WHITHER DIVERSIFICATION?

by

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ABSTRACT

Asset diversification has long been fundamental to investment risk mitigation. We compute new long-term country-specific indices of diversification potential for equity, sovereign debt, and real estate. Findings for the 1986-2021 study period indicate markedly declining or persistently dampened diversification potential for all asset classes. Declines in diversification potential for equities are especially pronounced among developed nations and coincide with higher levels of investment risk. Country-level panel analysis indicates that declines in diversification potential are associated with increases in the TED spread, country economic development, internet diffusion, political risk, and institutional ownership. Diversification potential increases with the Fed Funds Rate. Diversification potential waned temporarily among all asset classes during the 1992 ERM crisis and at the onset of the COVID-19 pandemic. Results are robust to measures of economic and financial market risk and to market liquidity. Findings offer a cautionary note regarding diversification of investment risk among asset classes and geographies in an increasingly connected and interdependent world.

Keywords: return integration, asset diversification, economic development

JEL Classification: G01, G10, G11, G12, G14, G15

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1. Introduction

Asset diversification is fundamental to risk mitigation. As early as 935 BC, the Book of Ecclesiastes advised to "divide your investments among many places, for you do not know what risks might lie ahead." Palmer (Moral Essays on Proverbs, 1710) similarly admonished "not to venture all your eggs in one basket". Contemporary strategies for investment diversification are commonplace. The California Public Employees Retirement System (CalPERS), like so many pension and advisory firms, seeks to diversify pension investments among stocks, bonds, and real estate to maximize returns at a prudent level of risk.[4] Yet, investment diversification opportunity may be limited or have waned over time in an increasingly interconnected and interdependent global economy. Diversification provides fewer benefits when returns across assets and geographies are highly integrated.[5] Limitations on diversification have major implications for investment strategies, fund composition, and macroeconomic and asset management.

Despite the overwhelming prevalence of asset diversification investment strategies, few studies have sought to investigate the implications of a more connected and integrated world for investment diversification and related risk mitigation. Nor have prior studies modelled how linkages across equity, sovereign debt, and real estate asset classes affect diversification opportunity. Studies typically have focused on explaining correlations in market trends in a single asset class such as equities or sovereign debt (see, for example, Bekaert, Hodrick, and Zhang (2009); Bekaert et al (2011); Bekaert and Harvey (2014); Carrieri et al. (2013); Christofersen et al (2012), and Chaib, Errunza and Brandon (2014)). Correlations are commonly related (inversely) to diversification. Further, international evidence on cross-country correlation is mixed; it is typically lower for emerging equity markets (Berger, Pukthuanthong and Yang, 2011; Eiling and Gerard, 2014; and Goetzmann, Li and Rouwenhorst, 2005). In contrast, relatively large and rising correlations have been found for tail return dependence

[4] Morningstar Investment Advisory Services advocates diversification to provide exposure across sectors and geographies to reduce portfolio risk.

[5] In the popular media, Friedman (2007) depicted a globalized marketplace where innovations in technology, extension of global supply chains, and accretions to household wealth made geographical divisions relevant.

(Christofferson, Errunza, Jacobs and Langlois, 2012; and You and Daigler, 2010). More generally, Roll (2013) has questioned the link between return correlation and investment diversification.

In this paper, we present new indexes of diversification potential within and across asset classes and countries, over the 1986-2021 period. Unlike much of the literature, we explicitly focus on diversification potential rather than correlation. We estimate asset return integration to compute the new diversification indexes. Further, we relate our new indexes to the risk of diversified global investment portfolios. We also uncover drivers of the diversification indexes and estimate the varying roles of macro-financial, economic development and country risk, technology diffusion, market liquidity and institutional ownership factors within and among assets classes, markets, and over time. We further assess how the COVID-19 pandemic affected asset return integration and related diversification opportunity. The new diversification indexes are relevant to a broad range of market participants, be they individual investors, pension fund managers, or institutional private equity firms. These indexes also provide useful information to policymakers about the asset class and geographic diffusion of macroeconomic or other shocks and policy. Such measures are vital to macroprudential policymakers that seek to mitigate risks associated with economic, public health, or financial crises.

Our study commences with estimation of return integration within and across asset classes and markets and over time. Our measure of integration is based on the proportion of asset returns that can be explained by an identical set of common factors (see Pukthuanthong-Le and Roll (2009)). The level of integration is indicated by the magnitude of R-square, with higher values representing higher levels of integration. Two assets are viewed as perfectly integrated if the same global factors fully explain asset returns in both markets. In that case, the R-square would be 1.0, implying no diversification potential between the assets. We employ a principal components methodology to estimate common factors in models of return integration within and among equity, sovereign debt, and real estate asset classes and countries. As discussed below, results are robust to changes in the number of principal components and to computation of principal components among or within asset classes.

We then compute new indexes of diversification potential [defined as 100 –the level of return integration (adjusted R-square)]. These indexes take on values between 0 and 100, where 0 indicates no diversification potential whereas 100 implies maximal diversification benefits. We compute diversification indexes for each of the asset classes within each market over time. We also examine diversification potential among cohorts of nations and across developed and emerging nations. We identify marked differences in diversification opportunity and related trends therein across and within asset classes and assess implications thereof for portfolio investment risk. We further illustrate shocks to diversification potential associated with the COVID-19 pandemic. Finally, we employ country panel data to identify factors associated with diversification potential.

Research findings reveal declining or already limited diversification opportunity over the 1986-2021 period both within and across asset classes and countries. In real estate, diversification opportunity trended down markedly over the study timeframe from an index level of 80 to that of roughly 60 (where 100 implies full diversification opportunity). A similar trending down in diversification opportunity was evidenced among global equity markets. Further, relatively low levels of diversification opportunity were evidenced throughout among developed nation equity markets. Diversification opportunity among issuers of sovereign debt was persistently dampened over the full study period to levels of roughly 35. The waning of diversification opportunity was especially pronounced during the decade of the 2000s and in the immediate wake of the Global Financial Crisis.

The most recent decade saw some recovery in diversification potential among those asset classes as well as marked swings therein during the COVID-19 pandemic. Some countries, however, notably including Middle Eastern and African nations, display ongoing weak integration with the global economy. While those areas may provide opportunity for portfolio diversification, they are often subject to substantial security, political, and economic risks along with higher transaction costs and lower liquidity. Overall, findings suggest the limits to diversification in an increasingly connected world.

We examine factors associated with trends in diversification potential. Using country panel regressions, we assess the role of macro-finance, development, and technology factors. Our model specification builds on established literature and includes factors shown to be important in prior studies of market integration, equity market segmentation, and asset return correlation (see, for example Carrieri et al (2007); Errunza et al (2007); Carrieri et al (2013); Christofersen (2012); Bekaert et al (2011); Chaib et al (2014); and Eiling and B. Gerard (2014)). We assess variation in factors associated with diversification potential across asset classes and over time.

In assessment of diversification opportunity, we evaluate the role of factors including risk-free yields, credit risk, market volatility, and investor sentiment as proxied by the Fed Funds Rate, TED spread, VIX, and the Baker and Wurgler (2006) investor sentiment index (SENT), respectively. Further, we include variables representing stage of economic development, internet diffusion, political, economic, and financial risk, market liquidity, and 1992-93 European Exchange Rate Mechanism (ERM) and 2010-2011 European sovereign debt crises. Country-specific measures of economic development are obtained from the World Bank and include government expenditure share on education, literacy rate, prevalence of ATMs, life expectancy at birth, internet users, cellular phone subscriptions, secondary school enrolment, gender parity index, maternal mortality rate, research and development expenditures as a share of GDP, and the like. Given high levels of simple correlation among the World Bank development indices, we also compute and utilise their first principal component, DEVPC1, which explains a very high proportion of the variation among these terms. Finally, the diversification panel analysis includes controls for institutional equity ownership as well as the COVID-19 pandemic.

Findings of the country-level panel analysis indicate that level of economic development, as proxied by the DEVPC1 principal component, is associated with sizable and significant declines in diversification potential among equity and real estate asset classes. Further, we substitute a measure of internet technology diffusion in place of the economic development term and find similar results for the equity and real estate asset classes. The estimated negative associations between diversification potential and stage of country economic development or internet diffusion are

pronounced among developed nations for all asset classes. Other events, including the 1992 ERM and the 2020-2021 period of the COVID-19 pandemic, were associated with immediate but short-lived declines in diversification opportunity, especially among developed equity markets. In contrast, the 2009-2010 Eurozone crisis was associated with dampened investment diversification potential in markets for sovereign debt, but significantly elevated opportunity to diversify in equities and real estate.

Also, diversification potential is dampened in equity and real estate markets in the wake of the rise in institutional trading. Further, equity market diversification is enhanced by market liquidity as measured in accordance with Lesmond, Ogden and Trcinka (1999). Among asset classes, diversification opportunity is significantly elevated with increases in sentiment and the Fed Funds Rate; in contrast, increases in credit risk as implied by the TED spread are associated with declines in diversification opportunity throughout. These findings are robust to the inclusion of various other factors including country-specific equity market implied volatility (VIX), and political, economic, and financial risk as computed from the International Country Risk Guide.

2. Indexes of Global Diversification

Below we discuss literature and methodological derivation of our diversification indexes. From there, we proceed to index estimation and analysis.

Literature and Methodological Approach

The starting point is estimation of asset return integration within and across countries and asset classes and over time. A review of existing literature suggests substantial variation in methods and geographic focus of related integration research. Much of the literature has focused on integration of returns among equity markets, rather than across asset classes. In that regard, the dynamics of equity market integration have been investigated by Harvey (1991), Chan, Karolyi, and Stulz (1992), Engle and Susmel (1993), Bekaert and Harvey (1995), Longin and Solnik (1995), Errunza, Hogan, and Hung (2007), Eun, Huang and Lai (2008), Eiling and Gerard (2014), and Akbari, Ng, and Solnik (2020,

2021). Baele et al (2009) and Baker and Wurgler (2012) examine correlations between bond and equity markets. Cotter, Gabriel, and Roll (2015) investigate integration of US housing market returns.

Papers have varied in geographic focus, as some address integration in the European community (see, for example, Hardouvelis, Malliaropoulos, and Priestley (2006), and Schotman and Zalewska (2006)), or in developed markets (Rangvid, Santa-Clara, and Schmeling (2016)), whereas others investigate emerging markets (see, for example, Bekaert and Harvey (1995), Chambet and Gibson (2008), Bekaert, Harvey, Lundblad and Siegel (2011)). Some employ the US as a benchmark market (Ammer and Mei (1995) and Karolyi and Stulz (1996)).

