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A cross-country, macro-level investigation into earnings retention during the COVID-19 pandemic

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Orientation: Many shareholders rely on dividends for income. During crisis periods, managers, however, tend to retain rather than distribute earnings. Most prior research during the coronavirus disease 2019 (COVID-19) pandemic focussed on company-specific factors and industry association that favour earnings retention. As far as could be ascertained, no studies to date have investigated the role that macro-level factors could have played.

Research purpose: The authors hence examined the extent to which government efficiency, business efficiency, infrastructure, economic performance, uncertainty avoidance, long-term orientation and indulgence influenced earnings retention at listed companies in 62 countries from 2019 to 2021.

Motivation for the study: Additional insights were uncovered regarding the earnings retention decision during an economic crisis.

Research approach/design and method: Earnings retention data were downloaded from Bloomberg database, and country-level data from the International Institute for Management Development, the World Bank, Hofstede Insights and the World Federation of Exchanges. Panel regressions were used to examine hypothesised relationships.

Main findings: Contrary to expectation, earnings retention was negatively associated with the cultural dimension that measures uncertainty avoidance. The notion that less earnings would be retained in countries with high indulgence scores was, however, supported. Significant differences in earnings retention were observed across geographic regions and income groups. This descriptive study provides support for the dividend signalling theory in some countries.

Practical/managerial implications: Shareholders who rely on dividends should be mindful of signalling behaviour during economic crises.

Contribution/value-add: The findings enrich the extant literature on the earnings retention decision during an economic crisis by highlighting the importance of cultural dimensions, notably uncertainty avoidance and indulgence. Recommendations are offered to managers, shareholders and policymakers.

Keywords: earnings retention; dividends; macroeconomic factors; cultural dimensions; signalling theory; COVID-19; uncertainty avoidance; long-term orientation; indulgence.

Introduction

In modern English, the term 'clamming up' has two meanings. It firstly refers to someone who suddenly stops talking and secondly to a clam closing its shell rapidly in response to a threat. Many companies across the globe clammed up when coronavirus disease 2019 (COVID-19) was declared a pandemic in March 2020. Many conserved cash by omitting dividends, delaying share repurchases, reducing executive compensation and cutting capital expenditures (Mazur, Dang & Vega 2021; Pettenuzzo, Sabbatucci & Timmermann 2023). Although previous pandemics, such as the Spanish Flu and Ebola, also fuelled panic in global markets in 1918 and 2014, respectively, COVID-19 was in a league of its own (Szczygielski et al. 2022).

Most of the scholarly research into the reasons why companies retained cash in 2020 and 2021 considered industry association and company-specific factors such as profitability, earnings prospects, size, leverage, asset turnover, dividend history and ownership type (Ali 2022; Cejnek, Randl & Zechner 2021; Krieger, Mauck & Pruitt 2021; Lindén et al. 2022; Nasir et al. 2022; Tinungki, Robiyanto & Hartono 2022; Xu, Lin & Yan 2023). As far as could be ascertained, no studies to date have investigated the role that macro-level factors have played in corporate

clamming behaviour during the COVID-19 pandemic, especially in low- and middle-income countries[1]. Specifically, the macroeconomic factors relating to cross-cultural differences have been identified as an under-researched phenomenon within crisis management literature (Bajaj, Khandelwal & Budhwar 2021).

Cross-country studies that have investigated the relationship between cultural dimensions and distribution decisions (Bae, Chang & Kang 2012; Fidrmuc & Jacob 2010; Khambata & Liu 2005; Khiar & Kooli 2023; Ramirez & Tadesse 2009; Shao, Kwok & Guedhami 2010; Zheng & Ashraf 2014) did not focus exclusively on the COVID-19 pandemic. These studies furthermore yielded inconsistent results. The authors thus investigated the association between earnings retention and seven macro-level factors in 62 countries over the period 2019 to 2021. The first four macro-level factors were compiled by the International Institute for Management Development (IMD) as part of their World Competitiveness Rankings and included economic performance, government efficiency, business efficiency and infrastructure. The remaining factors described three relevant cultural dimensions as measured by Hofstede Insights (2023a), namely uncertainty avoidance, long-term orientation and indulgence.

Data were also sourced from the World Bank, the World Federation of Exchanges and the Bloomberg database. Three multiple regressions were run to identify significant relationships between earnings retention and the seven independent variables before (2019), during (2020) and post-pandemic (2021). A mixed-model regression was furthermore used to determine whether any significant relationships occurred over the research period.

The findings show that shareholders who rely heavily on dividends to supplement their income should not only base their investment decisions on industry and company-specific considerations but should also consider macro-level factors, specifically the cultural dimensions of uncertainty avoidance and indulgence. Furthermore, shareholders should be cognisant of differences in retention ratios across geographic regions and income groups. Greater insight into the distribution decisions of companies could help dividend-reliant investors to make more informed investment decisions when future crises occur. This study highlights the complexity surrounding distribution decisions during an economic crisis and the importance for companies to consider cultural dimensions. Is also demonstrates the value of government support and the relevance of the agency, bird-in-the-hand and signalling theories in times of intense political and economic uncertainty. A brief literature review is presented next, followed by details on the methods used to collect and analyse secondary quantitative data. Empirical results are presented across geographic regions and income groups. The article concludes with recommendations for shareholders, listed companies, policymakers, and researchers.

1.In 2016, the World Bank decided to change their classification system of countries. Reference would no longer be made to developed and developing countries. The term 'developed' was replaced by 'high income' and 'developing' was split into two categories, namely 'low income' or 'middle income' (The World Bank 2016).

Literature review

Over the years many scholars have investigated the determinants of dividend payouts, with the 'dividend puzzle' seemingly still being unresolved (Floyd, Li & Skinner 2015). Initially, Miller and Modigliani (1961) proposed the irrelevance theory of dividends, based on the assumption that capital markets are perfect and complete. Later studies, however, provided both theoretical and empirical evidence that dividend payouts are mainly explained by the agency, signalling, bird-in-hand and pecking order theories (Shao et al. 2010).

The agency theory posits that the interests of managers and shareholders are not necessarily aligned and that dividend payments address the agency cost associated with management's ability to abuse cash (Shao et al. 2010). The signalling theory is associated with the practice of 'dividend smoothing' whereby managers use dividends to meet expectations from shareholders and analysts to signal positive prospects (Baker & Weigand 2015). The bird-in-hand theory reflects the expectations of investors who, especially in uncertain circumstances, prefer the certainty of a cash receipt in the form of a dividend to the promise of retention-generated capital gains (Baker & Weigand 2015). The pecking order theory postulates that internal funding in the form of retained earnings is the first choice for capital allocations – with dividends, if not paid, representing internal cash resources (Shao et al. 2010).

