B reports a test of mean differences between synchronicity in pairs of periods, i.e. Pre-GFC period and GFC periods, GFC and Post-GFC periods, and Pre-GFC and Post-GFC periods. Synchronicity is significantly lower in the Pre-GFC period than in the GFC period. Also, synchronicity is significantly lower in the GFC period than in the Post-GFC period and significantly lower in the Pre-GFC period than in the Post-GFC period. This holds for all three measures of synchronicity. A similar observation can be made in the case of Ghana except for the Pre-GFC and GFC pairs which are not statistically significant. Hence in some of the smaller markets, synchronicity increased over the period. One explanation for this might be that investors increased their reliance on market movements given the high levels of uncertainty and volatility of stock prices. However, in the case of Nigeria and South Africa, there appears to be no significant differences between any of the pairs of periods, although synchronicity in the GFC period is higher than in both the Pre-GFC and Post-GFC periods. This implies that despite increased movements and volatility during the GFC, market movements did not have a significantly greater impact on movements in stock prices in both Nigeria and South Africa. The last three columns of Panel B shows test of mean differences between synchronicity in the EDC period compared to the non-EDC periods (before and after). Statistically significant differences in synchronicity are observed for only the Nigeria sample.

[Insert Table 3 here]

5 Multivariate analyses

Table 4 presents OLS regression estimates for firm-level determinants of stock return synchronicity. We present results separately for each country, showing models for all three

measures of stock return synchronicity as the dependent variable. Coefficient estimates for firm size are positive and statistically significant across all models in all countries. This implies that returns for larger firms are relatively more synchronous than smaller firms. This is consistent with the arguments of Roll (1988) and also consistent with the findings of Piotroski and Roulstone (2004) and Boubaker et al. (2014). Piotroski and Roulstone (2004) for example, argue that the size of firms is a good indicator of the size of its information environment including overall investor interest and media exposure. Large firms may serve as leading market indicators by signaling macroeconomic trends which have the potential to trigger similar aggregate markets movements. Roll (1988) provides another explanation for why larger firms may exhibit greater synchronicity. He posits that larger firms usually tend to operate in different markets and industries, and can, therefore, be likened to a diversified portfolio of smaller firms. Thus, by operating in these different markets and industries, larger firms have greater exposure and will be more susceptible to the impact of market-wide factors.

With regards to firm age, coefficient estimates are less consistent across all countries. Age is statistically insignificant for Botswana, Ghana, Kenya, and Nigeria. However, it is positive and highly significant (at the 1% level) for South African firms across all three different measures of synchronicity. This implies that older firms are more synchronous than younger firms in the South African sample but not elsewhere. The positive and significant coefficient for Age in South Africa is consistent with the findings by Dasgupta et al. (2010) who argue that the market learns about a firm's time-invariant characteristics as it gets older. Therefore, more market-wide factors will be incorporated into its stock price, leading to high synchronicity. Further, Dasgupta et al. (2010) argue that older firms tend to have more stable fundamentals and will therefore co-move, leading to greater return synchronicity. The difference in the impact of age between South Africa and the other four countries could reflect the wide disparities in stock market development. The South African market is the largest and one of the oldest markets on the continent. Hence the implications of age for any firm level outcomes will be more pronounced as markets have had more time to learn about the company.

In terms of the other variables in Table 4, we first look at a firm's capital structure. The monitoring role of debtholders on accounting information disclosure and quality is well documented in the literature (eg. Bushman and Williams 2012). In a recent study, Danisewicz et al. (2021) et al. (2020) show that debtholders provide strong incentives to improve information disclosure, such as a reduction in earning opacity. If debtholders play an important role in accounting information disclosure and quality, then we would expect an impact of

capital structure on the level of synchronicity. As we can see *Leverage* is insignificant in Botswana, Ghana, Kenya, and Nigeria consistent with Gul et al. (2010) and Boubaker et al. (2014) who also do not find any statistically significant impact of leverage on synchronicity. In South Africa, however, *Leverage* has a positive and significant impact on synchronicity, lending support to the notion that, as leverage transfers ownership from equity to debtholders, stock prices of firms will incorporate less or no firm-specific information. *Profitability* is positive and significant across two models in Botswana but insignificant for the Ghana, Kenya, and Nigeria sample. This is consistent with the findings of Jones et al. (2020) who find no relationship between synchronicity and the informativeness contained in corporate earnings in Kenya and Nigeria. In South Africa and contrary to the case of Botswana, profitability is negative and statistically significant across all three measures of synchronicity. *Non-Zero Return Days* has no statistically significant impact on synchronicity in Botswana and Ghana. This might be due to the fact that these two countries are relatively less liquid compared to Kenya, Nigeria and South Africa where coefficient estimates for this variable, consistent with Chan et al. (2013), are positive and significant. This finding suggests that stocks that trade more often are also more likely to be driven by market wide-forces, and therefore, would exhibit higher levels of synchronicity. Using a different measure for liquidity, Feng et al. (2016) find that illiquidity has a negative impact on synchronicity which is consistent with the findings in this study as far as Kenya, Nigeria and South Africa are concerned. However, these results contrast with the findings of Boubaker et al. (2014) who find that less liquid stocks incorporate less firm-specific information and are therefore more synchronous. The number of firms in the industry (*Firms in Industry*) is insignificant in all five countries. This is consistent with Gul et al. (2010) and Hasan et al. (2014) who also do not find any statistically significant impact. This also suggests that industry-wide factors may not be very relevant for movement in prices of individual stocks. Finally, trading volume is not significant for the Botswana, Ghana and Kenya sample but positive and significant for the Nigerian and South African samples. The findings in the case of Nigeria and South African support the findings in Xing and Anderson (2011) who also find a positive impact of trading volume on synchronicity. This also explains why *Non-Zero Return days* has a positive impact in the case of Nigeria since stock liquidity is greater in Nigeria.