There is also considerable variation in methods. For instance, Carrieri, Errunza and Hogan (2007) use GARCH-in-mean to assess correlation in returns and volatility among markets, whereas Cappiello, Engle and Sheppard (2006) use GARCH models to report high correlation between international bond markets, as do Christoffersen, Errunza, Jacobs, and Xisong (2014) for equity markets. In examining correlation of international equity markets Longin and Solnik (1995) use cointegration techniques and Bekaert, Harvey and Ng (2005) use multiple economic fundamental factors. The link between correlation and risk is long standing (Solnik, Boucrelle, and Le Fur, 1996). Integration is often described in terms of cross-country correlations in stock returns (for an early study see King and Wadhwani (1990)); however, correlation may be a misleading measure.

Below we adopt the return integration measure proposed in Pukthuanthong-Le and Roll (2009). In that paper, the authors provide a simple intuitive measure of equity market integration based on the proportion of a country's returns that can be explained by an identical set of global factors. This measure of integration implicitly regards country-specific residual variance in a factor model as an indicator of imperfect integration.[6] Clearly, to the extent common global factors explain only a small

[6] When multiple factors drive returns, markets may be imperfectly correlated but perfectly integrated. As shown by Pukthuanthong and Roll (2009), while perfect integration implies that identical global factors fully explain index returns across countries, some countries may differ in their sensitivities to those factors and accordingly not exhibit perfect correlation. In the presence of multiple factors, the simple correlation between index returns could be a flawed measure of integration unless the estimated coefficient vectors from factor regressions are exactly proportional.

proportion of variance in a country's returns, the country would be viewed as less integrated (see, for example, Stulz (1981) and Errunza and Losq (1985)).[7] In contrast, markets would be viewed as highly integrated to the extent that their returns, as indicated by a high R-square, are well explained. We define our diversification index as 100 – level of integration (adjusted R-square in percent). Hence the index takes on values between 0 and 100, where the former indicates no diversification potential and the latter implies full potential. Further explication of our diversification measure is provided in Appendix 1. Diversification potential should be high to the extent asset returns are not well integrated. As suggested above, we estimate diversification potential over the long run both within and across alternative asset classes and across a broad set of domestic and international markets.

Data and Model Specification

For each available country, our diversification index is computed from the average R-square in a multi-factor asset return model fitted using daily data within each quarter between 1986 and 2021 inclusive. The global factors are 13 principal components obtained from existing markets pre-1986 but updated each calendar quarter.

a. Data

The analysis below employs index return data for equity, sovereign debt, and securitized real estate markets from Thompson Reuters DataStream©. DataStream provides the most comprehensive set of country-specific indexes available for the three asset classes.[8] The daily data are US dollar denominated and collected for equity, five-year sovereign bonds, and REIT indexes.[9] We

[7] According to this definition, a country is perfectly integrated if the country-specific variance is zero after controlling for global factors. In the case of two perfectly integrated countries, market indexes would have zero residual variance.

[8] Although Datastream gives us the greatest coverage it is not without its faults. That dataset is biased towards large capitalization stocks but we argue that investors would tend to create their diversified portfolio using these assets as those assets are more likely to be well known to them, have less political risk and are relatively liquid. This would certainly be true for international investors.

[9] 5-year sovereign bond indices are chosen as there are more of these than their 10-year counterpart.

choose the index in each market and asset class that is the most comprehensive in terms of coverage. We include both active and inactive assets to avoid survivorship bias.

Returns are defined as differences in log index levels. Index levels are removed from the dataset if they are identical to the previous day[10] Some markets and asset classes are more liquid than others. To foster estimation, we require at least 15 valid returns per quarter. This sometimes affects the estimation of the diversification index, especially for small markets, where on a particular quarter they may not meet this benchmark. For example, a diversification index in a quarter with at least fifteen returns might be followed by a quarter with no index value calculated because of insufficient (<15) daily returns.

b. Estimating Global Factors with Principal Components

The principal components analysis employs data from Datastream markets that had availability prior to 1986. The use of pre-1986 existing markets enables estimation of common factors for the combined three asset classes, equity, sovereign debt, and real estate among 23 countries, a total of 40 dollar-denominated global market indexes.[11] For each calendar quarter from 1986 – 2021, a covariance matrix is computed using returns from the 40 equity, bond, and REIT indexes. Because of time zone differences, the covariance matrix is augmented to include the one-day lagged returns from the North American markets (Canada and the US).[12] As an additional precaution, for each pre-

[10] Datastream records an index value on holidays when markets are closed or in those cases where index values are not 1 day apart from Monday through Thursday and 3 days apart from Friday through Monday.

[11] The pre-1986 markets include Equity: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, Singapore, South Africa, Switzerland, UK, US, Brazil, Malaysia, Norway, South Korea, Spain, Sweden; Sovereign Debt: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US.

[12] This non-synchronous trading issue arises because North America is the last region to trade on a given calendar day. If a globally-significant event occurs after the Asian or European markets close but while the North American markets are still open, there could be a co-movement between North America returns and returns in other regions the next day. Including the lagged North American markets yields a 44x44 covariance matrix including lags for 3 asset classes in the US and in Canada.

1986 cohort of countries, separate principal components are estimated after that country was excluded from the calculation.[13]

From the quarterly covariance matrices, sorted eigenvalues (low to high) are used to produce the orthogonal out-of-sample principal components that are evaluated in the factor model in each subsequent quarter. This is repeated for each quarter fixed-length interval from 1986 through the end of sample to yield 144 quarters of principal components. Principal components are obtained each calendar quarter using the daily data. We use out-of-sample principal components to avoid contamination in our return regressions that might possibly occur using contemporaneous realizations. Our approach allows for evolution in economic and other factors governing asset return integration. We retain 13 principal components, which explain roughly 90 percent of the volatility in the covariance matrix.[14] Appendix Figure 1 shows the average (over 1986-2021) cumulative percentage of variance explained by the sorted (low to high) eigenvalues from the pre-1986 country cohort covariance matrices.[15]

3. Empirical Findings

Diversification Indexes for Assets and Markets

The estimated 13 out-of-sample principal components serve as common global factors in the country-specific regressions. Those regressions are estimated for each country and for each calendar quarter 1986 – 2021. The adjusted R-square from each regression is a measure of market integration for that specific country and time period. We take a simple average of R-squares by country for each asset class and time period to provide the corresponding trend in global asset class integration. As

[13]This is to avoid any possible bias in the regression of a pre-1986 country's returns on the global factors associated with that country being heavily weighted in the principal components. Since we exclude a pre-1986 country from the PCs when that country is the dependent variable, the potential bias is obviated.

[14] We also examine the asset classes separately, obtaining separate principal components to explain respective asset classes. The findings are consistent with using principal components for the combination of assets. Further, as in Pukthuanthong and Roll (2009) there was negligible impact on the trend of R-squared estimates when the number of principal components were allowed to vary from 13.

[15] We also plot the average percentage of variance explained by sorted eigenvalues by calendar quarter. That plot is not included for sake of brevity and available upon request.

explained above, [100 – average asset class integration] is our index of asset-specific diversification potential.

Figure 1 shows the diversification index for each asset class between 1986 and 2021.[16] Figure 2 plots the same for the simple average of the three assets classes (100-average of R-squares across asset classes.) In each case, there is a time-series plot of the diversification index and a fitted linear trend line. As is evident, the time trend regressions reveal downtrend in diversification opportunity among the equity and real estate asset classes.[17] Further, the index plots reveal pronounced declines in diversification opportunity in equities and real estate over the period of the Global Financial Crisis; in real estate for example, diversification index levels were roughly halved to about 40 in 2010. Among issuers of sovereign debt, substantially lower levels of diversification opportunity were evidenced throughout; indeed, that index declined to a level of 20 in 2005. All asset class indices showed improvement in diversification opportunity subsequent to the GFC and prior to sharp but short-lived adverse shocks to diversification opportunity associated with the onset of the COVID-19 pandemic. Further, results indicate that investors would not be able to move across certain asset classes, for instance, from equities to sovereign debt, to enhance diversification.

Figure 2 displays the world diversification index for the (average) of the three asset classes. Again, results indicate some trending down in diversification opportunity across countries and asset classes. In that regard, the diversification index for a portfolio containing the three asset classes declined to roughly 60 in 2020, indicating substantial limits to diversification opportunity. The global three-asset class index similarly provides evidence of elevated financial contagion and related sharp

[16] Although as noted correlation and integration are not necessarily direct substitutes of each other we also look at correlation trends by estimating the time-varying correlation for each asset class. Similar to the diversification index, correlation is calculated every quarter from January 1986 using daily returns. We find a very similar pattern for correlation and integration trends with correlations for equities of 0.903, for sovereign debt of 0.734, and for REITs of 0.808. The correlation results are supportive of evidence we present (below) for our integration measure. Our analysis goes further however, in that we present and analyse a new measure of diversification potential, rather than integration.

[17] Estimated trend coefficients are robust to exclusion of the COVID-19 period.

contraction in opportunities for diversifying investment risk with the onset of the COVID-19 pandemic with a diversification index below 40.

Figure 3 displays the asset-specific diversification indexes by cohort. We go back to pre-1986 to illustrate long term trends in diversification potential, and to assess how robust these trends are to the timing of when a country becomes part of the analysis. Countries are assigned to cohorts depending upon when their data became available. Countries joining the dataset typically start out with lower integration R-squares, so averaging of all countries together (absent cohort assignments) could reduce R-squares early on for the sample and thus spuriously depress any trend in the average. The equity database covers a much longer period and allows us look at cohorts going back over a long period, even further back than our post 1986 documented diversification indexes. The assigned cohorts for equities include pre-1974, 1974-1983, 1984-1993 and post-1993. In the case of sovereign debt, the assigned cohorts include: pre-1986, 1986-1999 and post-1999. We assign countries to pre-2000 and post-2000 cohorts for REITs. Table 1 displays cohort members by asset class.

As shown in Figure 3, substantial variation in diversification opportunity is evidenced among equity cohorts. As expected, initial cohorts exhibit substantial ongoing trending down in diversification opportunity to index levels of 40 by 2020. [18] In marked contrast, more recent cohorts, containing less developed markets, exhibit higher levels of diversification opportunity throughout. Among the post-1983 cohort, diversification opportunity remained relatively elevated at an index level of roughly 80 in 2020. In the case of sovereign debt and REITs, the changes over time in diversification potential are largely robust to cohort stratification.[19]

[18] The pre-1974 equity market cohort includes the major advanced modern economies of Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Ireland, Japan, Netherlands, Singapore, South Africa, Switzerland, the UK and the USA.