Cross-country studies mainly investigate dividend policies and payments through an agency theory lens and report that dividends are often associated with a country's legal institutions (La Porta et al. 2000), financial market development, economic growth, politics and culture (Booth & Zhou 2017). Furthermore, companies from low- and middle-income markets generally exhibit more erratic dividend distributions than their counterparts in high-income countries (Avizian, Booth & Cleary 2003). Companies in the United States (US) also tend to pay higher dividends than companies listed in other countries (Bildik, Fatemi & Fooladi 2015; Nguyen & Tran 2016). The flexible nature of share repurchases, as opposed to dividends, has also been shown to affect dividend policies and payments, especially in the US (Nguyen & Tran 2016). Given the problem statement of this study, focus will now shift to dividend payments during crisis periods.

Dividends during crisis periods

Literature distinguishes between two types of crises: financial and economic. Whereas the former refers to a sharp and sudden decrease in the nominal value of financial assets, the latter points to a downturn in an entire economy. In today's globalised world, stock market corrections and crashes often

lead to economic crises (Vargas-Hernandez & Campos 2022). The financial repercussion of recent financial and economic crises around the globe have sparked renewed interest in understanding the determinants of dividends distributions. The global financial crisis that started in the US in 2007 had a significant effect on dividend payouts, especially in the financial sector, which was most affected by the crisis. An immediate reaction to this crisis included a reduction of dividend payout in many countries, with the US being the most affected over the long-term (Hauser 2013; Kilincarslan 2021; Nguyen & Tran 2016).

The dividend signalling theory was found to be particularly useful in explaining dividend payments during this crisis, especially within the financial sector (Bozos, Nikolopoulos & Ramgandhi 2011; Floyd et al. 2015). Using data for listed companies in Canada, China, Germany and the US, Lajili Chourou, Dobler and Zéghal (2023) furthermore found that the volatility of earnings during and directly after the global financial crisis was positively and significantly related to business risk disclosures.

The COVID-19 crisis of 2020 did not stem from an earlier crisis within a specific sector but was rather the result of the global restriction on trade and physical movement to contain the spread of the disease (Shen et al. 2020). Although government involvement was found to have a moderating effect on the spread of the virus (Li, Shang & Zhang 2021), the presence of strong health security systems (represented by the global health index) in high income countries did not significantly decrease the impact of the pandemic in terms of COVID-19-related deaths (Bajaj et al. 2021). G-7 countries[2] with strong institutions were, however, able to address economic stability by way of financial support to individuals and organisations adversely affected by the pandemic (Ntantamis & Zhou 2022).

Recent cross-country studies on the effect of COVID-19 on dividend distributions mainly focus on payout stability, measured as binary variables to represent dividend omissions, increases and decreases (Ali 2022; Krieger et al. 2021; Pettenuzzo et al. 2023). The studies report significantly higher levels of dividend reductions and omissions during the pandemic compared to pre-COVID-19 periods. Most firms, however, either maintained or increased dividends during this economic crisis (Ali 2022; Krieger et al. 2021). In the US, significantly higher levels of dividend reductions and omissions were observed during the COVID-19 pandemic compared to the global financial crisis of 2007/2008 (Pettunuzzo et al. 2023).

Ntantamis and Zhou's (2022) cross-country study shows that companies in Europe experienced a larger reduction in dividends than their counterparts in the US and Canada. The payout restrictions, specifically those imposed in the United Kingdom (UK), and COVID-19 relief programmes may explain cross-country differences during the pandemic (Ntantamis & Zhou 2022). Limited evidence exists on studies that examine the effect of macroeconomic factors (such as legal institutions, financial market development, economic growth, politics and culture) on dividend payouts during the COVID-19 pandemic (Bajaj et al. 2021). As explained earlier, most studies examined industry association and company-specific factors (Ali 2022; Cejnek et al. 2021; Krieger et al. 2021; Lindén et al. 2022; Nasir et al. 2022; Tinungki, et al. 2022; Xu et al. 2023).

Macroeconomic factors and dividend payouts

In their summary of worldwide literature on the determinants of dividend policy, Booth and Zhou (2017) conclude that a country's financial system, institutions and culture are important considerations in determining dividend distributions. Ample evidence supports the notion that countries with strong legal systems generally pay higher dividends (Albi & Aditya 2021; La Porta et al. 2000). Vo and Mazur (2023) analysed data from 62 countries from Q1 2010 to Q4 2020 and report that jurisdictions offering stronger investor protection experienced significantly lower volatility and better performance during the pandemic. The observed effect was amplified in countries strongly affected by COVID-19, based on the rate of reported new fatal cases caused by COVID-19.

Ali (2022) furthermore reported that many companies in the G-12 reported better financial performance in 2020 and maintained, or even increased, dividend payouts. Companies did so to signal their financial prospects during the crisis. It should be noted that all G-12 countries[3] are generally characterised by strong institutions and financial systems. Companies increasing dividend payments during a crisis for signalling purposes is not unheard of but have been criticised for engaging in such a costly exercise (Forti & Schiozer 2015).

Crises generally lead to policy uncertainty. The question thus becomes 'how does this uncertainty influence the decision to retain earnings (or pay dividends when considering the other side of the coin)?'. Drawing on the signalling theory, Baker, Chang and Ho (2020) posited that investors facing policy uncertainty often collect private information and contemplate the decisions made by management before trading. These investors will also value firms that pay dividends more highly than those that do not, the argument being that dividend payers signal earnings quality.

Using data from companies listed on the New York Stock Exchange (NYSE), Amex and Nasdaq over the period 1986 to 2017, Baker et al. (2020) confirm that managers indeed increased dividends when uncertainty surrounding government policies was high. Investors also responded more favourably towards dividend payers than their counterparts who retained earnings. Managers' signalling efforts during periods of policy uncertainty were particularly

2.The G-7 countries include the US, the UK, Canada, France, Italy, Germany and Japan.

3.The G-12 countries include the UK, the US, Australia, Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Spain and Switzerland.

evident among better performing firms in the sample. Baker et al. (2020) measured policy-related economic uncertainty from newspaper articles, tax code provisions and forecasters' surveys. It should be noted that their study measured policy uncertainty in countries with strong institutions and financial systems. Their findings might have been different in other contexts.

Rising economic activity, inflation and interest rates most likely contributed to many companies retaining more earnings in 2020 and 2021 compared to pre-pandemic levels. Several scholars noticed that companies retain earnings in an inflationary environment to maintain their asset base (Lotto & McMillan 2020) and that they re-invest corporate profits, instead of paying dividends, when gross domestic product (GDP) levels are high (Bozos et al. 2011; Lotto & McMillan 2020; Vo & Mazur 2023).

Culture also shapes dividend payout policies and practices (Fidrmuc & Jacob 2010; Zheng & Ashraf 2014). Culture provides a subjective perspective of management and investors' perceptions on the agency problems associated with dividend distributions (Shao et al. 2010). Culture is commonly defined as a set of shared values, norms and beliefs that are deeply embedded (Hofstede Insights 2023a). Culture furthermore distinguishes one group of individuals from another. Hofstede's model of cultural dimensions includes uncertainty avoidance, long-term orientation and indulgence as components of national culture (Hofstede Insights 2023a).