Overall, our regressions suggest that the main determinant of synchronicity for firms across all countries is firm size as this is consistently positive and significant in each of the countries. This is still the case when the South African sample is compared to the rest of the sample. The impact of other variables including *Age*, *Leverage*, *Profitability*, *Non-Zero return*

days, *Firms in Industry* and *Trading Volume* is less consistent across all countries. These differences are indicative of the differences in the development of the respective stock markets.

[Insert Table 4 here]

6 Additional analyses

6.1 The impact of mandatory IFRS adoption

The value relevance of accounting information plays a vital part in explaining stock synchronicity. On the one hand if more firm-specific accounting information is reflected in stock price, then the level of synchronicity should decline. The impact of International Financial Reporting Standard (IFRS) adoption on value relevance has been extensively investigated since 2005. Ahmed et al. (2015) document that value relevance of earnings and analysts' forecast accuracy have generally increased in post-IFRS period. Using African data, Hillier et al. (2016) provide strong evidence that the value relevance of earnings and book value has significantly increased in Botswana, Egypt, Kenya, Morocco, and South Africa, after IFRS adoption. Kim and Shi (2012) investigate the impact of voluntary IFRS adoption on stock return synchronicity in 34 markets and document a decline in the level of synchronicity after IFRS adoption. They argue that IFRS adoption facilitates the incorporation of firm-specific information in share prices, thereby reducing synchronicity. On the other hand, the increase in value relevance of financial information, stemming from the adoption of IFRS may cause lower surprises with such information, leading to higher levels of synchronicity. Unlike Kim and Shi (2012), who focus on voluntary adoption of IFRS, Beuselinck et al. (2009) test the effect of mandatory adoption of IFRS. They find that the level of synchronicity only decreases in the first year of IFRS adoption and increases significantly afterwards. This is because more transparent information under mandatory IFRS adoption leads to less 'surprises' in the future and, therefore, greater synchronicity in the post-IFRS adoption period.

All five countries in our sample have adopted International Financial Reporting Standards (IFRS): Kenya (1999), South Africa (2005), Botswana (2007), Ghana (2007) and Nigeria (2012). However, only Ghana and Nigeria have a sample covering both their respective pre-IFRS and post-IFRS period. As noted in Figure 1 both demonstrate an upward drift of synchronicity after adoption of IFRS: Ghana (after 2007) and Nigeria (after 2012). We therefore check for whether the level of synchronicity is influenced by the adoption of IFRS by using our Ghana and Nigeria samples. We use an indicator variable, Post IFRS which takes

the value of 1 in the years after the adoption of IFRS in each of these two countries (2007 for Ghana and 2012 for Nigeria) and zero, for years before. Due to limited number of observations, we are only able to conduct univariate tests for Ghana but can conduct both univariate and multivariate analysis for Nigeria. Table 5 presents the univariate test where we compare each of our three synchronicity measures in both the pre- and post-IFRS adoption period. Table 6 presents the regression results for Nigeria where we include the Post IFRS variable as an additional explanatory variable.

[Insert Table 5 here]

[Insert Table 6 here]

Our findings in both Tables 5 and 6 echo Beuselinck et al (2009)'s results. Synchronicity in the post IFRS period is significantly higher than synchronicity in the pre-IFRS period. Thus, the mandatory IFRS adoption leads to an increase in synchronicity in African countries. The different impact of voluntary and mandatory adoption of IFRS may be due to 'signalling' effect. Firm who voluntarily adopt IFRS are signalling more transparent information disclosure, which reduces stock return synchronicity. However, this is not the case for mandatory adoption of IFRS, because investors could not distinguish the level of information transparency by looking at accounting standards. Nonetheless, and as we see in Table 6, the other firm-level determinants of synchronicity continue to main their significant as in the baseline regression results.

6.2 The impact of ownership structure

In this study, we also examine the effect of ownership structure on synchronicity. Compared to other corporate governance mechanisms, investigating ownership structure has distinct advantages. Ownership structure not only provides a solution for traditional principal-agent conflict, but is also a useful tool for principal-principal conflict (eg. Lozano et al. 2016). Furthermore, Munisi et al. (2014) show that the institutional background in Africa enables ownership structure to play an important role in corporate governance. They argue that the set of corporate governance mechanisms in Africa is largely decided by its ownership structure. They document that ownership structure is a powerful determinate of board size and structure in twelve Sub-Saharan African countries.