[19] The post-1999 bond cohort includes China, the Czech Republic, Mexico, Poland, and South Africa.

I. Portfolio Diversification and Risk

Next, we assess the relation between diversification potential and portfolio risk for global investors. As noted, asset diversification long has been fundamental to risk mitigation. Figure 4 shows global diversification indexes for each asset class (equity, sovereign debt, real estate) alongside asset-specific risk as proxied by the quarterly standard deviation of asset returns.

Figure 4 provides evidence of an inverse relationship between diversification potential and risk in each of the asset classes. Specifically, as opportunities to diversify decline, investment risks move up sharply. The negative correlation between the computed asset diversification index and risk was particularly pronounced for equities and real estate post-2005. For the 2005-2011 period, the asset-specific diversification potential and risk correlation coefficients are in the range of -0.45 to -0.49 for the REIT and equity sectors; respectively; in the case of sovereign debt, the full sample correlation coefficient is -0.30[20] Further, that relationship is starkly evidenced for the early COVID-19 pandemic period. The massive contraction in diversification opportunity at the onset of the pandemic and both within and among asset classes was accompanied by sizable increases in measured risk.

Figure 5 confirms a similar marked inverse relationship between risk and diversification for the composite of the three asset classes. For the composition of asset classes and over the 2005-2021 period, the diversification and risk correlation coefficient is -0.51 (t-stat -7.12). Hence augmenting the portfolio with three asset classes does not provide much relief from risk. Overall, volatility in returns moved up as diversification opportunities abated. Indeed, when global returns to an asset class are well integrated, potential benefits of geographic diversification are meagre.

Diversification Trends by Country and Asset Class

Table 2 provides further details on diversification trends by asset class and country. Among other things, it provides insight into systematic differences among highly integrated developed and other markets. For each estimated country and asset class diversification index, Table 2 reports the

[20] Diversification index levels and risk are strongly negatively correlated for each of the three asset classes over the full sample period with all t-statistics over 3.5, for example the correlation for equities is -0.49 (t-stat = -6.62).

coefficient and t-statistic from fitting a linear time trend. Trends are given for each country included in the analysis.[21]

Table 2 also reports those findings for a global equal-weighted index (labelled World) for each asset class. Each asset class-specific global index displays a modest but significant downward trend that would have been even more pronounced if country weights were applied. There is similarity, with highly correlated trends (the lowest correlation coefficient is 0.415 between equities and sovereign bonds), for the three asset classes (albeit stronger for real estate), suggesting reduced opportunity for diversification by switching between the asset classes.

While opportunities for risk diversification within and among asset classes turned largely negative and significant over the 1986-2021 timeframe, there are some notable country exceptions. A number of Middle Eastern nations, including Egypt, Lebanon, Oman, and the UAE, do not exhibit a significant long-run decline in their index of equity diversification. This is similarly the case for several developing Asian and African nations, including Ghana, Kenya, Nigeria, Pakistan, and Zambia. Further, Bosnia and Herzegovina, Cote d'Viore, Jordan, Panama and Venezuela offered significant positive trends in diversification potential. Similarly, in the market for sovereign debt, India, Mexico, and Portugal show significantly improved diversification opportunity over the 1986-2021 period. Finally, among REIT diversification indexes, Turkey provides significant opportunity for real estate investment diversification. Hence, while the above-identified nations offer higher levels of diversification potential, many are subject to other country-specific risks, including barriers to investment, political instability, inadequate legal infrastructure, and civil and sectarian violence.

Table 3 shows results of estimation of a linear time trend for portfolios comprised of all 3 assets for individual nations and over the 1986-2021 sample timeframe. Unfortunately, only a limited number of advanced western nations allow estimation of those trends for a 3-asset class portfolio. This analysis asks whether an investor in domestic assets, in the U.S. for example, could enhance their

[21] Trends by sub-period of analysis are available from the authors by request. Those results, for example, show significantly improved sovereign debt diversification opportunities for Greece, Portugal, and Spain in the wake of the 2000s subprime and European sovereign debt crises.

diversification potential via investment in multiple asset classes. Among the 17 country indexes, only Portugal offered a positive and significant time trend. Elsewhere, in virtually all other cases, the estimated time trends are negative and highly significant, suggesting limitations on diversification of country-specific investment potential via the three asset classes.

In table 3 we also assess trends in diversification potential when countries in the sample are in high (diversification index values above the median value) and low (diversification index values below the median value) states of diversification potential. Median diversification potential for the full sample is above 69 for equities, 34 for sovereign debt, and 68 for REITs. In general we find distinct variation in trends across the high- and low-diversification states. Among countries in high diversification states, index values tend to decline markedly over time so as to limit the potential risk mitigation offered to the investor. In contrast, among countries in the low diversification state, declines in diversification potential are substantially less pronounced. For example, for equities, there is a significantly strong decline for countries above the median diversification value (t-stat -4.252) that disappears for countries below the median trend (t-stat -0.254). Those findings again suggest that diversification potential is either limited and static (low diversification states) or initially elevated but declining (among the high diversification potential panel).

We further investigate the estimated trend in diversification opportunity among developed and emerging economies. We allocate countries across these categories based on the United Nations Human Development Index. In accordance with the UN Index, we coded those countries identified as "very high human development" as developed nations, whereas the others were included in the "emerging" category. The UN categorization is based on a large number of country-level economic and human capital characteristics. Figure 6 displays trends in global diversification indexes by asset class and for developed and emerging economies. Overall, as anticipated, among emerging equity and sovereign debt markets, diversification potential is both substantially higher and exhibits less erosion over the 1986-2021 study period. This is not the case for devoloped markets. For these, , for example, diversification potential declines from an estimated index value of .80 early in the sample to

roughly .60 in 2021. In marked contrast, diversification potential remains elevated in excess of .90 among undeveloped equity markets throughout the 1986-2021 study horizon. Results of fitting of time trends by asset class to the developed and emerging country groups indicates dampened and less significant estimated trend coefficients in the case of emerging markets.[22] As suggested above, those diversification opportunities may be accompanied by other country-specific risks, including political instability, inadequate investment legal infrastructure, and instances of civil and sectarian violence.

Appendix Figure 2 distinguishes global equity, sovereign debt, and real estate asset class diversification potential by NBER recessions (red bars) and non-recession periods. As is evident, the plots in Appendix Figure 2 show little variation across recession and upswing periods during the early and late 2000s in the equity, sovereign debt, and REIT asset class diversification indexes. Plainly notable, however, are the sharp declines in diversification opportunity among all asset classes with the economic downturn associated with onset of the COVID-19 pandemic in 2020. Next we analyse prospective factors associated with diversification potential.

Factors Associated with Diversification Indexes

This section examines drivers of diversification potential. While prior studies typically focus only on correlation (or integration) of returns among a limited number of countries and for a single asset class, our work computes new diversification indexes within and among asset classes and for a large

[22] Trend coefficient estimation results not displayed for the sake of brevity and are available upon request. For equities the developed markets are: Argentina, Australia, Austria, Bahrain, Belgium, Canada, Chile, Croatia, Cyprus, Czech Rep., Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Qatar, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, UAE, UK and US. The associated emerging equity markets are: Bangladesh, Botswana, Brazil, Bulgaria, China, Colombia, Cote d'Ivoire, Ecuador, Egypt, Ghana, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Lebanon, Macedonia, Malaysia, Mauritius, Mexico, Montenegro, Morocco, Namibia, Nigeria, Oman, Pakistan, Panama, Peru, Philippines, Romania, Russia, Serbia, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, Trinidad, Tunisia, Turkey, Ukraine, Venezuela, Vietnam and Zambia. For bonds the developed markets are: Australia, Austria, Belgium, Canada, Czech Rep., Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, UK and US. The associated emerging bond markets are: China, Mexico and South Africa. For REITs the developed markets are: Australia, Belgium, Canada, France, Germany, Greece, Hong Kong, Italy, Japan, Netherlands, New Zealand, Singapore, UK and US. The associated emerging REIT markets are: Bulgaria, Malaysia, Mexico, South Africa and Turkey.

sample of countries. We undertake the analysis using country-specific panels.[23] The panel regression analysis allows us to assess associations between country level diversification potential and an extensive set of macro-financial and development factors. We do this using both unbalanced and more restricted balanced panels. We assess the varying effects across asset class and geography.

Table 4 lists the diversification factors. As discussed below, model specification includes diversification factors shown to be important in prior studies of market integration, equity market segmentation, and asset return correlation (see, for example Carrieri et al (2007); Errunza et al (2007); Carrieri et al (2013), Bartram et al (2015), Faias and Ferreira (2017) amongst others). Further, consistent with the hypothesis of dampened diversification potential in a more interconnected and developed global economy, we include controls for country economic development and technology (internet) adoption. Other factors include credit risk, asset return volatility, investor sentiment, prevalence of institutional trades, Fed Funds Rate, market liquidity, economic development, internet diffusion, political and economic risk as well as controls for 1992-1993 ERM, 2009-2010 European sovereign debt, and the COVID-19 crises.[24] Simple correlations (not reported) among the various factors posited to effect diversification potential are typically small in magnitude. That said, relatively high levels of correlation are uncovered among proxies of economic, political and financial risk.

We start with unbalanced panel regression analyses of the diversification indexes. In Table 5, we report on associations between asset-class and country-specific diversification trends and various global and country-specific factors. Among controls, we assess the role of both credit and market risk and sentiment as embodied by the TED spread, the VIX, and the Baker and Wurgler (2006) investor

[23] Our analysis examines multiple specifications for the relationship between the diversification indexes and their drivers (Appendix Table 1) . The findings are reported in levels of all regression terms but we also examine models with changes in the level of internet diffusion. We do this as there is a mechanical negative relation between the trends in diversification (upward) and internet diffusion (downward) over our period of analysis. We also estimated models with the change in levels of all variables, the change in levels of all right-hand side variables, and a relationship between lagged right-hand side variables and contemporaneous diversification. The findings are consistent across models.

[24] Note other economic events such as the 1987 stock market crash were also examined but were not found to be significant and are not reported.

sentiment index (SENT), respectively. Prior studies also have modelled credit risk using the US corporate bond default premium as measured by the yield difference between Moody's Baa- and Aaa-rated bonds (see Carrieri, et al (2013). The VIX measure of stock market volatility (the so-called "fear index") similarly has been employed in studies of equity market segmentation and bond market integration (see, for example, Bekaert et al (2011) and Chaieb et al (2020)). Other factors included in the analysis are the FED FUNDs rate, internet diffusion (contrasting results for both country-specific and global measures) and other measures of country economic development, and categorical indicators for the ERM, European sovereign debt, COVD-19 crises. In columns (1) – (3) of table 5, we proxy for internet diffusion using the average internet utilization among countries in the dataset. In columns (4) – (6), we assess the robustness of results to a country-specific rather than global average measure of internet use. Finally, in columns (7) – (9), we replace the internet diffusion factor with the first principal component of a set of country-specific development indices obtained from the World Bank World Development Index.