Uncertainty avoidance captures the degree to which individuals of a specific society are comfortable with uncertainty and the unknown (Hofstede Insights 2023b). Stated differently: do members of a society try to control the future, or do they just let it happen? Countries with a high uncertainty avoidance score believe and behave in a strict or regimented manner. Decision makers also tend to avoid unconventional ways of thinking and behaving. In contrast, societies with low uncertainty avoidance scores maintain a more relaxed attitude to ambiguity. Fidrmuc and Jacob (2010) contend that there may be two viewpoints on the association between uncertainty avoidance and dividend payouts.

On the one hand, low cash dividends may be regarded as representing investments in uncertain future profits and are, therefore, regarded as risky – supporting higher dividend payouts in high uncertainty avoidance cultures, in line with the bird-in-hand theory. Shao et al. (2010) found empirical evidence substantiating this view across 21 countries from 1995 to 2007. On the other hand, lower dividend payouts are perceived as certainty because it is easier to meet the level every year – therefore, supporting lower dividend payouts in high uncertainty avoidance cultures. Ramirez and Tadesse (2009) show that, in crises, companies in countries with high levels of uncertainty avoidance hold more cash to hedge against adverse events. Cross-country studies generally report a significant negative association between dividend payouts and uncertainty avoidance (Bae et al. 2012; Fidrmuc & Jacob 2010; Khambata & Liu 2005; Ramirez & Tadesse 2009; Zheng & Ashraf 2014). Bae et al. (2012:3) attributed the significant inverse relationship between uncertainty avoidance and dividend levels in their cross-country study by referring to the agency theory. They state: 'when managers' and investors' desires collide in the face of an uncertain future, managers' perspectives tend to dominate'. One of these perspectives include retaining cash to deal with adversity.

Long-term orientation refers to the degree in which a culture views the future, by delaying gratification to achieve long-term goals (Chun et al. 2021). High levels of long-term orientation are associated with lower dividend payouts (Bae et al. 2012; Khambata & Liu 2005; Zheng & Ashraf 2014). At national level, a high long-term orientation has been shown to be positively associated infrastructure (patient) investments in a country (Lin & Wang 2017). Indulgence stands in contrast to restraint (Hofstede Insights 2023a). A society that exhibits indulgence does not suppress gratification by way of strict social norms but allows gratification and having fun (Hofstede Insights 2023a).

Although Alipour and Yaprak (2022) did not specifically investigate the decision to retain earnings, they did notice that a high level of indulgence is positively related to corporate risk-taking behaviour, especially in the presence of abundant slack resources and growth opportunities. Khiar and Kooli (2023) also found that firms operating in societies with high levels of uncertainty avoidance and indulgence return more cash to shareholder than their counterparts in low uncertainty avoidance and indulgence countries. They attribute these findings to manager's efforts to maintain shareholders and investors' confidence.

Some dividend scholars have reported a moderating effect of cultural dimensions on dividend payments. In Chen et al.'s (2015) multicountry study, corporate cash holdings were, for example, negatively associated with individualism and positively related to uncertainty avoidance. Individualism and uncertainty avoidance strongly influenced the precautionary motive for holding cash. Per definition, this motive features prominently during crisis periods (Lozano & Yaman 2020). Chen et al. (2015) collected data from 41 countries from 1989 to 2009. This period included the Wall Street crash in 1989 and the global financial crisis. These authors controlled for country-level governance factors such as investor protection, shareholders rights and legal origin.

Research design

The study was based on a positivistic paradigm in which the world is viewed objectively, detached from the researchers' values and beliefs. Deductive reasoning was consequently applied. A quantitative research design was adopted to construct and analyse an unbalanced panel dataset. In the following section, details are provided on the population and sample.

TABLE 1: An overview of the sample.

World Bank classification	Number of countries	% of sample	COVID-19 deaths recorded per mil on 31 December 2021
Region†			
Europe and Central Asia	33	53.23	66.71
East Asia and Pacific	12	19.35	2.96
Latin America and the Caribbean	7	11.29	20.75
Middle East and North Africa	5	8.06	2.80
North America	2	3.23	3.63
Sub-Saharan Africa	2	3.23	2.76
South Asia	1	1.61	0.38
Total	62	100.00	100.00
Income group‡			
High	43	69.35	64.98
Upper-middle	17	27.42	34.14
Lower-middle	2	3.23	0.88
Total	62	100.00	100.00

Source: World Health Organization, 2023, *WHO Covid-19 detailed surveillance data dashboard*, viewed 06 January 2023, from https://app.powerbi.com/view?r=eyJrIjoiYWRiZWVkNWUtNmM0Ni00MDAwLTljYWMtN2EwNTM3YjQzYmRmIiwidCI6ImY2MTBjMGI3LWJkMjQtNGIzOS04MTBiLTNkYzI4MGFmYjU5MCIsImMiOjh9

COVID-19, coronavirus disease 2019.

†, The World Bank (2023) uses the term 'country' interchangeably with 'economy'. They state that 'country' does not imply political independence, but rather refers to any territory for which authorities report separate social or economic statistics. Country borders or names do not necessarily reflect the World Bank Group's official position (The World Bank 2021); ‡, Countries were classified based on gross national income (GNI) per capita in 2021. The World Bank (2021) classifies countries each year on 01 July based on the estimate of their GNI per capita for the previous calendar year. Income groupings remain fixed for the entire World Bank fiscal year (i.e., until 01 July of the following year) even if GNI per capita estimates are revised in the meantime. Low-income countries in 2021 were those with a GNI per capital of $1045 or less, whereas lower-middle-income economies had a GNI per capita between $1046 and $4095. Upper-middle-income economies had a GNI per capita between $4096 and $12 695 and high income economies a GNI per capita of $12 695 or more.

Country selection

The population consisted of all countries that featured in the IMD World Competitive Rankings from 2019 to 2021. The 3-year period was chosen to encompass 1 year before, 1 year during and 1 year after the initial harsh effect of the COVID-19 pandemic[4]. The sample resembled the population, except for Mongolia, which was excluded owing to data limitations on the dependent variable (retention ratio). Apart from Botswana, that was added to the Rankings in 2021, all countries included in the sample were represented in each of the years of the research period (2019 to 2021). Appendix 1 includes details on the 62 countries included in the sample, the regions and income groups in which they operated during the research period. As illustrated in Table 1, most of the considered countries were based in two geographic regions, namely Europe and Central Asia (53.23%) and East Asia and Pacific (19.35%). Most were also classified as high income (69.35%) or upper-middle income (27.42%) countries. Only two lower-middle income countries were included in the study, namely India and the Philippines.

The highest number of COVID-19 deaths per million at the end of 2021 were recorded in two upper-middle income countries, namely Peru (within the Latin American and the Caribbean region) and Bulgaria (within the Europe and Central Asia region), followed by Hungary, Czech Republic and Croatia – all classified as high-income countries within the European and Central Asia region (WHO 2023). At the other end of the spectrum, three countries within the East Asia and Pacific region (China, classified as an upper-middle income country, and the high-income countries of New Zealand and Japan) reported the least number of reported COVID-19 deaths per million (WHO 2023).