Previous studies document the impact of different types of ownership structures on stock return synchronicity, including ownership concentration (Gul et al. 2010), state ownership (Ben-Nasr and Cosset 2014) and institutional ownership (An and Zhang 2013). We therefore investigate whether stock return synchronicity in our sample is driven by ownership structure of firms. We test for the impact of ownership concentration (measured by the percentage of shares held by Top 5 shareholders), Government ownership, Institutional ownership and ownership by individuals and families, and present these results in Table 7. Similar to previous regressions in this paper, we include industry and year fixed effects. Due to the limited number of observations in each country, results are presented for the full sample and not by country.[3] However, in order to ensure that the results are not driven by the South African sample, which is disproportionately greater than each of the other four samples, a separate set of results are also presented for a sample that excludes South Africa. We include country dummies to address the impact of any particular country effects. The results in Table 7 do not provide any evidence in support of the hypothesis that synchronicity is influenced by ownership structure. For the full sample, none of the coefficients for ownership variables are statistically significant. In the sample that excludes South Africa, we find only a weakly significant relationship between synchronicity and Government Ownership and Families and Individuals.

The findings from these regressions contrast with previous studies on synchronicity and ownership structure. Gul et al. (2010), using the percentage of shares held by the largest shareholder as a measure of ownership concentration, find a positive and significant relationship between synchronicity and ownership concentration. They further find this relationship to be more pronounced when the largest shareholder is government related. However, and consistent with the alignment effect posited by Fan and Wong (2002), the relationship they find between synchronicity and ownership concentration is concave. Beyond a level of ownership concentration, synchronicity starts to decrease. This is because, at a certain high level of ownership concentration, there is no further entrenchment irrespective of the increase in voting rights. However, the majority shareholder(s) will find it more costly to divert firm resources for private gain due to the huge cash flow rights they possess. An and Zhang (2013) find that the level of institutional holdings has a significantly negative impact on

[3] With the exception of South Africa, other countries in the sample have few observations for ownership data, with some being fewer than 30 observations. However, we include country dummies to account for any country effects and also present results for a sample that excludes South Africa.

synchronicity suggesting that firms with higher levels of institutional ownership are less synchronous.

[Insert Table 7 here]

7 Conclusion

This paper examines the level of stock return synchronicity in African markets using a sample of five countries. The study is motivated by the argument that stock returns in developing markets, which are characterised by poor protection of property rights, are deemed to be more synchronous than more developed markets (Morck et al 2000). According to this framework, it is reasonable to expect higher levels of synchronicity between equity prices and market indices in African markets. However, Dasgupta et al. (2010) argue that more developed markets, characterised by a better information environment, can be associated with higher stock return synchronicity. Alternatively, less developed markets, which typically have weaker information environments, can be associated with lower level of synchronicity. Consistent with such a view, Nguyen et al. (2020) find that corporate governance quality increases the level of synchronicity in developing markets, such as Vietnam. Our findings show that on average, stock prices in African markets do not fit the conventional narrative of high synchronicity. This is consistent with the alternative school of thought which states that stock return synchronicity can be higher in more developed markets and lower in less developed markets (Dasgupta et al. 2010).

As far as the information channels of synchronicity in our results are concerned, we have identified two candidates. The first channel is firm size. Large firms are more likely to be covered by mass media and financial analysts. They also contribute to a large weighting in the market index. We show that large African firms have higher levels of synchronicity, consistent with previous evidence for the global market (eg. Cheng et al. 2021). The average firm size is quite small in our African sample, the median firm size is only $43m for Ghana and $114m for South Africa. This could partly explain why the overall level of synchronicity is relatively low in our results. The second channel is the reporting standard of accounting information. The adoption of IFRS has changed the accounting information disclosure environment. One the one hand, IFRS adoption may lead to more transparent disclosure of firm specific information, decreasing the level of synchronicity. On the other hand, the adoption of IFRS may lead to firm-specific information with fewer surprises, increasing the level of synchronicity. We show that even the overall synchronicity level in African countries is low, but it has increased after

mandatory adoption of IFRS. Such a result is consistent with the findings in developed countries (eg. Bissessur and Hodgson 2012).

Overall, the findings in this paper contribute to our understanding of synchronicity and how price discovery can vary between different information environments. Although the African countries examined in this study are characterised by low GDP and relatively weak transparency, the low level of synchronicity among firms may suggest that corporate events may carry some stock price implications. Investors in such stocks may rely more on such information than on market prices than has been previously suggested. Given our findings on the relationship between firm size and synchronicity, investors may need to pay more attention to firm specific news of smaller firms. In a weak information environment, due to absent or inadequate disclosure of information, market participants may not be able to glean sufficient information about the fundamentals of firms for market participants to make trades based on equity valuation. For example, it may be difficult to determine if a particular company is likely to be the target of a takeover bid because the level of transparency and disclosure are insufficient to enable efficient pricing. Should a bid be lodged and disclosed, substantial reactions may be triggered.