A number of prior studies have investigated a country's level of economic development and the related diffusion of technology in analyses of equity market segmentation. For instance, Bekaert et al (2011), employ secondary school enrolment, life expectancy, population growth, telephone lines, and internet use. We would expect that technology innovation and the level of development to be positively related to return integration hence reducing diversification potential. Further, technological innovation has been shown to be a key determinant of investor home bias (Portes and Rey, 2005). We obtain a number of country-specific development measures from the World Bank (see Table 4). The development factors include government expenditure share on education, literacy rate, prevalence of ATMs, life expectancy at birth, internet users, cellular phone subscriptions, secondary school enrolment, gender parity index, maternal mortality rate, research and development expenditures as a share of GDP, and the like. However, given high levels of simple correlation among the World Bank development indices, we instead compute and test their first principal component, DEVPC1. The first principal component explains a very high proportion of the variation among the

World Bank development terms. We also separately employ the Internet diffusion term to capture the unprecedented telecommunications innovation associated with this factor over our study timeframe. There is a high correlation between the internet diffusion and DEVPC1 factors (corr 0.777), thus we enter either one or the other of these factors into the panel analysis. The unbalanced country panels enable substantial degrees of freedom. All models include country-specific fixed effects.

As shown in Table 5, internet diffusion is strongly associated with declines in diversification opportunity. Results are largely significant and robust to substitution of country-specific internet utilization for a global measure thereof. The first principal component of the World Bank country development indices (as shown in columns (7) – (9)) is similarly negative and significant across equity and real estate asset classes, indicating as expected that higher levels of economic development are associated with reduced asset diversification potential. In the case of sovereign debt, the stage of economic development proxy does not enter the regression with a significant coefficient.

Other diversification drivers similar enter the analysis as anticipated with notable variations for sovereign debt markets. The estimated loadings on credit risk as embodied in the TED spread are associated with reductions in diversification opportunity across all asset classes and significant throughout. The onset of the COVID-19 pandemic in general is also associated with significant and marked declines in diversification opportunity. On the other hand, upward movements in consumer sentiment and the Fed Funds Rate are positively associated with diversification potential among all asset classes. The estimated effect of increased equity market volatility as proxied by the VIX is negative and significant in equity and real estate markets. Notably, the 2000s European Sovereign Debt Crisis period is associated with increases in diversification potential among equity and real estate asset classes; in sovereign debt markets, that crisis period is related to declines in diversification opportunities.

In Table 6, our large sample of equity markets further allows us to assess drivers of diversification potential across developed, emerging, and frontier equity markets. We define those geographical

cohorts using the United Nations Human Development Index. Those countries described by the U.N. as "very high human development" are designated as developed countries and those outside this list as emerging countries. We then further stratify the latter using Standard & Poor's list of Frontier markets that were developing but too small to be considered emerging markets. While frontier markets previously have not been examined for diversification trends, Berger et al (2011) have documented lower integration in these markets. The table reports results of model specification identical to that above, similarly including country-specific fixed effects.

Results displayed in table 6 are largely consistent with above. However, as expected, findings do indicate progressively larger negative loadings associated with the TED spread proxy for default risk on interbank loans among emerging and frontier markets. In contrast, consumer sentiment is positively associated with diversification potential throughout but is insignificant among frontier markets. The onset of the COVID-19 pandemic is associated with significantly larger reductions in diversification opportunity among frontier markets, relative to those in developed and emerging countries. As might be expected, the 1992 ERM crisis was of little import to diversification opportunity among frontier markets. Also, an increase in internet diffusion or stage in economic development is associated with sizable and significant declines in diversification opportunity throughout. Overall, model fit is relatively higher for developed equity markets.

In Table 7, we augment the above country unbalanced panel models to include controls for market liquidity and for economic, financial, and political risk as suggested by prior literature.[25] We proxy for market liquidity using a simple and intuitive measure that has the advantage of adequacy of coverage in small and less developed markets. Our (il)liquidity measure is the capitalization-weighted proportional incidence of observed zero daily equity returns as suggested by Lesmond, Ogden and Trzinka (1999) and Lesmond (2005). We compute this measure using the constituents of the DataStream indexes. This measure has been used extensively in similar studies that examine emerging

[25] We also estimate models throughout for balanced country panels and results are available on request. In general, findings are robust to estimation of balanced panels.

markets (see Bekaert et al (2011); Carrieri et al (2013); and Bekaert et al (2007)). Diversification of investment to small illiquid markets may not be executable as illiquidity is often a barrier to foreign investment. We further include a measure of share institutional ownership. Bartram et al (2017) find a positive association between institutional ownership levels and stock return correlations. We would expect a similar relation for integration with a negative sign on the relationship between our diversification indexes and levels of institutional ownership, and especially for equities, as our variable explicitly captures this.

Proxies for country-specific economic, political and financial market risk are obtained from the Political Risk Services International Country Risk Guide (ICRG).[26] The financial risk term, for example, includes foreign debt and exchange rate stability measures that have been used to explain bond market integration (Chaieb et al (2020)). Political risk and its components, inclusive of the presence of corruption, external or internal conflict, democratic accountability, and the like, also have been shown to limit market integration (see Bekaert et al (2011) and Carrieri et al (2013)). The economic risk term includes proxies for price, budgetary, and other factors that characterize the macroeconomic environment. This term further includes a country level current account estimate incorporating trade considerations that have been examined in a number of papers (for example, Bekaert et al, 2011). Similar to Carrieri et al (2013) and Chaieb et al (2020), we use the aggregate risk series and hence avoid high levels of correlation between some sub-indexes in the panel regressions.

As shown in columns (1) – (3) of Table 7, baseline modelled factor estimates are largely robust to the inclusion of the ICRG country risk, liquidity, and institutional ownership indices. While less liquid

[26] The ICRG model for assessment of financial, economic, and political risk dates to 1980 and is published online by the PRS Group. The system is based on a set of 22 components grouped into three major categories of risk: political, financial, and economic, with political risk comprising 12 components (and 15 subcomponents), and financial and economic risk each comprising five components. The political risk components include government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. The economic risk components include GDP per capita, real GDP growth rate, inflation rate, government budgetary deficit as a share of GDP, and current account as a share of GDP. Financial risk is comprised of foreign debt as a share of GDP, foreign debt service as a share of exports of goods and services, current account as a share of exports of goods and services, net international liquidity as months of import cover, and exchange rate stability.

markets may offer some added diversification potential in sovereign debt markets, investors face a challenge in accessing those markets. In contrast, among equity markets, higher levels of (il)liquidty are associated with elevated diversification opportunity. The liquidity results are largely robust to the inclusion of either internet diffusion [columns (4) – (6)] or the first principal component of the World Bank development indexes [columns (7) – (9)] as a proxy for communication technology diffusion or country stage of economic development. Among the ICRG risk factors, country-specific economic risk is associated with significantly reduced equity and sovereign debt diversification potential but elevated diversification opportunity among real estate markets. Similarly, higher levels of political risk serve to significantly reduce diversification potential among equity and sovereign debt markets. As shown in columns (4) – (5) and (7) – (8), for equity and debt asset classes, results for economic and political risk are largely robust to the inclusion of either internet diffusion of the first principal component of the World Bank development indexes as the development factor. In the context of the table 7 model specification, with the exception of sovereign debt markets, both levels of country internet diffusion and country stage of economic development are associated with significantly dampened investment diversification opportunity.

In Appendix Table 1 we examine robustness of findings to alternative model specifications. We include a number of specifications, including the change in level of internet diffusion, changes in levels of all variables, changes only in right-hand side variables, and regression of lagged right-hand side variables on contemporaneous diversification. The findings are robust to these model specifications.

In Table 8, we further assess variation in equity investment diversification potential associated with country stage of development (developed, emerging, and frontier) equity panels. As in table 7, results of full model estimation reveal some variation in results across equity market segments stratified by level of economic development. As expected, model fit is substantially higher in developed equity markets. That said, certain factors, including the TED spread, Fed Funds Rate, COVID-19, economic and financial risk, and market liquidity and share institutional investors, play a more prominent role in less-developed frontier markets.

4. Conclusion

Diversification has long been fundamental to risk mitigation. Recent anecdotal evidence, however, suggests that increasing integration of global markets has served to reduce the benefits of diversification. This paper provides confirming empirical evidence using new indexes of investment diversification potential. Our diversification indexes, based on common global factors, are computed within and among equity, sovereign debt, and real estate asset classes and for 95 countries.

Findings for the 1986-2021 study period indicate markedly declining or persistently dampened diversification potential for all asset classes. Declines in diversification potential for equities are especially pronounced among developed nations and coincide with higher levels of investment risk. Country-level panel analysis indicates that declines in diversification potential are associated with increases in the TED spread, country economic development, internet diffusion, political risk, and institutional ownership. Diversification potential increases with the Fed Funds Rate. Diversification potential waned temporarily among all asset classes during the 1992 ERM crisis and at the onset of the COVID-19 pandemic. Results are robust to measures of economic and financial market risk and to market liquidity. Findings offer a cautionary note regarding diversification of investment risk among asset classes and geographies in an increasingly connected and interdependent world.

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Appendix 1. Explication of our Diversification Measure

This appendix provides further background and explication of our diversification measure. A time-honoured (inverse) measure of diversification potential is the correlation between two assets. The Markowitz principle states that the volatility of a portfolio formed by combining two assets is a monotonically negative function of the assets' correlation; e.g., if the correlation is +1, there is no diversification benefit while there exists a portfolio with zero volatility if the correlation is -1. While the Markowitz principle is correct when dealing with individual assets, correlation can be a misleading indicator of diversification when considering a combination of two portfolios, such as large indexes, each of which already contains many individual assets, provided that there are two or more underlying common factors that drive all returns. The correlation between the two portfolios can conceivably vary over the entire range of possibilities, -1 to +1, without implying anything about the true benefits of diversification.

The basic reason for this seemingly perverse result is implied by the possibility that large portfolios can be re-weighted to mimic one another. If the mimicking is adequate, then one portfolio contains a re-weighted image of the other, so combining the two original portfolios has little benefit relative to simply combining one of them with its re-weighted self.