Although only 7 of the 62 considered countries were in the Latin America and Caribbean region, one fifth of all COVID-19 deaths per million (20.75%) were recorded in this region. The number of recorded deaths also seems disproportionate for the upper-middle income group – which resembles about a quarter (27.42%) of the countries sampled, but about a third (34.14%) of the reported COVID-19 deaths. This situation might be because of several factors, one of which could be that recordkeeping of new infections and deaths in upper-middle income countries was better than in the other two income groups. It could also be owing to vaccines only becoming available later to citizens in these two income groups when compared to high-income countries.

Company selection

All companies listed on the main security exchange of the 62 countries within the study sample were included in the dataset, if they had retention ratio data in any of the 3 years of the research period. The total number of domestic publicly listed companies in a country was sourced from the World Federation of Exchange as at 31 December of the respective years. To avoid double counting, only one ticker per company was used. Where companies had different classes of common stock (to reflect different rights), only A-class shares were selected for inclusion in the dataset. All listed preferences shares were excluded from the analysis. For the US, the NYSE was selected to represent the security exchange and only the largest 25% of companies listed on this exchange were considered to avoid single-country bias in the dataset.

As the focus in this study was on macro-level factors, no American Depositary Receipts (ADRs) were considered. An ADR is a stock that trades on a US exchange but represents shares in a foreign company. In some countries, banks were not allowed to distribute dividends in 2020 given high levels of uncertainty. Matyunina and Ongena (2022) contend that dividend bans in the European Union (EU) caused a surge in regulatory uncertainty which 'undermined banks' market valuation[s]' which in turn raised expected funding costs. In most cases, banks resumed dividend payments in 2021. Banks were not excluded from this study, as other industry effects also occurred during the research period. Governments, for example, provided financial support to companies in specified industries to help them survive the impact of lockdowns and other measures were introduced to curb the spread of the pandemic. Examples include the restaurant industry (Song, Yeon & Lee 2020).

4.The authors acknowledge that some impacts of the COVID-19 pandemic might have affected 2021 financial values because of differing financial year-ends.

The final sample consisted of 41 695 firm-year observations.

Data collection: Dependent variable

Retention ratios for the 3 years under investigation were collected from the Bloomberg database. This ratio, which is also called a plowback ratio, is computed as follows:

Retention ratio (%) = 100 – Dividend payout ratio (1)

Where:

Dividend payout ratio = [(Cash ordinary dividends) / (Net income – minority interest – cash preference dividends)] * 100.

Net income after minority interest and preference dividends is generally referred to as profit attributable to ordinary shareholders or distributable earnings. The retention ratio therefore reflects the portion of the distributable earnings that was not paid out as cash ordinary dividends during a reporting period. The cash dividends applied in the retention ratio for a specific reporting period reflects the dividends paid during that reporting period, irrespective of the reporting period it relates to. Final dividends are typically declared and paid after year-end and will, therefore, be included in the calculation of the retention ratio of the subsequent reporting period.

A retention ratio of zero implies that management paid all distributable earnings as cash ordinary dividends in a year, whereas a ratio of 100% implies that none of the company's distributable earnings were paid as cash ordinary dividends in the year under review. Care was taken to ensure that the number of retention ratios downloaded from Bloomberg per year did not exceed the total number of *domestic* publicly listed companies in a country in the same year. Bloomberg shows no values for cases where the calculated retention ratio was either negative (which happens when earnings are negative) or where it exceeded 100%.

Data collection: Independent variables

Data on the first four macro-level indicators were downloaded from the IMD website for all the considered countries from 2019 to 2021 (IMD World Competitiveness Center 2023a). These variables included Government efficiency, Business efficiency, Infrastructure and Economic performance. The IMD is an independent academic institution that has been compiling World Competitiveness Rankings for more than 30 years. They collate data on a wide range of indicators from international, national and regional sources, business communities, government agencies and academics (IMD World Competitiveness Center 2023b). The lower a country's ranking, the better it scored on a particular competitiveness category each year.

Government efficiency considers data related to a country's public finance, tax policy, institutional framework (including investor protection), business legislation and societal framework. *Business efficiency* evaluates macro-level factors such as the composition of a country's labour market, workforce productivity, the size and development of financial markets, the entrepreneurial orientation of the country's citizens and national culture. *Infrastructure* is also a composite ranking based on five measures, namely basic infrastructure, technological infrastructure, scientific infrastructure, health and environment, and education. *Economic performance* considers a country's domestic economy, international trade, international investment, employment and prices. Considering the manner in which the IMD ranks countries, Table 2 provides the hypotheses in respect of the IMD variables that have been formulated and tested in this study.

The three cultural dimensions relevant to this study, namely *Uncertainty avoidance*, *Long-term orientation* and *Indulgence*

TABLE 2: Hypotheses developed in respect of International Institute for Management Development rankings.

Hypothesis		Interpretation
H_1:	The Government efficiency variable is *positively* related to earnings retention.	A low IMD score for *Government efficiency* implies strong institutions and policy certainty. Therefore, companies in countries with higher Government efficiency scores are less likely to distribute dividends (therefore, more likely to retain earnings).
H_2:	The Business efficiency variable is *positively* associated with earnings retention.	A low IMD score for *Business efficiency* points to a productive and innovative nation with well-functioning labour, and financial markets. Therefore, companies in countries with higher Business efficiency scores are less likely to distribute dividends (and, therefore, more likely to retain earnings).
H_3:	The Infrastructure variable is *negatively* related to earnings retention.	A low IMD score for *Infrastructure* suggests that a country values and makes investments in basic, technological, scientific, health, environmental, and education infrastructure. Therefore, companies in countries with high Infrastructure scores are more likely to distribute dividends (and, therefore, less likely to retain earnings).
H_4:	The Economic performance variable is *negatively* associated with earnings retention.	A low IMD score for *Economic performance* indicates a strong domestic economy, international trade, international investment, employment levels, and prices. Therefore, companies in countries with high Economic performance scores are less likely to distribute dividends (and, therefore, more likely to retain earnings).

IMD, International Institute for Management Development.

TABLE 3: Hypotheses developed in respect of cultural dimensions.

Hypothesis		Interpretation
H_5:	Uncertainty avoidance is *positively* related to earnings retention.	A high Hofstede score for *uncertainty avoidance* implies that companies retain more cash to hedge against adverse events.
H_6:	Long-term orientation is *positively* associated with earnings retention.	A high Hofstede score for *Long-term orientation* suggests that companies tend to retain earnings to achieve long-term goals.
H_7:	Indulgence is *negatively* related to earnings retention.	A high Hofstede score for *Indulgence* points to a society that values current consumption and gratification. Companies in such countries tend to pay higher dividends and thus retain less earnings.

were all computed by Hofstede Insights (2023a). Scores for each dimension range from 0 to 100. The higher the score, the higher is the presence of the relevant cultural dimension among the members of a particular society. As cultural dimensions remain relatively stable over time (Beugelsdijk, Maseland & Van Hoorn 2013), the same scores were used for all 3 years under investigation. Data on Hofstede scores for four countries were unavailable. Case-wise deletion was applied to missing values within the unbalanced panel dataset. Table 3 provides the hypotheses in respect of cultural dimensions that were empirically tested in this study.