Our paper has a number of important implications. Firstly, the overall pattern we observe shows a low reliance on market indices for price discovery and instead valuation updates based on major additions to the information set. It is hard to rely on market prices in such a situation and so we strongly recommend that market regulators focus on enhancement of the information environment including strengthening the release of detailed fundamental corporate data and corporate news release. Were this to be coupled with strong investor protection policies then such countries as those in our study would likely be able to attract greater inward investment and greater financial development. Further, prior empirical evidence suggests there are potential diversification benefits of including African stocks in portfolios due to the weak stochastic trends between African markets and World Markets (Alagidede 2009). However, there is the need for more empirical studies that help investors the assess the informational efficiency of these markets in the context of their different institutional and regulatory environments. Moreover, Ibbotson et al. (2013) argue that liquidity can be an investment style just like size, value/growth or momentum. Therefore, and in line with this argument, our results show that for international investors who seek to diversify, stocks in these markets could potentially form a basis for the construction of investment portfolios, particularly

to take advantage of trading opportunities around announcements of corporate events as stock prices become more informationally efficient.

Our study also provides avenues for further research. We focus on common law countries not only due to the potential for the stock market to be the cornerstone of governance, but also partly due to challenges with availability of data. Thus, as information systems develop and improve, future studies might be able to explore not just a broader set of countries, but also compare between market-based economies and bank-based economies. Also, future work might focus on how market participants engage with the information set. In particular, we suggest attention might focus on the effect of more complex ownership structures such as blockholdings and cross-shareholdings on liquidity and price discovery in markets with low levels of market efficiency.

Declaration of interest

The Authors declare that there is no conflict of interest

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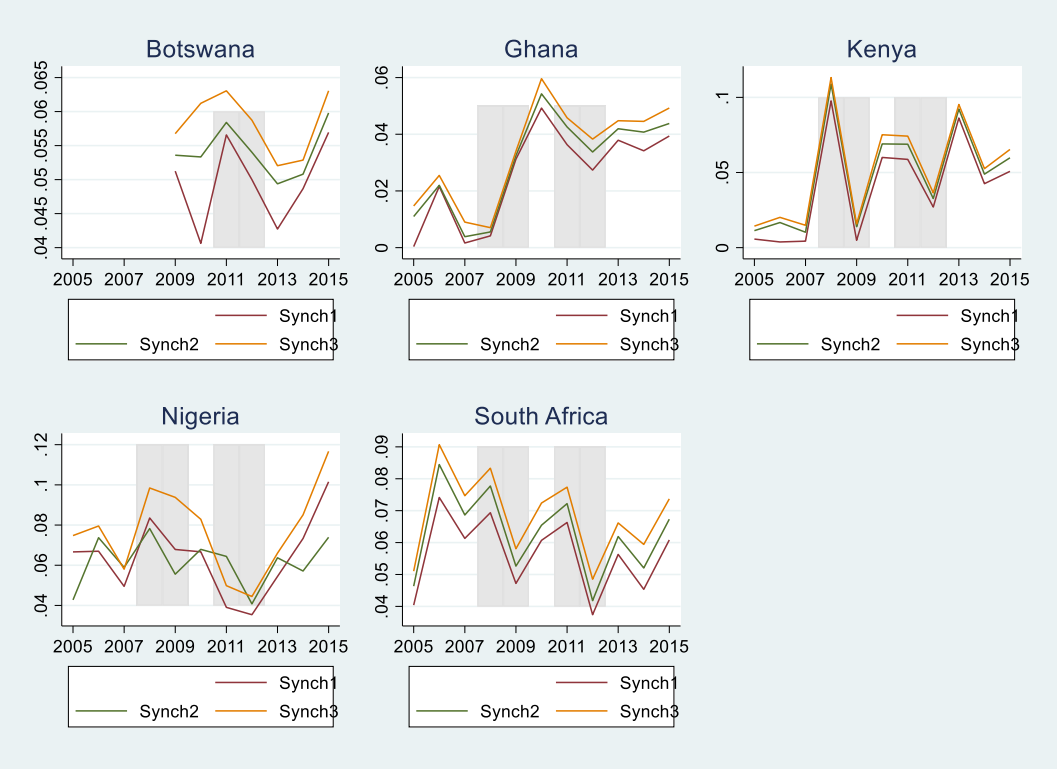
Figure 1: Synchronicity measures in African markets



Notes: Shaded bars represent the Global Financial Crisis (2007-2009) and European Debt Crisis (2010-2012)

Table 1: Sample distribution

This table presents the distribution of firms by country and industry

	Botswana N= 15		Ghana N=27		Kenya N=49		Nigeria N=121		South Africa N=404	
	Number	%	Number	%	Number	%	Number	%	Number	%
Basic Materials	1	6.7	2	7.4	1	2.0	9	7.4	61	15.1
Consumer Goods	3	20.0	6	22.2	14	28.6	22	18.2	33	8.2
Consumer Services	1	6.7	1	3.7	6	12.2	7	5.8	45	11.1
Financials	8	53.3	10	37.0	17	34.7	46	38.0	112	27.7
Health Care	-	-	2	7.4	-	-	4	3.3	11	2.7
Industrials	1	6.7	2	7.4	5	10.2	22	18.2	102	25.3
Oil & Gas	-	-	3	11.1	2	4.1	7	5.8	2	0.5
Technology	1	6.7	1	3.7	1	2.0	2	1.7	31	7.7
Telecommunications	-	-	-	-	1	2.0	2	1.7	6	1.5
Utilities	-	-	-	-	2	4.1	-	-	1	0.3

Table 2: Summary statistics

This table presents summary statistics of variables used. It reports the number of observations, mean standard deviation, minimum value, median value and maximum values. In order to minimize the effects of outliers, continuous variables are winsorized at the 1st and 99th percentile. For variables that are log transformed, the non-log transformed version is reported in this table.