To illustrate, consider a multi-factor world wherein all asset returns are driven by K common factors; i.e., every asset's return at time t conforms to the return generating model:

$$R_{i,t} = E_i + \beta_{i,1} f_{1,t} + \beta_{i,2} f_{2,t} + \ldots + \beta_{i,K} f_{K,t} + \varepsilon_{i,t}$$

where the f's denote common factors that influence the return R on asset i through its "sensitivity coefficients," the βs. By assumption and without loss of generality, the factors have zero means, as does the idiosyncratic risk, ε, while the expected return on asset i is E_i. Note that everything is specific to asset i (and thus carries an i subscript), except the common factors. Also, in this elementary multi-factor model, the asset's expected return and its sensitivities (β's) are assumed to be time invariant constants.

Within this world, now consider the relations among well-diversified portfolios. For example, suppose that two asset classes, A and B, have broad, widely-followed, well-diversified market indexes, as in our country level indexes. Suppose the indexes are so well-diversified that both have negligible remaining idiosyncratic volatility; i.e., for A and B respectively,

$$R_{A,t} = E_A + \beta_{A,1} f_{1,t} + \beta_{A,2} f_{2,t} + ... + \beta_{A,K} f_{K,t},$$

$$R_{B,t} = E_B + \beta_{B,1} f_{1,t} + \beta_{B,2} f_{2,t} + ... + \beta_{B,K} f_{K,t}.$$

The returns of both indexes are perfectly integrated as they are explained entirely by the same underlying systematic factors. However, the returns are perfectly correlated if and only if for some constant of proportionality, k≠0, $\beta_{A,j} = k\beta_{B,j}$ for each and every j=1,…K.. For any other set of sensitivity coefficients (β's), the correlation will be imperfect.[27] Although correlation and integration can have similar patterns and implications, conceivably, the correlation can be quite low even though both indexes A and B are driven by the same common influences.

Within an asset class such as, e.g., U.S. equities, portfolios have similar sensitivities to the underlying factors, so correlations are relatively high. But across asset classes, this is not necessarily the case. Consider the example of equities and bonds. Suppose one factor is related to shocks in real output and another factor is related to shocks in expected inflation. Then a positive shock in the first factor would increase equity returns but not affect bonds all that much. Conversely, a reduction (a positive shock) in expected inflation would drive up nominal bond prices but have a more attenuated impact on equities. The result over many periods, when there are shocks in both real output and expected inflation, could be a relatively low correlation between stocks and bonds. There could be other systematic factors, such as investor confidence, that drive them in the same direction.[28] In other

[27]The formal proof is delivered by the Cauchy inequality. The correlation is +1 (-1) when k is the same for all pairs of β's and k > (<) 0.

[28] Another example is suggested by the frequently-observed low correlations across some country equity indexes. For example, Hong Kong and Saudi Arabia are undoubtedly driven differentially by global energy shocks. Saudi stocks are driven upward by energy price increases but the opposite is true for Hong Kong, an

words, low correlation between bundles of assets fails to properly measure the potential benefits of diversification.[29]

Generally, the literature focuses on modelling correlation rather than explicitly assessing diversification. Papers that have directly examined diversification and are complementary to our analysis include Christoferson et al (2012; 2017). There the authors present a dynamic diversification measure based on expected shortfall and tail values. Unlike their measure, our diversification indexes do not require a specific portfolio allocation as well as estimation of the full covariance matrix.

energy importer. These two countries could be very well integrated in the sense that they both depend on the same global factors, yet their simple correlation could be small or even negative depending on the volatility of energy shocks relative to other common factors.

[29] To see the extent of this issue, consider again two diversified portfolio indexes A and B, perhaps in different asset classes or countries, whose returns are driven by the same underlying systematic factors but with diverse sensitivities (β's). Assume that their simple correlation is relatively low. Diversification into the two indexes might seem powerful because various allocations between them (such as 50-50) appear to substantially reduce volatility. But this overstates the true diversification benefit because the respective index compositions are held constant when making such allocations. Instead of allocating a fraction of investment funds to index A and the complementary fraction to index B, consider structuring a different investment portfolio from the individual assets within index A that matches the factor sensitivities of index B. This is feasible when there is a large enough menu of available derivatives or when short positions are inexpensive. The resulting returns, index B and the re-structured version of index A, denoted A*, would then conform to the following return generating multi-factor models:

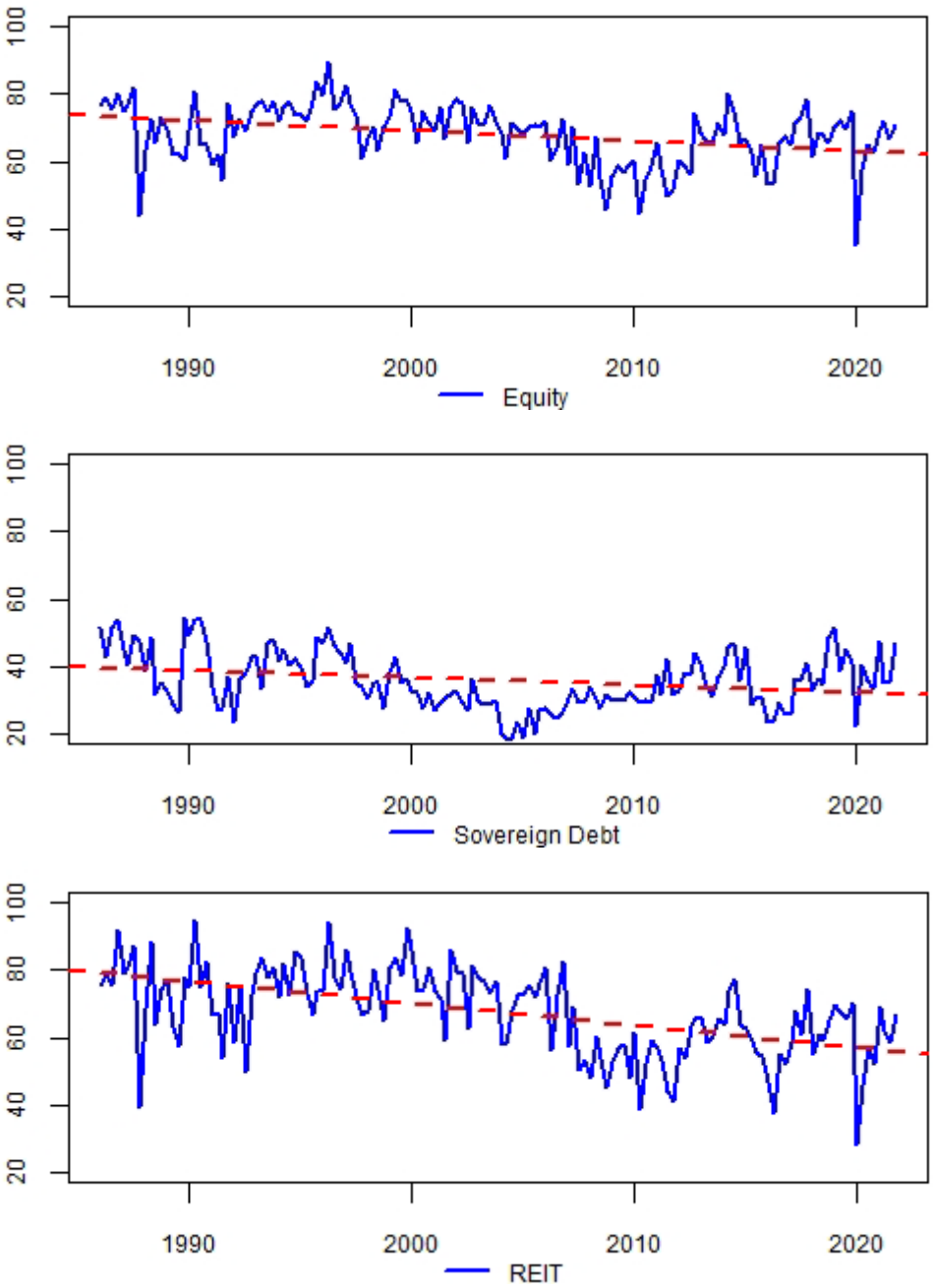
$$R_{A^*,t} = E_{A^*} + \beta_{B,1} f_{1,t} + \beta_{B,2} f_{2,t} + \ldots + \beta_{B,K} f_{K,t} + \varepsilon_{A^*,t},$$

$$R_{B,t} = E_B + \beta_{B,1} f_{1,t} + \beta_{B,2} f_{2,t} + \ldots + \beta_{B,K} f_{K,t} + \varepsilon_{B,t}.$$

Notice that the sensitivity coefficients (β's) from the restructured portfolio A* of A assets now match the original sensitivity coefficients of index B. What, then, is the actual diversification benefit available from combining A and B? In words, if the re-structured portfolio A* from the class A assets has no idiosyncratic component, diversifying with B brings absolutely no benefit in terms of risk reduction; w is zero. This is true even when, as we assumed initially, the correlation is weak between the original indexes of classes A and B. Any benefit from combining B with A would have to be in terms of enhanced return, not reduced risk. If the re-structured A-asset-only portfolio A* retains some idiosyncratic risk, there is a diversification benefit. But that benefit has nothing to do with the correlation between the original indexes A and B. This result leads directly to our proposed measure of diversification potential.

If the β_B-structured B-mimicking portfolio A* composed of A assets has an r-square on the underlying factors close to 1.0, then $Var(\varepsilon_{A^*,t})$ will be very small, so there will be negligible diversification benefits from combining B and A. (The same would be true going the other direction; i.e., restructuring B to match the factor sensitivities of the A index.) Hence, we compute the r-square (denoted R^2) from multi-factor regressions for each asset class and country and then measure the benefit of diversifying with that class or country by 1-R^2. If R^2 = 1.0, there is no benefit while if R^2 is close to zero, the benefit is large.

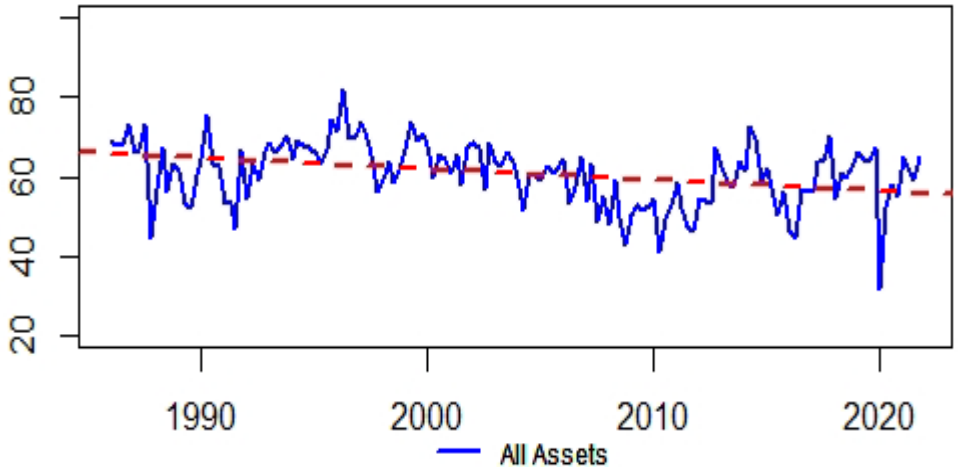
Figure 1
Trends in Global Diversification Indexes by Asset Class



Notes: This figure shows the average diversification indexes for each asset class between 1986 and 2021. Each panel contains a time-series plot of a diversification indexes and a fitted linear trend line. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. The dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter.