Data analysis

Outliers were winsorized before descriptive and inferential statistics were computed. One-way mixed-model analysis of variance (ANOVA) and Fisher's least significant difference (LSD) tests were used to determine significant differences over time. Analysis of variances were furthermore used to examine differences in the average retention ratios of countries based on their region and World Bank income group classification. A mixed-model regression was used to identify significant relationships between the dependent (retention ratio) and seven independent (government efficiency, business efficiency, infrastructure, economic performance, uncertainty avoidance, long-term orientation and indulgence) variables over the research period (2019 to 2021). In the mixed-models, year and all other predictors were included as fixed effects and country was added to the model as a random effect. A first-order (AR(1)) autoregression correlation structure was added to the model to address the timeseries component of the collected panel data. In fitting the mixed-model regression, the R package 'lmerTest' (version 3.1-3) was applied.

A mixed-model approach was deemed appropriate owing to the longitudinal nature of the data, where there is a possible dependency in the data. Specifically, the short nature of the timeseries of the data (only 3 years) and the fact that the repeated measures on countries are not independent from each other, supported the decision to apply a mixed-model approach and incorporate the AR(1) autoregression structure.

Owing to the Bloomberg methodology of applying cash dividends in the calculation of the retention ratio, it is expected that the effect of the pandemic on retention ratios will be more pronounced in 2021 than in the 2020 COVID-19 year. A significant increase in retention ratios is therefore expected in 2021, owing to the lower levels of final dividends relating to the 2020 COVID-19 year being paid after year-end and the strengthening of earnings in 2021. Three separate multiple regressions were also run to identify significant relationships in 2019, 2020 and 2021, respectively. Multicollinearity was evaluated by calculating variance inflation factors (VIFs). All VIFs were acceptable (less than 10).

Ethical considerations

Ethical approval to conduct this study was obtained from the Stellenbosch University Research Ethics Committee: Social, Behavioural and Education Research (REC: SBE). (No. ONB-2023-28701).

Results and discussion

Retention ratios

The average retention ratio for all companies included in the sample increased from 70.13% in 2019 to 72.89% and 73.69% in 2020 and 2021, respectively. Although not reported separately within the reported results, the increase from 2019 to 2021 was found to be statistically significant ($F(2,41644) = 59.96$, $p \leq 0.01$). The percentage of companies that retained all of their earnings, that is companies that had retention ratios of 100%, increased from 24.88% in 2019 to 28.19% in 2021. These findings are in line with evidence of reduced dividend payouts observed during the global financial crisis of 2007/2008 (Hauser 2013; Kilincarslan 2021; Nguyen & Tran 2016) and other studies on the COVID-19 pandemic (notably Ntantamis & Zhou 2022). The trend in the average retention ratio over time within the different regions (Table 4) shows that all regions, except for the Latin America and Caribbean region in 2020, showed an increase in the average retention rate in 2020 and 2021.

In line with expectation, retention ratios in all regions increased when comparing the year 2021 with 2019 (Table 4).

TABLE 4: Descriptive statistics: Retention ratios (%) across regions and income groups.

World Bank classification	Entire research period (2019 to 2021)			2019	2020	2021
	n	Mean	SD			
World Bank region						
East Asia and Pacific	19 787	69.40	27.96	67.60	68.71	69.12
Europe and Central Asia	11 691	73.68	29.46	71.76	77.54	77.50
Latin America and the Caribbean	1223	70.42	28.12	71.40	68.65	74.64
Middle East and North Africa	1440	69.93	31.32	61.48	69.73	70.04
North America	3738	73.21	27.11	71.13	72.70	74.16
South Asia	3504	85.57	19.30	84.10	85.91	86.53
Sub-Saharan Africa	312	55.91	28.61	55.11	56.00	62.81
World Bank income group						
High	25 769	69.75	29.34	69.00	72.04	72.90
Lower-middle	3996	85.15	20.03	82.48	84.16	84.93
Upper-middle	11 930	73.31	26.80	73.16	75.29	75.28

SD, standard deviation.

These changes were significant for all regions except for the Latin America and Caribbean region (Appendix 2). Several statistically significant differences were found between regions over time (Appendix 2). Some of these differences might relate to varying regulations as was evidenced by Kaźmierska-Jóźwiak, Wesson and Steenkamp (2022) or other macro-level factors. It is also evident from Table 4 that, on average companies within the South Asia region, represented only by India, retained the most earnings (85.57%) over the combined period, whereas sub-Saharan Africa, represented by South Africa and Botswana, retained the least (55.75%). The largest increase in earnings retention over time occurred in the two sub-Saharan African countries (13.97%) followed by those in the Middle East and North African region (13.93%).

Based on the World Bank income group classification, the lower-middle income group, represented by India and Philippines, retained the most earnings on average (85.15%) over the total period. This finding corresponds with Agrawal (2021) who also noticed considerable reductions in payouts and omissions by Indian companies in 2020 and 2021 vis-à-vis the preceding years. There is, however, no significant difference between the retention ratios of the different income groupings within a specific year (Appendix 3). Although the average retention ratios for the high income and higher-middle income groups increased significantly in 2020 and 2021, the average retention ratios for the lower-middle income group did not change significantly over the research period (Appendix 3). The non-significant increase in average retention ratios for the lower-middle income group may be attributed to the fact that this category (represented by India and Philippines) comprised a limited number of observations when compared to the other two categories.

Macroeconomic factors

The descriptive statistics on the IMD World Competitiveness Rankings show that all the top performers across all 3 years were high-income countries, represented by the East Asia and Pacific; North America; Europe and Central Asia, and Middle East and North Africa regions (Table 5). The worst performance across all IMD World Competitiveness Rankings, except for the Business performance category, were from two upper-middle income countries (Venezuela and Argentina) within the Latin America and Caribbean region. In respect of the business performance ranking, Croatia (classified as a high income category within the Europe and Central Asia region) was the worst performer. When compared to the study sample (Table 1), the European and Central Asia region – which represents the largest portion of the sample and COVID-19 deaths per million – features within the best performing categories based on the IMD World Competitiveness Rankings in 2020 and 2021 but is also represented as a worst performer in respect of business performance in all periods (Table 5).

The Latin America and Caribbean region, which showed disproportioned COVID-19 deaths reported when compared to sample size (Table 1), is the worst performer on all IMD World Competitiveness Rankings for all periods except for the business performance ranking. This region has a long history of public sector corruption, social controversies and environmental damage because of the growth of extractive industries such as mining and forestry (Neshkova & Kalesnikaite 2019; Rodrigo, Duran & Arenas 2016).