Panel A: Botswana						
	Count	Mean	SD	Min	Median	Max
$Synch_1$	103	0.050	0.141	0.000	0.003	0.707
$Synch_2$	103	0.054	0.142	0.000	0.007	0.709
$Synch_3$	103	0.058	0.141	0.000	0.010	0.709
Firm Size($ M)	88	184.973	223.556	0.920	79.620	861.070
Age	103	2.952	1.997	0.000	3.000	6.000
Leverage	73	0.141	0.131	0.002	0.082	0.449
Profitability	100	0.102	0.090	-0.120	0.086	0.415
Non-zero return days	103	0.075	0.064	0.000	0.058	0.319
Firms in Industry	103	2.500	2.810	1.000	1.000	8.000
Trading Volume	100	0.042	0.054	0.000	0.020	0.329
Panel B: Ghana						
	Count	Mean	SD	Min	Median	Max
$Synch_1$	235	0.027	0.076	0.000	0.002	0.833
$Synch_2$	235	0.032	0.078	0.000	0.005	0.834
$Synch_3$	235	0.035	0.078	0.000	0.009	0.837
Firm Size($ M)	119	129.429	185.528	0.400	43.340	805.210
Age	161	3.087	1.992	0.000	3.000	7.000
Leverage	174	0.217	0.266	0.001	0.131	1.172
Profitability	206	0.033	0.153	-0.951	0.039	0.311
Non-zero return days	235	0.099	0.101	0.000	0.062	0.506
Firms in industry	235	3.375	3.114	1.000	2.000	10.000
Trading Volume	220	0.208	1.043	0.000	0.018	7.356
Panel C: Kenya						
	Count	Mean	SD	Min	Median	Max
$Synch_1$	473	0.042	0.085	0.000	0.007	0.665
$Synch_2$	473	0.050	0.088	0.000	0.015	0.689
$Synch_3$	473	0.054	0.088	0.000	0.020	0.693
Firm Size($ M)	455	237.849	482.496	0.380	70.480	5498.730
Age	473	15.275	6.652	0.000	17.000	24.000
Leverage	340	0.165	0.158	0.001	0.117	0.746
Profitability	402	0.056	0.086	-0.677	0.045	0.421
Non- Zero return days	473	0.531	0.215	0.000	0.595	0.835
Firms in Industry	473	5.444	2.001	1.000	2.000	17.000
Trading Volume	443	0.137	0.446	0.000	0.064	7.356

Continued on next page

Table 2 continued

Panel D: Nigeria						
	Count	Mean	SD	Min	Median	Max
$Synch_1$	793	0.063	0.104	0.000	0.016	0.750
$Synch_2$	793	0.073	0.107	0.000	0.027	0.756
$Synch_3$	793	0.077	0.107	0.000	0.032	0.756
Firm size($ M)	453	537.496	1253.194	1.070	72.710	8364.220
Age	702	2.922	2.166	0.000	3.000	11.000
Leverage	501	0.198	0.179	0.001	0.151	0.972
Profitability	612	0.050	0.105	-0.830	0.042	0.421
Non-zero return days	793	0.349	0.278	0.000	0.314	0.916
Firms in industry	793	13.444	4.802	2.000	7.000	46.000
Trading volume	637	0.109	0.121	0.000	0.072	1.388
Panel E: South Africa						
	Count	Mean	SD	Min	Median	Max
$Synch_1$	3124	0.057	0.104	0.000	0.011	0.610
$Synch_2$	3124	0.063	0.105	0.000	0.018	0.628
$Synch_3$	3124	0.069	0.107	0.000	0.024	0.749
Firm Size($ M)	2883	806.768	1726.011	0.040	114.150	8364.220
Age	3124	12.413	8.646	0.000	12.000	42.000
Leverage	2664	0.227	0.215	0.001	0.174	1.172
Profitability	3017	0.041	0.183	-0.951	0.062	0.421
Non-zero return days	3124	0.437	0.232	0.000	0.487	0.905
Firms in industry	3124	40.400	12.791	1.000	32.000	112.000
Trading volume	2953	0.407	0.918	0.000	0.201	7.356

Table 3: Synchronicity and financial crisis

This table compares average synchronicity in the Pre-Crisis, Crisis and Post-Crisis periods for each country. We also show the average level of synchronicity during the European Debt Crisis (EDC) Panel A presents the mean synchronicity values of firms and Panel B presents results for tests of mean differences.