Figure 2

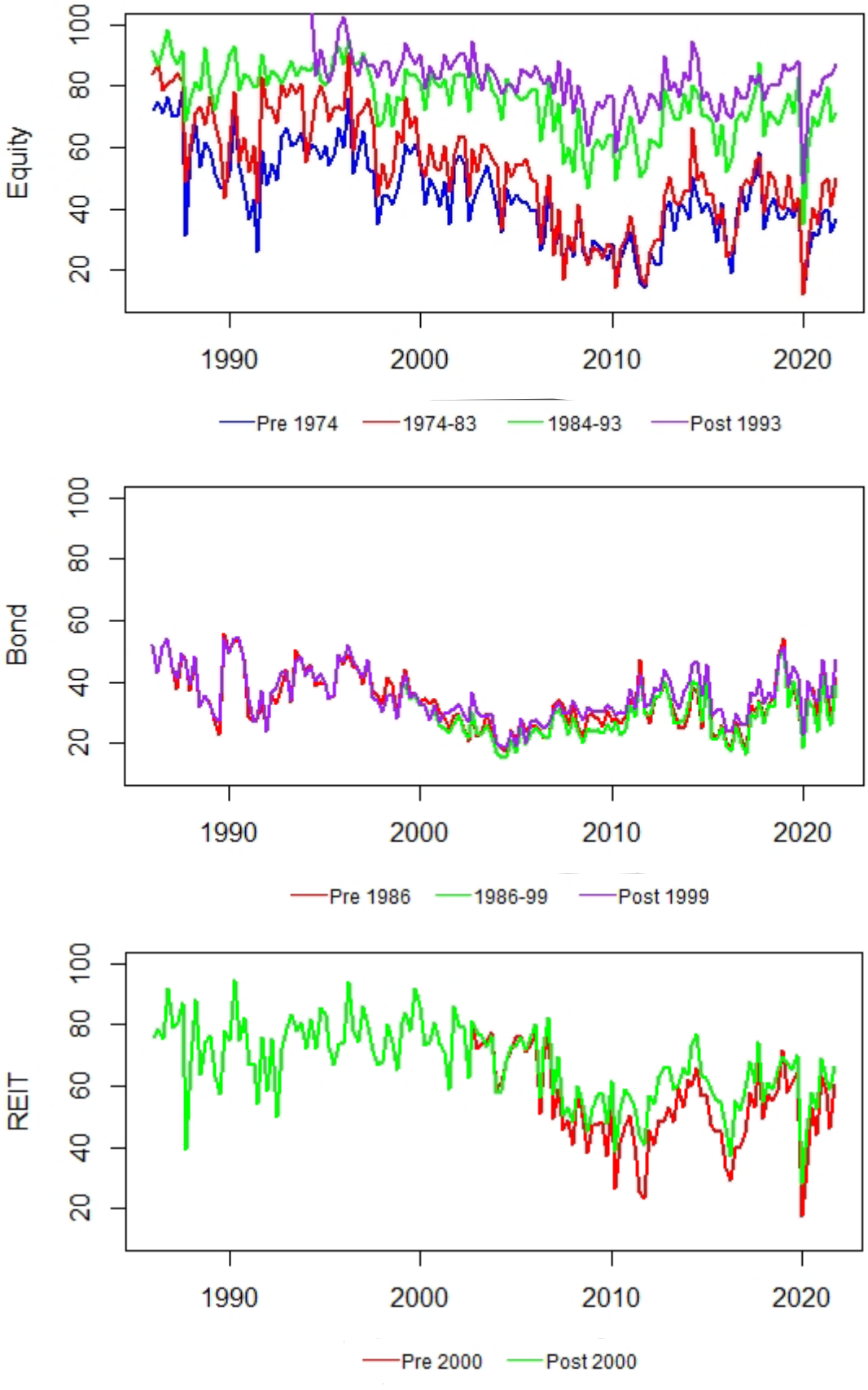
Trend in World Diversification Index (average of 3 asset classes)



Notes: This figure shows a time series plot of the average diversification index for three asset classes, equities, sovereign debt, and REITS along with a fitted linear trend line. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. The dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter.

Figure 3

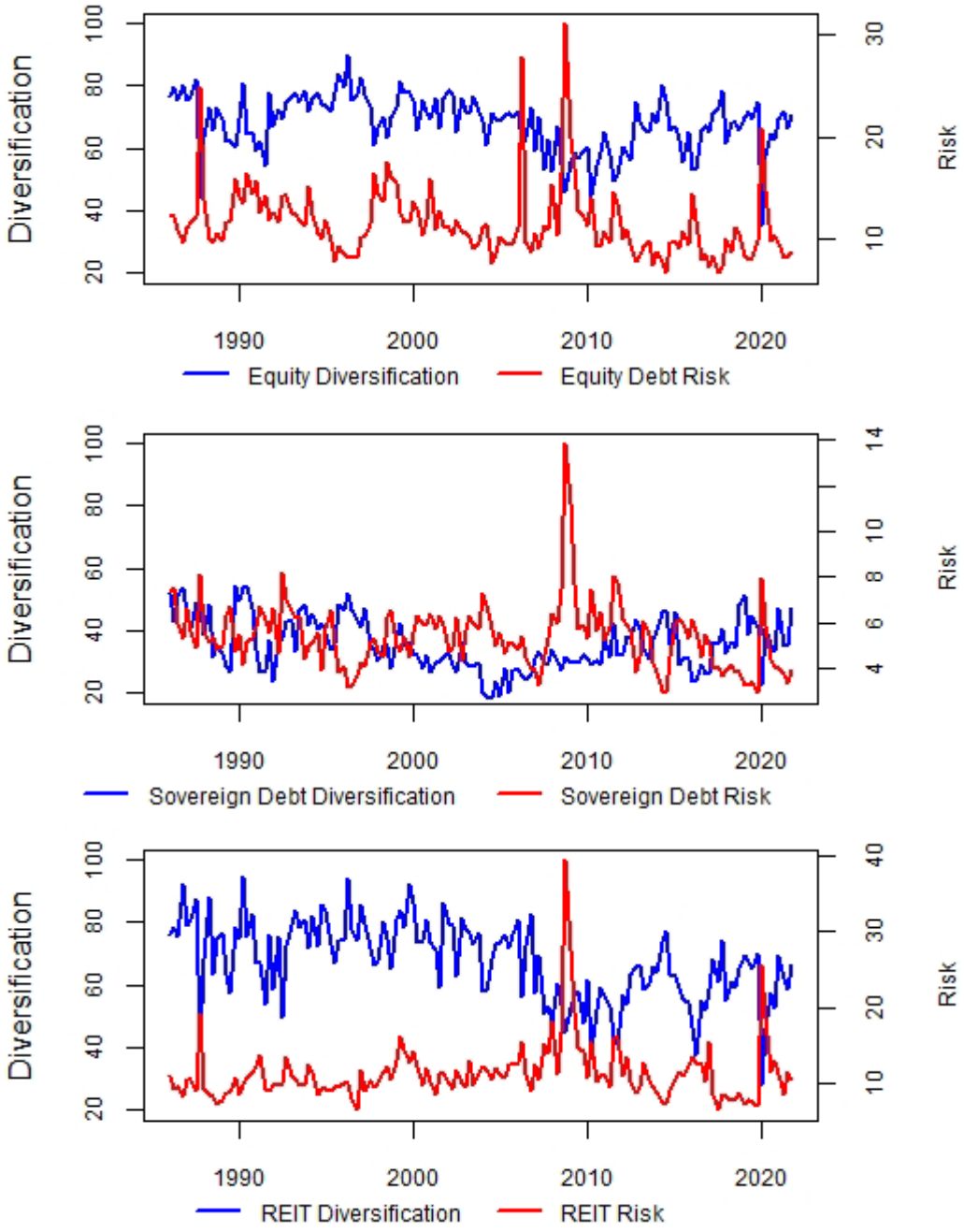
Trends in Global Diversification Indexes by Asset Class and Cohort



Notes: This figure shows the average diversification indexes for each asset class between 1986 and 2021 broken out by cohort years. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. on the dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter. Cohorts for equities are pre-1974, 1974-1983, 1984-1993 and post-1993; for sovereign debts they are: pre-1986, 1986-1999 and post-1999; and for REITs they are pre-2000 and post-2000.

Figure 4

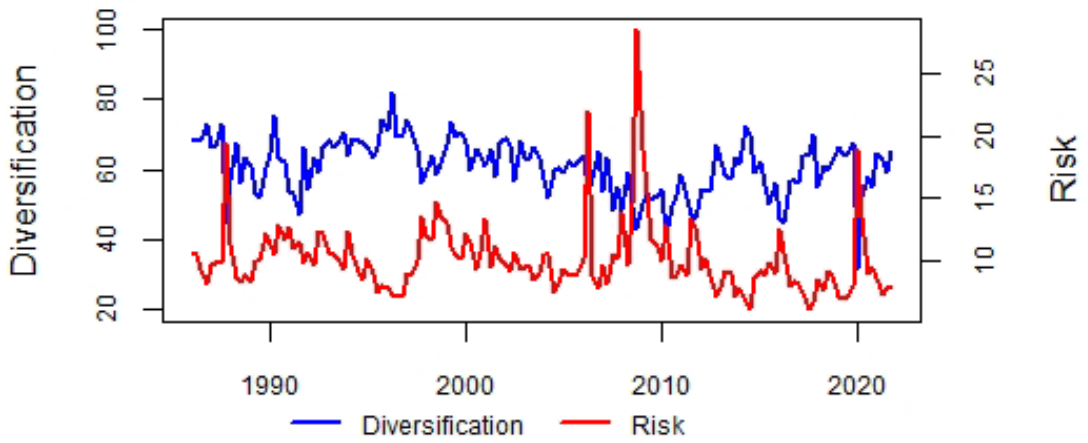
Trends in Global Diversification and Risk by Asset Class



Notes: This figure shows the average diversification indexes for each asset class and the associated standard deviation of returns. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. The dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included in the analysis, a country/asset class must have at least 15 valid daily returns during the quarter.