The cultural variables obtained from Hofstede Insights (2023a) (see Appendix 1), showed that Singaporeans (representing the East Asia and Pacific region within the high-income category) can tolerate the most uncertainty, whereas Greeks (representing the Europe and Central Asia region within the high income category) prefer to avoid the unknown. The Republic of Korea (South Korea) and Colombia (representing the Latin America and Caribbean region within the upper-middle income category) had the highest and lowest scores for long-term orientation, respectively. Given its communist history, it comes as no surprise that Latvia (representing the Europe and Central Asia region within the high-income category) had the lowest indulgence score, whereas Venezuela (representing the Latin America and Caribbean region within the upper-middle income category) had the highest indulgence score.

The differences in the macroeconomic features between countries within the same region and income category may affect the results of the subsequent analyses based on region

TABLE 5: Best and worst performing countries (regions; income groups) in the International Institute for Management Development World Competitiveness Rankings.

Year	Government efficiency		Business performance		Infrastructure		Economic performance	
	Best	Worst	Best	Worst	Best	Worst	Best	Worst
2019	Hong Kong SAR (East Asia and Pacific; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)	United Arab Emirates (Middle East and North Africa; high-income)	Croatia (Europe and Central Asia; high-income)	US (North America; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)	US (North America; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)
2020	Hong Kong SAR (East Asia and Pacific; high-income)	Argentina (Latin America and the Caribbean; Upper-middle)	Denmark (Europe and Central Asia; high-income)	Croatia (Europe and Central Asia; high-income)	Sweden (Europe and Central Asia; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)	Netherlands (Europe and Central Asia; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)
2021	Hong Kong SAR (East Asia and Pacific; high-income)	Argentina (Latin America and the Caribbean; Upper-middle)	Denmark (Europe and Central Asia; high-income)	Croatia (Europe and Central Asia; high-income)	Switzerland (Europe and Central Asia; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)	Singapore (East Asia and Pacific; high-income)	Venezuela (Latin America and the Caribbean; Upper-middle)

Source: IMD World Competitiveness Center, 2023a, *World competitiveness ranking*, viewed 20 March 2023, from https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/

US, Unites States.

and income groupings. For the Latin America and Caribbean region (within the upper-middle income grouping), there is a tension between the consistent poor performance on the competitiveness rankings (which is expected to increase retention ratios) and the observed levels of the cultural dimensions of long-term orientation and indulgence (which is expected to decrease retention ratios). The fact that this region was disproportionately worse affected by COVID-19 may therefore have inclined companies to base their dividend payout decisions on the cultural dimensions (by increasing dividend payouts, therefore decreasing retention ratios) amid the policy and economic uncertainty posed by the pandemic.

Inferential statistics

Table 4 shows the results of inferential statistics of the relationship between macroeconomic factors and retention ratios over the total period (2019 to 2021), as well as separately for each of the 3 years. Analysis per region and country were not performed owing to low observations from certain regions and income categories. When considering the entire research period (2019 to 2021), only one significant relationship was uncovered (Panel A in Table 6). In line with expectations (H_7), companies listed in countries with high levels of *Indulgence* generally had lower retention ratios. Stated differently, managers in countries where there is a strong focus on enjoying life and having fun distributed more cash to shareholders (i.e., they had low retention ratios) compared to managers in countries where investors value restraint. When examining the results per year (Panel B in Table 6), *Indulgence* also had a significant negative relationship with earnings retention in 2021. H_7 could thus be supported.

As *Uncertainty avoidance* had a significant negative relationship with earnings retention in 2021, H_5 could not be supported. This hypothesis suggested that retained earnings would have been high (and dividends low) in countries with high uncertainty avoidance scores. The empirical evidence shows the opposite. The unprecedented levels of uncertainty brought about by the COVID-19 pandemic might have enhanced information-signalling efforts by companies to smooth dividend payments and restore market confidence. It also supports the bird-in-the-hand theory by way of a cash dividend in times of uncertainty. Shao et al. (2010) reported a similar result when studying 21 countries over the 1995 to 2007 period.

Although there was no significant relationship between *Government efficiency* and earnings retention over the full period, the direction of the association was as expected (positive) in each of the 3 years under investigation. The nature of the observed relationships between earnings retention and *Business efficiency*, *Infrastructure*, *Economic performance* and *Long-term orientation* were also mostly as anticipated. None of these associations were statistically significant either. Government interventions, such as financial support for businesses and households and free vaccinations, may have affected the reported results (Ntantamis & Zhou 2022). The hypotheses formulated for this study were based on corporate actions during previous crises, notably the global financial crisis. As pointed out in the introduction, the COVID-19 pandemic was in a league of its own (Szczygielski et al. 2022). Whereas the bursting of the dot.com bubble in 2000 mainly affected shareholders in the technology, media and telecommunication industries (Hendershott 2004; Ljungqvist & Wilhelm 2003), the impact of COVID-19 was felt across all economic sectors and industries. Scholars also show that the global financial crisis primarily influenced banks and other financial companies (Bozos et al. 2011; Floyd et al. 2015; Forti & Schiozer 2015).

Conclusion

A review of the literature identified a paucity of research on the impact of macro-level factors on the dividend distribution decision. The authors thus investigated the association between earnings retention (the opposite of distributions) and seven macro-level factors in 62 countries from 2019 to 2021. The empirical evidence provides some

TABLE 6: Regression results (dependent variable: retention ratio).

Variable	Panel A					Panel B											
	Fixed effects regression over the entire research period (2019 to 2021)†					2019‡				2020§				2021¶			
	Value	SE	*df*	*t*	*p*	Beta	SE	*t*	*p*	Beta	SE	*t*	*p*	Beta	SE	*t*	*p*
Intercept	78.637	7.821	110	10.054	0.000	76.883	9.402	8.178	0.000	75.193	8.929	8.421	0.000	83.368	7.862	10.603	0.000
Government efficiency	0.164	0.109	110	1.503	0.136	0.151	0.186	0.809	0.423	0.260	0.169	1.538	0.130	0.157	0.145	1.080	0.285
Business efficiency	0.145	0.107	110	1.362	0.176	0.255	0.223	1.144	0.258	0.028	0.200	0.140	0.889	0.205	0.173	1.188	0.240
Infrastructure	-0.047	0.099	110	-0.472	0.638	-0.034	0.126	-0.274	0.785	-0.055	0.135	-0.411	0.683	-0.142	0.127	-1.119	0.268
Economic performance	-0.001	0.058	110	-0.015	0.988	0.031	0.116	0.265	0.792	0.064	0.109	0.584	0.562	0.177	0.108	1.630	0.109
Uncertain avoidance	-0.105	0.067	54	-1.564	0.124	-0.172	0.088	-1.963	0.055	-0.086	0.082	-1.048	0.300	-0.176**	0.071	-2.475	0.017
Long-term orientation	-0.040	0.068	54	-0.587	0.560	-0.020	0.081	-0.245	0.807	0.014	0.078	0.174	0.863	-0.014	0.071	-0.192	0.849
Indulgence	-0.167	0.070**	54	-2.385	0.021	-0.153	0.082	-1.865	0.068	-0.125	0.079	-1.586	0.119	-0.193***	0.069	-2.796	0.007

SE, standard error; *df*, degrees of freedom.