Panel A: Average Synchronicity

	Pre-GFC(2005-2006)			GFC(2007-2009)			Post-GFC(2010-2015)			EDC (2010-2012)		
	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$
Botswana				0.051	0.054	0.057	0.049	0.054	0.059	0.049	0.055	0.061
Ghana	0.011	0.017	0.020	0.012	0.014	0.016	0.037	0.043	0.047	0.038	0.044	0.048
Kenya	0.005	0.014	0.017	0.036	0.045	0.048	0.054	0.062	0.066	0.048	0.057	0.062
Nigeria	0.067	0.074	0.077	0.068	0.081	0.089	0.061	0.070	0.074	0.048	0.057	0.061
South Africa	0.058	0.066	0.071	0.059	0.066	0.072	0.054	0.060	0.066	0.055	0.060	0.066

Panel B: Test of mean differences.

	Pre-GFC —GFC			GFC and Post—GFC			Pre-GFC and Post—GFC			EDC period-Non EDC period		
	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$
Botswana				-0.050	-0.02	-0.04				0.03	-0.07	-0.18
Ghana	-0.11	-0.300	-0.400	-2.74***	-3.11***	-3.24***	-2.44***	-2.36***	-2.41***	-1.08	-1.22	-1.29
Kenya	-4.07***	-3.60***	-3.59***	-1.91*	-1.73*	-1.82*	-8.49***	-7.23***	-7.36***	-1.14	-1.11	-1.26
Nigeria	-0.05	-0.48	-0.79	0.690	1.170	1.560	0.460	0.330	0.280	3.30***	-3.43***	3.63***
South Africa	-0.31	-0.10	-0.14	1.190	1.520	1.390	0.640	1.130	0.970	0.52	0.98	0.83

Table 4: Firm determinants of synchronicity

This table presents results of OLS regression estimates on the determinants of synchronicity. *Synch$_1$, Synch$_2$, and Synch$_3$* are the dependent variables. *Synch$_1$* is the R-squared from a regression of firm's stock returns on the contemporaneous market return in each year. *Synch$_2$* is the R-Squared from the regression of a firm's stock returns on the contemporaneous market return and the lagged market return for each year. *Synch$_3$* is the R-Squared from the regression of a firm's stock returns on the contemporaneous market return, lagged market return as well as the world market return. *Firm size* is measured as the natural logarithm of the firm's market value at the beginning of the year. *Age* is the log of the number of years since a firm's base date in DataStream. *Leverage* is computed as total debt divided by total assets at the beginning of the year. *Profitability* is measured as operating income scaled by Total Assets. *Non-zero return days* is the number of days a firm has non-zero returns in the previous year. *Firms in Industry* is the log of the number of firms in the industry to which a firm belongs. *Trading volume* is the total trading volume of a firm in each year scaled by the number of shares outstanding at the year-end. *T*-statistics based on standard errors adjusted for heteroscedasticity are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% respectively.

	Botswana			**Ghana**			**Kenya**		
	Synch$_1$	Synch$_2$	Synch$_3$	Synch$_1$	Synch$_2$	Synch$_3$	Synch$_1$	Synch$_2$	Synch$_3$
Firm size	0.9480***	0.6095**	0.5624**	0.9177***	0.6229***	0.4334***	0.4828***	0.3668***	0.3208***
	(3.01)	(2.38)	(2.51)	(5.31)	(4.91)	(3.93)	(4.60)	(5.00)	(5.98)
Age	-0.6834	-0.6300	-0.5775	11.8820	0.4465	-1.7142	0.2422	0.0354	0.0132
	(-1.08)	(-1.44)	(-1.48)	(1.46)	(0.11)	(-0.45)	(1.03)	(0.24)	(0.11)
Leverage	2.3733	0.0861	0.4823	-0.5218	0.3261	0.8756	1.3004	0.6964	0.5996
	(0.83)	(0.04)	(0.23)	(-0.34)	(0.32)	(1.03)	(1.02)	(0.88)	(1.02)
Profitability	6.6970	11.3002***	9.0903**	-2.7996	0.8611	1.0128	0.6397	0.7556	0.6961
	(1.13)	(3.30)	(2.27)	(-0.81)	(0.51)	(0.75)	(0.25)	(0.56)	(0.63)
Non-zero return days	2.8032	5.1175	4.0061	4.4941	2.4048	2.2788	3.0885***	2.2105***	1.9311***
	(0.38)	(0.94)	(0.73)	(1.19)	(0.80)	(0.91)	(3.27)	(3.38)	(3.77)
Firms in industry	0.0000	0.0000	0.0000	0.0885	0.1700	0.1229	0.0751	-0.0124	0.0219
	(0.00)	(0.00)	(0.00)	(0.26)	(0.71)	(0.67)	(0.50)	(-0.12)	(0.25)
Trading volume	0.4137	-0.0342	-0.0356	0.0368	0.1814	0.0470	-0.0354	0.0628	0.1237
	(1.50)	(-0.18)	(-0.21)	(0.10)	(1.32)	(0.37)	(-0.18)	(0.65)	(1.53)
Constant	-9.6997***	-9.0563***	-7.2829***	-31.6845**	-8.1241	-3.4793	-10.5442***	-7.0910***	-6.2717***
	(-4.36)	(-5.29)	(-4.77)	(-2.18)	(-1.02)	(-0.49)	(-7.55)	(-7.16)	(-8.15)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	60	60	60	86	86	86	323	323	323
Adj. R^2	0.311	0.344	0.286	0.419	0.503	0.328	0.423	0.421	0.466