Figure 5

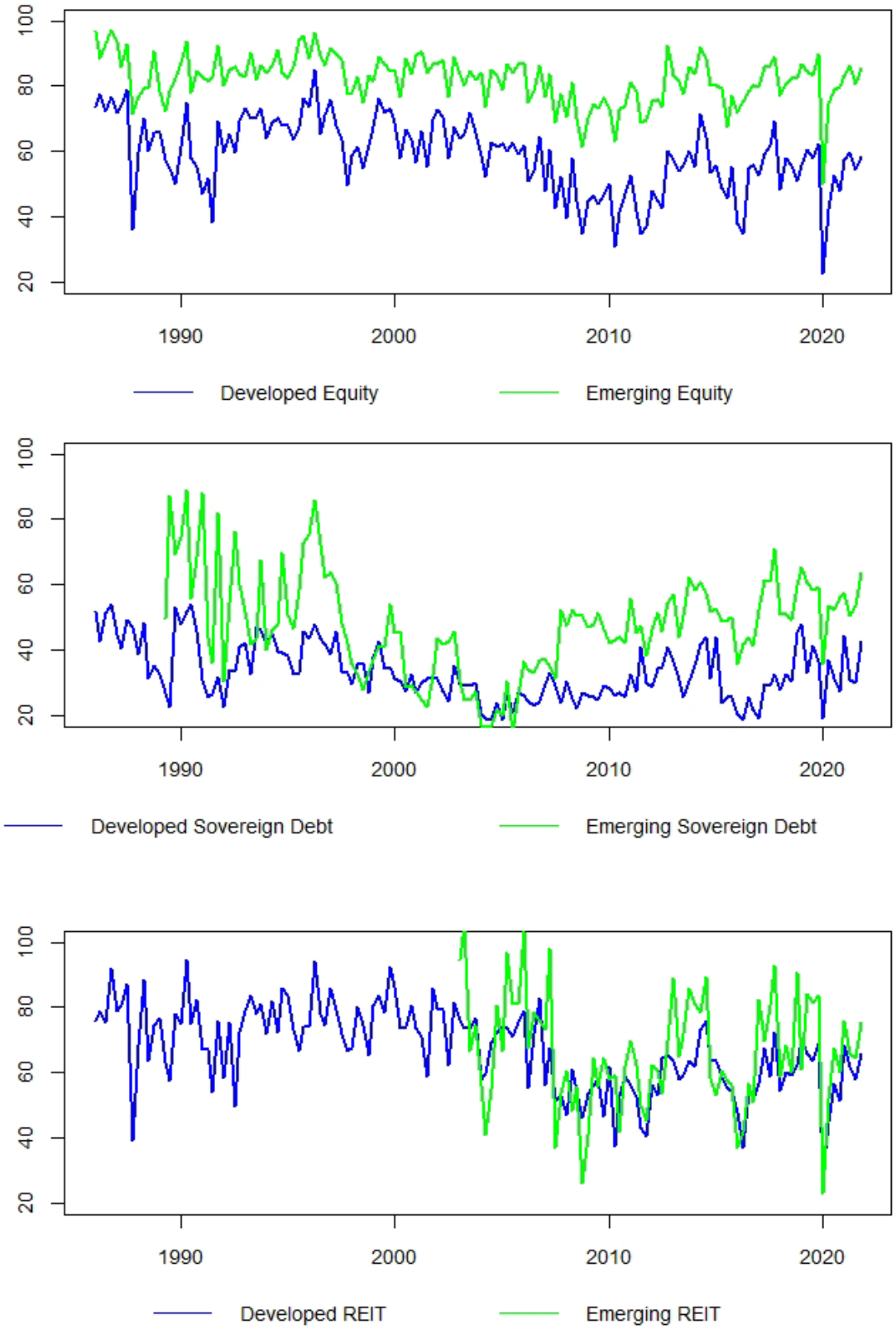
Trends in World Diversification and Risk (average of 3 asset classes)



Notes: This figure shows an average of the diversification indexes and associated risk for the three asset classes, equities, sovereign debts and REITS. There is a time-series plot of the averages of the diversification indexes and risk using the standard deviation of returns. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. The dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter.

Figure 6

Trends in Asset Class Diversification Indexes by Country Economic Development Status



Notes: This figure shows the average diversification indexes for each asset class between 1986 and 2021 broken out for developed and emerging markets. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. The dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter. The categorization of "developed" and "emerging" economies relies on the United Nations Human Development Index that incorporates a number of distinguishing features such as income and education. The United Nations country category of "very high human development" is taken here as a developed economies; those outside that category are taken here as emerging economies.

Table 1

Cohort Members for Asset Classes

Equity	pre 1974	Australia	Austria	Belgium	Canada	Denmark	France
		Germany	Hong Kong	Ireland	Italy	Japan	Netherlands
		Singapore	South Africa	Switzerland	UK	US	
	1974-83	Brazil	Malaysia	Norway	South Korea	Spain	Sweden
	1984-93	Argentina	Chile	China	Colombia	Ecuador	Finland
		Greece	Hungary	Iceland	India	Indonesia	Israel
		Jordan	Kenya	Luxembourg	Mexico	Morocco	New Zealand
		Pakistan	Panama	Peru	Philippines	Poland	Slovakia
		Sri Lanka	Taiwan	Thailand	Turkey		
	post 1993	Bahrain	Bangladesh	Bosnia and Herzegovina	Botswana	Bulgaria	Cambodia
		Chad Côte D'Ivoire	Croatia	Cyprus	Czech Republic	Egypt	Estonia
		Georgia	Ghana	Iraq	Jamaica	Kazakhstan	Kuwait
		Latvia	Lebanon	Lithuania	Macedonia	Malta	Mauritius
		Montenegro	Namibia	Nigeria	Oman	Palestinian Territories	Portugal
		Qatar	Romania	Russia	Saudi Arabia	Serbia	Slovenia
		Trinidad and Tobago	Tunisia	Uganda	Ukraine	United Arab Emirates	Venezuela
		Vietnam	Zambia	Zimbabwe			
Sovereign Debt	pre 1986	Austria	Belgium	Canada	Denmark	France	Germany
		Ireland	Japan	Netherlands	Sweden	Switzerland	UK
		Us					
	1986-99	Australia	Austria	Belgium	Canada	Denmark	Finland
		France	Germany	Ireland	Italy	Japan	Netherlands
		New Zealand	Norway	Portugal	Spain	Sweden	Switzerland
		UK	US				
	post 1999	Australia	Austria	Belgium	Canada	China	Czech Rep.
		Denmark	Finland	France	Germany	Hungary	India
		Ireland	Italy	Japan	Mexico	Netherlands	New Zealand
		Norway	Poland	Portugal	Singapore	South Africa	South Korea
		Spain	Sweden	Switzerland	UK	US	
REIT	pre 2000	Australia	Belgium	Canada	France	Germany	Italy
		Netherlands	South Africa	UK	US		

	post 2000	Australia	Belgium	Bulgaria	Canada	France	Germany
		Greece	Hong Kong	Ireland Italy	Japan	Malaysia	Mexico
		Netherlands	New Zealand	Portugal	Singapore	South Africa	Spain
		Turkey	UK	US			

Notes: This table lists the markets used in estimating diversification indexes for equities, sovereign debt and REITS broken out by cohorts. There are 95 equity indexes, 30 sovereign debt indexes and 22 REIT indexes with data obtained from DataStream. Cohorts for equities are pre1974, 1974-1983, 1984-1993 and post1993; for sovereign debts are pre1986, 1986-1999 and post1999; and for REITs are pre2000 and post2000.

Table 2

Time Trends for Diversification Indexes for Equities, Sovereign Debt and REITs

Equity							
World	Argentina	Australia	Austria	Bahrain	Bangladesh	Belgium	Bosnia and Herzegovina
-0.070	-0.137	-0.266	-0.263	0.060	0.016	-0.203	0.499
-3.400	***-2.195***	***-6.105***	***-8.150***	***0.532***	***0.133***	***-4.998***	***3.134***
Botswana	Brazil	Bulgaria	Cambodia	Canada	Chad	Chile	China
-0.484	-0.328	-0.081	0.100	-0.324	-0.085	-0.321	-0.150
-7.706	***-6.959***	***-0.719***	***0.387***	***-7.270***	***-0.512***	***-6.549***	***-3.426***
Colombia	Cote D'Ivoire	Croatia	Cyprus	Czech Republic	Denmark	Ecuador	Egypt
-0.157	0.248	-0.325	0.094	-0.374	-0.104	0.031	-0.022
-0.938	***3.335***	***-4.784***	***0.601***	***-5.103***	***-2.583***	***0.608***	***-0.552***
Estonia	Finland	France	Georgia	Germany	Ghana	Greece	Hong Kong
-0.178	-0.388	-0.382	-0.261	-0.329	0.026	-0.174	-0.210
-2.468	***-9.190***	***-9.389***	***-1.438***	***-7.527***	***0.696***	***-3.621***	***-5.174***
Hungary	Iceland	India	Indonesia	Iraq	Ireland	Israel	Italy
-0.239	-0.084	-0.297	-0.214	-0.410	-0.189	-0.293	-0.458
-4.213	***-1.513***	***-6.984***	***-4.583***	***-2.897***	***-4.343***	***-8.239***	***-10.080***
Jamaica	Japan	Jordan	Kazakhstan	Kenya	Kuwait	Latvia	Lebanon
-0.021	-0.121	0.109	0.257	0.014	-0.334	0.051	0.037
-0.557	***-2.934***	***2.687***	***1.568***	***0.490***	***-7.009***	***0.532***	***0.298***
Lithuania	Luxembourg	Macedonia	Malaysia	Malta	Mauritius	Mexico	Montenegro
-0.132	-0.041	-0.283	-0.039	0.162	-0.144	-0.310	-0.327
-1.487	***-0.675***	***-2.508***	***-0.812***	***1.838***	***-3.351***	***-5.490***	***-2.358***
Morocco	Namibia	Netherlands	New Zealand	Nigeria	Norway	Oman	Palestinian Territories
0.000	-0.270	-0.226	-0.135	-0.018	-0.297	-0.018	0.247
0.006	***-2.366***	***-7.468***	***-2.932***	***-0.522***	***-7.154***	***-0.365***	***0.760***
Pakistan	Panama	Peru	Philippines	Poland	Portugal	Qatar	Romania
0.054	0.091	-0.287	-0.152	-0.499	0.115	-0.119	-0.463
1.109	***2.331***	***-5.986***	***-3.872***	***-9.049***	***1.236***	***-2.119***	***-5.114***
Russia	Saudi Arabia	Serbia	Singapore	Slovakia	Slovenia	South Africa	South Korea
-0.378	-0.179	0.119	-0.067	-0.037	-0.679	-0.344	-0.447
-4.817	***-2.824***	***0.564***	***-1.630***	***-0.830***	***-4.663***	***-8.596***	***-10.950***
Spain	Sri Lanka	Sweden	Switzerland	Taiwan	Thailand	Trinidad and Tobago	Tunisia
-0.376	0.060	-0.357	-0.120	-0.434	-0.121	0.027	0.196
-8.411	***2.556***	***-9.478***	***-3.447***	***-12.210***	***-2.817***	***0.820***	***3.123***
Turkey	Uganda	Ukraine	United Arab Emirates	UK	US	Venezuela	Vietnam
-0.292	-0.040	-0.496	-0.059	-0.347	-0.335	0.123	-0.061
-5.905	***-0.647***	***-8.372***	***-0.418***	***-10.100***	***-6.636***	***3.410***	***-0.393***
Zambia	Zimbabwe						
-0.014	-0.136						
-0.425	***-1.152***						