, significant at the 5% level; *, significant at the 1% level; †, Durbin–Watson = 2.32; Marginal R^2 (variance explained by fixed effects) = 0.24; Conditional R^2 (variance explained by entire model) = 0.82.; ‡, N = 58; Durbin–Watson = 2.15; R^2 = 0.288; df = 7; F = 2882 391; P = 0.013; §, N = 58; Durbin–Watson = 2.17; R^2 = 0.230; df = 7; F = 2,139061; P = 0.056.; ¶, N = 58; Durbin–Watson = 1.92; R^2 = 0.389; df = 7; F = 455 107; P = 0.000.

support for 'clamming' behaviour among listed companies as the average retention ratio increased significantly from 70.13% in 2019 to 73.69% in 2021. The percentage of companies that retained all their earnings also rose over this period. Contrary to expectation, a significant negative relationship existed between uncertainty avoidance and earnings retention (H_5). This counterintuitive finding might be explained by the nature of the COVID-19 pandemic in that most industries were negatively affected, which in turn prompted substantial government interventions in 2020 and 2021. Companies that received financial and other government support might thus have opted to distribute earnings rather than retain it. In doing so, companies could send positive signs to the market.

The hypothesis that less earnings are retained in countries with high indulgence scores (H_7) was also supported over the research period. This result is in line with agency and bird-in-the hand theories, which purport that managers try to mitigate agency problems and maintain shareholders' confidence in them through their distribution decisions (Khiar & Kooli 2023; Shao et al. 2010). The findings show that companies should not ignore cultural factors when making distribution decisions amid an economic crisis. This study's results contribute to growing empirical evidence on culture being an important factor for a wide range of capital market behaviours. Specific attention should be paid to the cultural dimensions of uncertainty avoidance and indulgence. These dimensions not only have an impact on the views of decision makers within companies, but also shape shareholders' expectations regarding distributions. Shareholders' views on enjoying life (i.e., indulgence) and preparing for uncertainty seemingly influence their preferences for cash dividends relative to future capital gains.

A greater awareness of cultural differences is particularly important for multinational companies operating across diverse regions. Greater insight could translate into more considered dividend policies and communication with shareholders in diverse regions. The empirical evidence further highlights the important role that policy makers can play in containing the adverse consequences of an economic crisis. Efforts by governments to support the private sector in 2020 and 2021 enabled many companies to survive and even pay dividends during very challenging times. In doing so, governments indirectly supported economic performance and recovery – an important lesson for future crises. Shareholders who favour dividends over retention-generated gains should notice that there are significant differences in retention behaviour among companies based on region and income group. They should also be mindful of signalling behaviour during economic crises.

The study has a few limitations, firstly being that it only included data from countries that featured in the IMD World Competitiveness Rankings over the research period. Only two sub-Saharan African countries, South Africa and Botswana, were thus included. Future researchers could extend their studies to countries from this region, such as Kenya and Nigeria, given that they are experiencing strong economic growth (International Monetary Fund 2022). Secondly, attention could also be given to trends in share repurchases, the impact of changing dividend tax regimes, and company-specific control variables. Thirdly, scholars such as Chun et al. (2021) argue that Hofstede's cultural dimensions do in fact change over time. As such, other proxies for these measures could be considered. Despite these limitations, the findings still make a valuable contribution to understanding the macro-level factors that shape the earnings retention decision during an economic crisis, particularly uncertainty avoidance and indulgence.

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Authors' contributions

S.V. conceptualised the article, collected the raw data and wrote some sections. N.W. wrote large sections of the article.

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Data availability

The data that support the findings of this study are available on request from the corresponding author, S.V.

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Appendix 1

TABLE 1-A1: Countries included in the statistical analysis.

Country	World Bank region	World Bank income category	Uncertain avoidance	Indulgence	Long-term orientation
Argentina	Latin America and the Caribbean	Upper-middle	86	62	20
Australia	East Asia and Pacific	High	51	71	21
Austria	Europe and Central Asia	High	70	63	60
Belgium	Europe and Central Asia	High	94	57	82
Botswana	Sub-Saharan Africa	Upper-middle	-	-	-
Brazil	Latin America and the Caribbean	Upper-middle	76	59	44
Bulgaria	Europe and Central Asia	Upper-middle	85	16	69
Canada	North America	High	48	68	36
Chile	Latin America and the Caribbean	High	86	68	31
China	East Asia and Pacific	Upper-middle	30	24	87
Colombia	Latin America and the Caribbean	Upper-middle	80	83	13
Croatia	Europe and Central Asia	High	80	33	58
Cyprus	Europe and Central Asia	High	59	-	-
Czech Republic	Europe and Central Asia	High	74	29	70
Denmark	Europe and Central Asia	High	23	70	35
Estonia	Europe and Central Asia	High	60	16	82
Finland	Europe and Central Asia	High	59	57	38
France	Europe and Central Asia	High	86	48	63
Germany	Europe and Central Asia	High	65	40	83
Greece	Europe and Central Asia	High	100	50	45
Hong Kong SAR	East Asia and Pacific	High	29	17	61
Hungary	Europe and Central Asia	High	82	31	58
Iceland	Europe and Central Asia	High	50	67	28
India	South Asia	Lower-middle	40	26	51
Indonesia	East Asia and Pacific	Upper-middle	48	38	62
Ireland	Europe and Central Asia	High	35	65	24
Israel	Middle East and North Africa	High	81	-	38
Italy	Europe and Central Asia	High	75	30	61
Japan	East Asia and Pacific	High	92	42	88
Jordan	Middle East and North Africa	Upper-middle	65	43	16
Kazakhstan	Europe and Central Asia	Upper-middle	88	22	85
Latvia	Europe and Central Asia	High	63	13	69
Lithuania	Europe and Central Asia	High	65	16	82
Luxembourg	Europe and Central Asia	High	70	56	64
Malaysia	East Asia and Pacific	Upper-middle	36	57	41
Mexico	Latin America and the Caribbean	Upper-middle	82	97	24
Netherlands	Europe and Central Asia	High	53	68	67
New Zealand	East Asia and Pacific	High	49	75	33
Norway	Europe and Central Asia	High	50	55	35
Peru	Latin America and the Caribbean	Upper-middle	87	46	25
Philippines	East Asia and Pacific	Lower-middle	44	42	27
Poland	Europe and Central Asia	High	93	29	38
Portugal	Europe and Central Asia	High	99	33	28
Qatar	Middle East and North Africa	High	80	-	-
Republic of Korea (South Korea)	East Asia and Pacific	High	85	29	100
Romania	Europe and Central Asia	High	90	20	52
Russia	Europe and Central Asia	Upper-middle	95	20	81
Saudi Arabia	Middle East and North Africa	High	64	14	27
Singapore	East Asia and Pacific	High	8	46	72
Slovak Republic	Europe and Central Asia	High	51	28	77
Slovenia	Europe and Central Asia	High	88	48	49
South Africa	Sub-Saharan Africa	Upper-middle	49	63	34
Spain	Europe and Central Asia	High	86	44	48
Sweden	Europe and Central Asia	High	29	78	53
Switzerland	Europe and Central Asia	High	58	66	74
Taiwan	East Asia and Pacific	High	69	49	93
Thailand	East Asia and Pacific	Upper-middle	64	45	32

Table 1-A1 continued on the next page →

TABLE 1-A1 (Continues...): Countries included in the statistical analysis.