Continued on next page

Table 4 Continued

	Nigeria			South Africa			Excl. South Africa		
	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$	$Synch_1$	$Synch_2$	$Synch_3$
Firm size	0.7203***	0.5199***	0.4617***	0.5984***	0.4397***	0.3852***	0.6658***	0.4494***	0.3972***
	(9.75)	(10.80)	(11.72)	(19.26)	(22.06)	(24.78)	(12.28)	(13.14)	(13.84)
Age	0.0340	0.0297	0.1271	0.1724***	0.1482***	0.1283***	-0.1595	-0.2335***	-0.2348***
	(0.06)	(0.08)	(0.33)	(3.02)	(4.06)	(4.26)	(-1.43)	(-3.11)	(-3.61)
Leverage	-0.4594	-0.2972	-0.5563	0.3456	0.4447***	0.3816***	0.4374	0.2131	0.3171
	(-0.54)	(-0.48)	(-1.21)	(1.47)	(3.04)	(3.19)	(0.72)	(0.51)	(1.02)
Profitability	-0.4992	-0.0421	0.0447	-0.6925**	-0.4159**	-0.4169***	-0.6993	0.1860	0.1261
	(-0.20)	(-0.04)	(0.06)	(-2.34)	(-2.28)	(-2.89)	(-0.53)	(0.22)	(0.20)
Non-zero return days	3.2711***	3.0956***	2.5440***	0.5667	0.8094***	0.6875***	2.4446***	2.2187***	1.8644***
	(4.69)	(7.33)	(7.20)	(1.47)	(3.38)	(3.65)	(4.92)	(6.97)	(6.78)
Firms in industry	0.2550	0.3431*	0.3715**	-0.0196	-0.1885*	-0.1132	0.0021	-0.1151	-0.0903
	(1.20)	(1.77)	(2.30)	(-0.06)	(-1.77)	(-1.20)	(0.01)	(-0.94)	(-0.88)
Trading volume	0.3992***	0.2728***	0.2195***	0.3391***	0.2137***	0.1781***	0.1353	0.0848	0.0439
	(3.14)	(3.24)	(3.23)	(7.32)	(7.49)	(7.64)	(1.46)	(1.59)	(0.98)
Constant	-8.6522***	-8.0722***	-7.7802***	-7.2533***	-5.0487***	-4.8664***	-8.3965***	-5.7900***	-5.2809***
	(-5.59)	(-6.19)	(-6.81)	(-3.55)	(-7.79)	(-8.51)	(-8.58)	(-8.05)	(-8.73)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	291	291	291	2373	2373	2373	760	760	760
Adj. R^2	0.541	0.581	0.653	0.448	0.520	0.547	0.414	0.435	0.461

Table 5: Differences in synchronicity, Pre and Post IFRS in Ghana and Nigeria.

Panel A: Ghana						
	Pre- IFRS		Post IFRS		Mean Difference	
	N	Mean	N	Mean	Difference	t-stat
$Synch_1$	51	0.0079	184	0.0325	-0.0246**	(-2.07)
$Synch_2$	51	0.0121	184	0.0370	-0.0249**	(-2.04)
$Synch_3$	51	0.0163	184	0.0406	-0.0243**	(-1.97)
Panel B: Nigeria						
	Pre- IFRS		Post IFRS		Mean Difference	
	N	Mean	N	Mean	Difference	t-stat
$Synch_1$	522	0.0562	271	0.0754	-0.0192**	(-2.47)
$Synch_2$	522	0.0665	271	0.0842	-0.0177**	(-2.23)
$Synch_3$	522	0.0712	271	0.0882	-0.0170**	(-2.12)

Table 6: Post IFRS and synchronicity in Nigeria regressions

This table presents regression results of the post IFRS adoption period on synchronicity in Nigeria. *$Synch_1$, $Synch_2$, and $Synch_3$* are the dependent variables. *$Synch_1$* is the R-squared from a regression of firm's stock returns on the contemporaneous market return in each year. *$Synch_2$* is the R-Squared from the regression of a firm's stock returns on the contemporaneous market return and the lagged market return for each year. *$Synch_3$* is the R-Squared from the regression of a firm's stock returns on the contemporaneous market return, lagged market return as well as the world market return. *Firm size* is measured as the natural logarithm of the firm's market value at the beginning of the year. *Age* is the log of the number of years since a firm's base date in DataStream. *Leverage* is computed as total debt divided by total assets at the beginning of the year. *Profitability* is measured as operating income scaled by Total Assets. *Non-zero return days* is the number of days a firm has non-zero returns in the previous year. *Firms in Industry* is the log of the number of firms in the industry to which a firm belongs. *Trading volume* is the total trading volume of a firm in each year scaled by the number of shares outstanding at the year-end. *T*-statistics based on standard errors adjusted for heteroscedasticity are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% respectively.