Country	World Bank region	World Bank income category	Uncertain avoidance	Indulgence	Long-term orientation
Turkey	Europe and Central Asia	Upper-middle	85	49	46
United Arab Emirates	Middle East and North Africa	High	66	22	22
United Kingdom	Europe and Central Asia	High	35	69	51
United States	North America	High	26	68	26
Venezuela	Latin America and the Caribbean	Upper-middle	76	100	16

Source: IMD World Competitiveness Center, 2023a, *World competitiveness ranking*, viewed 20 March 2023, from https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/; The World Bank, 2021, *The world by income and region*, viewed 05 January 2023, from https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html; The World Bank, 2023, *World Bank country and lending groups*, viewed 05 January 2023, from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

TABLE 1-A2: Significance of relationships between mean retention ratios per region over time.

Region number	Year	Region	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	2019	East Asia and Pacific	-	0.220	0.447	0.259	0.641	0.109	0.143	0.015**	0.003***	0.832	0.694	0.501	0.076	0.177	0.001***	0.004***	0.155	0.652	0.387	0.066	0.562
2	2019	Europe and Central Asia	-	-	0.936	0.037**	0.931	0.220	0.043**	0.369	0.000***	0.484	0.680	0.897	0.160	0.058	0.436	0.000***	0.515	0.727	0.741	0.142	0.260
3	2019	Latin America and the Caribbean	-	-	-	0.107	0.974	0.236	0.071	0.590	0.171	0.149	0.785	0.873	0.176	0.090	0.648	0.174	0.086	0.825	0.734	0.158	0.327
4	2019	Middle East and North Africa	-	-	-	-	0.250	0.038**	0.491	0.182	0.001***	0.242	0.000***	0.181	0.025**	0.556	0.158	0.001***	0.031**	0.000***	0.131	0.022**	0.883
5	2019	North America	-	-	-	-	-	0.285	0.133	0.749	0.377	0.759	0.867	0.137	0.224	0.158	0.790	0.380	0.665	0.896	0.004***	0.205	0.426
6	2019	South Asia	-	-	-	-	-	-	0.023**	0.135	0.514	0.149	0.188	0.348	0.106	0.028**	0.146	0.512	0.376	0.198	0.413	0.026**	0.090
7	2019	Sub-Saharan Africa	-	-	-	-	-	-	-	0.111	0.006***	0.132	0.114	0.099	0.016**	0.806	0.101	0.007***	0.030**	0.107	0.074	0.014**	0.042**
8	2020	East Asia and Pacific	-	-	-	-	-	-	-	-	0.009***	0.990	0.851	0.599	0.095	0.139	0.375	0.010***	0.231	0.806	0.473	0.084	0.475
9	2020	Europe and Central Asia	-	-	-	-	-	-	-	-	-	0.046**	0.114	0.505	0.406	0.009***	0.013**	0.951	0.512	0.129	0.642	0.371	0.064
10	2020	Latin America and the Caribbean	-	-	-	-	-	-	-	-	-	-	0.860	0.618	0.107	0.163	0.925	0.047**	0.001***	0.821	0.497	0.095	0.504
11	2020	Middle East and North Africa	-	-	-	-	-	-	-	-	-	-	-	0.723	0.138	0.140	0.910	0.115	0.422	0.854	0.597	0.124	0.442
12	2020	North America	-	-	-	-	-	-	-	-	-	-	-	-	0.277	0.119	0.637	0.508	0.811	0.751	0.170	0.254	0.344
13	2020	South Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	0.019	0.103	0.404	0.292	0.146	0.333	0.562	0.066
14	2020	Sub-Saharan Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.127	0.010***	0.039**	0.132	0.090	0.017**	0.083
15	2021	East Asia and Pacific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.014**	0.265	0.865	0.506	0.091	0.445
16	2021	Europe and Central Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.517	0.131	0.645	0.370	0.065
17	2021	Latin America and the Caribbean	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.452	0.953	0.266	0.175
18	2021	Middle East and North Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.623	0.131	0.422
19	2021	North America	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.308	0.277
20	2021	South Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.059
21	2021	Sub-Saharan Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Mean retention ratio (%) are as follows: Group 1 = 67.595; Group 2 = 71.763; Group 3 = 71.404; Group 4 = 61.475; Group 5 = 71.134; Group 6 = 84.103; Group 7 = 55.109; Group 8 = 68.711; Group 9 = 77.537; Group = 10 68.650; Group = 11 69.728; Group 12 = 72.700; Group 13 = 85.906; Group 14 = 55.995; Group 15 = 69.117; Group 16 = 77.500; Group 17 = 74.638; Group 18 = 70.040; Group 19 = 74.162; Group 20 = 86.529; Group 21 = 62.806; **, significant at the 5% level; ***, significant at the 1% level.

Appendix 3

TABLE 1-A3: Significance of relationships between mean retention ratios per income group over time.

Group number	Year	Income group	1	2	3	4	5	6	7	8	9
1	2019	High	-	0.068	0.169	0.000***	0.040**	0.038**	0.000***	0.031**	0.038**
2	2019	Lower-middle	-	-	0.224	0.158	0.106	0.348	0.195	0.016**	0.347
3	2019	Upper-middle	-	-	-	0.711	0.151	0.000***	0.931	0.124	0.000***
4	2020	High	-	-	-	-	0.101	0.283	0.033**	0.081	0.283
5	2020	Lower-middle	-	-	-	-	-	0.246	0.128	0.447	0.246
6	2020	Upper-middle	-	-	-	-	-	-	0.430	0.208	0.990
7	2021	High	-	-	-	-	-	-	-	0.104	0.431
8	2021	Lower-middle	-	-	-	-	-	-	-	-	0.207
9	2021	Upper-middle	-	-	-	-	-	-	-	-	-

Note: Mean retention ratio (%) are as follows: Group 1 = 69.003; Group = 82.480; Group 3 = 73.163; Group 4 = 72.040; Group 5 = 84.162; Group 6 = 75.289; Group 7 = 72.903; Group 8 = 84.930; Group 9 = 75.282; **, significant at the 5% level; ***, significant at the 1% level.