	(1)	(2)	(3)
Post IFRS	1.0850***	0.7327***	0.6802***
	(2.78)	(3.00)	(3.52)
Firm size	0.7223***	0.5201***	0.4608***
	(9.72)	(10.80)	(11.77)
Age	-0.0771	-0.0108	0.0757
	(-0.19)	(-0.04)	(0.31)
Leverage	-0.3777	-0.2342	-0.5093
	(-0.45)	(-0.38)	(-1.11)
Profitability	-0.2822	0.0823	0.1314
	(-0.12)	(0.07)	(0.16)
Non-zero return days	3.3462***	3.0866***	2.5129***
	(5.04)	(7.31)	(7.29)
Firms in industry	0.2296	0.3330*	0.3653**
	(1.08)	(1.76)	(2.31)
Trading volume	0.3494***	0.2416***	0.1972***
	(2.90)	(3.14)	(3.19)
Constant	-9.9864***	-9.0671***	-8.6129***
	(-7.73)	(-8.01)	(-9.25)
Industry effect	Yes	Yes	Yes
Obs	291	291	291
Adj. R^2	0.534	0.570	0.642

Table 7: Ownership structure and synchronicity

This table presents results of OLS regression estimates of the impact of ownership structure on synchronicity. The dependent variable is $Synch_1$. To preserve space, the variable definitions are excluded from this table. *T*-statistics based on standard errors adjusted for heteroscedasticity are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% respectively.

Dependent Variable: Synch1								
	Full Sample				**Excl. South Africa**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top 5 Shareholders	0.3614				0.0009			
	(1.49)				(0.00)			
Institutional Ownership		0.2295				-0.4775		
		(0.91)				(-0.93)		
Government Ownership			4.5054				6.7040*	
			(1.16)				(1.73)	
Families and Individuals				1.0514				3.8261*
				(1.15)				(1.76)
Firm size	0.6609***	0.6605***	1.8130***	0.6429***	0.8368***	0.8476***	2.1007***	0.9851***
	(16.32)	(16.33)	(4.34)	(10.48)	(9.36)	(9.50)	(4.51)	(6.38)
Age	0.2387**	0.2329**	0.0838	0.3341**	0.4127	0.4595	1.2418	0.3846
	(2.51)	(2.43)	(0.04)	(2.31)	(1.03)	(1.14)	(0.58)	(0.80)
Leverage	0.1164	0.1015	3.4969	0.4065	0.4588	0.5333	2.0620	2.3753**
	(0.31)	(0.27)	(1.51)	(0.62)	(0.50)	(0.59)	(0.76)	(2.07)
Profitability	-0.4973	-0.4628	-7.7850	-1.9290**	-1.8079	-1.5684	-15.6239	-5.6716
	(-0.94)	(-0.88)	(-0.66)	(-2.07)	(-0.65)	(-0.56)	(-0.63)	(-1.45)
Non-zero return days	-0.4082	-0.4426	5.4817	-0.3981	1.5969	1.6093	5.8885	-0.8257
	(-0.73)	(-0.80)	(1.38)	(-0.56)	(1.47)	(1.52)	(1.44)	(-0.64)
Firms in industry	-0.2831**	-0.2892**	-0.5540	-0.2905**	-0.4143	-0.4301	-0.2554	-0.1980
	(-2.51)	(-2.57)	(-0.56)	(-2.42)	(-0.96)	(-1.01)	(-0.37)	(-1.47)
Trading volume	0.4131***	0.4023***	-0.1032	0.3997***	0.2078	0.2044	-0.2843	0.3424
	(5.78)	(5.62)	(-0.27)	(3.77)	(1.22)	(1.27)	(-0.60)	(1.25)
Constant	-5.5702***	-5.4104***	-18.5288***	-5.7531***	-8.2180***	-8.2712***	-16.4245***	-8.2378***
	(-7.02)	(-7.04)	(-2.87)	(-5.91)	(-3.94)	(-3.98)	(-4.09)	(-3.52)
Country effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	1122	1122	54	552	235	235	44	120
Adj. R^2	0.482	0.482	0.430	0.433	0.498	0.500	0.426	0.498

Appendix A: Variable definitions

Variable	Definition	Data source
$Synch_1$	R-squared from a regression of firm's stock returns on the contemporaneous market return in each year	Stock returns and Index returns from DataStream
$Synch_2$	R-Squared from the regression of a firm's stock returns on the contemporaneous market return and the lagged market return for each year	Stock returns and Index returns from DataStream
$Synch_3$	R-Squared from the regression of a firm's stock returns on the contemporaneous market return, lagged market return as well as the world market return	Stock returns and Index returns from DataStream
Firm size	The natural logarithm of the firm's market value at the beginning of the year.	DataStream
Age	The log of the number of years since the base date of the firm in DataStream	DataStream
Leverage	Total debt divided by total assets at the beginning of the year.	DataStream
Profitability	Operating profit scaled by Total Assets	DataStream
Non-zero return days	Number of days a firm has non-zero returns in the previous year	DataStream
Firms in industry	Log of the number of firms in the industry to which a firm belongs	DataStream
Trading volume	Volume of shares traded in each year scaled by shares outsanding at the end of the year.	DataStream
Top 5 Shareholders	Percentage of shares directly held by the top 5 shareholders in each company. A measure of ownership concentration	Osiris
Government Ownership	Percentage of shares directly held by government or government agencies	Osiris
Institutional Ownership	Percentage of shares directly held by institutional investors	Osiris
Families and Individuals	Percentage of shares directly held by families and individuals	Osiris