Sovereign Debt							
World	Australia	Austria	Belgium	Canada	China	Czech Rep.	Denmark
-0.054	-0.161	-0.095	-0.117	-0.334	-0.324	0.037	-0.111
-2.514	***-4.312***	***-3.039***	***-3.362***	***-10.520***	***-3.419***	***0.471***	***-2.867***
Finland	France	Germany	Hungary	India	Indonesia	Ireland	Italy
-0.227	-0.091	-0.022	-0.220	0.349	Na	-0.129	-0.057
-3.605	***-3.005***	***-0.873***	***-2.459***	***3.028***	***Na***	***-3.252***	***-0.813***
Japan	Mexico	Netherlands	New Zealand	Norway	Poland	Portugal	Singapore
-0.053	0.579	-0.052	-0.245	0.060	-0.446	0.117	-0.294
-0.976	***2.954***	***-2.230***	***-5.261***	***1.755***	***-3.677***	***2.197***	***-1.217***
South Africa	South Korea	Spain	Sweden	Switzerland	UK	US	
-0.226	0.011	-0.145	-0.100	0.048	0.058	-0.188	
-2.886	***0.033***	***-3.161***	***-2.035***	***1.150***	***1.367***	***-6.113***	
REIT							
World	Australia	Belgium	Bulgaria	Canada	France	Germany	Greece
-0.158	-0.220	-0.316	-0.237	-0.495	-0.637	-0.057	0.023
-6.229	***-5.484***	***-5.436***	***-1.357***	***-9.671***	***-10.300***	***-0.926***	***0.156***
Hong Kong	Ireland	Italy	Japan	Malaysia	Mexico	Netherlands	New Zealand
-0.221	-0.706	-0.243	-0.079	0.190	-0.166	-0.021	0.004
-1.827	***-1.755***	***-3.095***	***-0.807***	***0.896***	***-0.775***	***-0.466***	***0.037***
Portugal	Singapore	South Africa	Spain	Turkey	UK	US	
0.324	-0.012	-0.574	-1.178	0.451	-0.298	-0.154	
0.578	***-0.089***	***-10.490***	***-2.548***	***2.241***	***-6.664***	***-3.399***	

Notes: This table shows the coefficient from fitting a linear trend to each market's diversification index followed by the associated t-test (in bold and italics). NA refers to cases where no trend statistics can be computed. This may have occurred for markets where there was at least one quarter of insufficient returns to calculate a diversification index in a quarter after the countries joined the database or where there were insufficient diversification index values to fit a time-trend. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every quarter in 1986-2021. The dependent variable in each regression is a country-specific return on an asset class and the explanatory variables are global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter.

Table 3

Time Trends for Diversification Indexes Across Three Asset Classes

Full sample							
Australia	Belgium	Canada	France	Germany	Ireland	Italy	Japan
-0.237	-0.125	-0.340	-0.318	-0.100	-0.068	-0.240	-0.047
-6.398	***-4.273***	***-10.839***	***-11.697***	***-4.406***	***-1.941***	***-5.375***	***-1.261***
Mexico	Netherlands	New Zealand	Portugal	Singapore	South Africa	Spain	UK
-0.231	-0.089	-0.136	0.235	-0.035	-0.411	-0.263	-0.137
-4.222	***-3.442***	***-3.540***	***4.889***	***-1.027***	***-10.720***	***-5.168***	***-3.873***
US							
-0.160							
-6.575							
Above diversification median							
Australia	Belgium	Canada	France	Germany	Ireland	Italy	Japan
-0.301	-0.141	-0.183	-0.238	-0.148	-0.101	-0.501	-0.195
-4.249	***-2.512***	***-3.714***	***-5.827***	***-4.746***	***-1.775***	***-5.993***	***-4.020***
Mexico	Netherlands	New Zealand	Portugal	Singapore	South Africa	Spain	UK
-0.300	-0.125	-0.193	0.201	-0.040	-0.214	-0.530	-0.153
-4.069	***-3.223***	***-3.413***	***1.977***	***-0.765***	***-3.133***	***-4.722***	***-2.722***
US							
-0.160							
-3.767							
Below diversification median							
Australia	Belgium	Canada	France	Germany	Ireland	Italy	Japan
-0.072	-0.012	-0.224	-0.075	0.016	0.039	-0.024	0.095
-1.313	***-0.403***	***-3.759***	***-1.327***	***0.387***	***0.828***	***-0.604***	***1.982***
Mexico	Netherlands	New Zealand	Portugal	Singapore	South Africa	Spain	UK
-0.011	-0.076	-0.021	0.088	0.137	-0.172	0.016	0.000
-0.128	***-2.722***	***-0.362***	***1.699***	***2.618***	***-2.687***	***0.462***	***0.000***
US							
-0.038							
-0.733							

Notes: This table shows the coefficient from fitting a linear trend to the average diversification indexes across asset classes followed by the associated t-test (in bold and italics). The diversification indexes are created for those countries where the three asset classes, equities, sovereign debt and REITs are available. The indexes represent portfolios containing the three asset classes together. The first panel is for the full period, followed by two subsamples corresponding to periods when the diversification index is above and below its median value. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every quarter between 1986 and 2021 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 13 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, UK, US; for sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Netherland, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US. To be included, a country/asset class must have at least 15 valid daily returns during the quarter.

Table 4

Variables Associated with Diversification Indexes

TED Spread, Percent, Not Seasonally Adjusted. 1986-. From FRED
VIX, 1990-. From FRED
SENT, Investor sentiment data, 1986-, From Jeffrey Wurgler
FEDFUNDS, US FEDERAL FUNDS RATE (MONTHLY AVERAGE), 1986-, From DataStream
ECONOMIC, Economic Risk is the aggregate of all the respective sub-indexes of macro factors obtained from the International Country Risk Guide (ICRG), 1986-, From the PRS Group.
FINANCIAL, Financial Risk is the aggregate of all the respective financial and exchange rate sub-indexes including obtained from the International Country Risk Guide (ICRG), 1986-, From the PRS Group.
POLITICAL, Political Risk is the aggregate of all the respective sub-indexes obtained from the International Country Risk Guide (ICRG), 1986-, From the PRS Group.
LIQUIDITY, Liquidity is obtained using the measure suggested by Lesmond, Ogden, and Trzcinka (1999), 1986-, From DataStream.
GLOBAL INTERNET, Percentage of Individual Using the Internet, Aggregate of all countries, 1986-, From World Bank WDI.
EDUCATION, Government expenditure on education, total (% of GDP), 1986-, From World Bank WDI.
LITERACY, Literacy rate, adult total (% of people ages 15 and above), 1986-, From World Bank WDI.
ATM, Automated teller machines (ATMs) (per 100,000 adults), 1986-, From World Bank WDI.
EXPECTANCY, Life expectancy at birth, total (years), 1986-, From World Bank WDI.
BROADBAND, Fixed broadband subscriptions (per 100 people), 1986-, From World Bank WDI.
CELL, Mobile cellular subscriptions (per 100 people), 1986-, From World Bank WDI.
SERVERS, Secure Internet servers (per 1 million people), 1986-, From World Bank WDI.
ENROLLMENT, School enrolment, secondary (gross), gender parity index (GPI), 1986-, From World Bank WDI.

HOSPITAL, hospital beds/1000 people, 1986-, From World Bank WDI.
PHYSICIANS, physicians/1000 people, 1986-, From World Bank WDI.
MORTALITY, Maternal mortality ratio (modeled estimate, per 100,000 live births), 1986-, From World Bank WDI.
RESEARCH, Research and development expenditure (% of GDP), 1986-, From World Bank WDI.
INTERNET, Percentage of Individual Using the Internet, Country level, 1986-, From World Bank WDI.
DEVPC1, The first Principal Component of a set of 13 individual developmental factors from World Bank WDI , 1986-.
INSTOWN, Percentage Institutional ownership, 1999- , From FactSet.
1992-1993 ERM crisis dummy, 1 for crisis quarters and 0 for other quarters
2009-10 - Eurozone bond crisis dummy, 1 for crisis quarters and 0 for other quarters
2020-21 - Covid-19 crisis dummy, 1 for crisis quarters and 0 for other quarters

Notes: The table defines the independent variables considered for the panel regressions and their data sources. The variables are both macro-financial (TED Spread, VIX, SENT, FEDFUNDS, ECONOMIC, POLITICAL, FINANCIAL and LIQUIDITY) and developmental proxies (EDUCATION, LITERACY, ATM, EXPECTANCY, BROADBAND, CELL, SERVERS, ENROLLMENT, HOSPITAL, PHYSICIANS, MORTALITY, RESEARCH, INTERNET and PCDEV1). Given very high correlations (in excess of 0.9) between developmental variables a further developmental variable, DEVPC1, is also included separately as a developmental factor. PCDEV1 is the first Principal Component of a set of 13 developmental factors. All variables are quarterly for the timeframe 1986-2021 inclusive, except VIX which is from 1990-2021. There are a set of Global and World Factors, aggregates of individual country level or individual series (TED, VIX, SENT, FED FUNDS, and GLOBAL INTERNET). All other series are obtained at country level. TED Spread is the annual TED spread obtained from FRED. VIX is the option volatility index from the Chicago Board Options Exchange obtained from FRED. SENT is investor sentiment described in Baker and Wurgler (2006) obtained from Jeffrey Wurgler. FEDFUNDS is the US Federal Funds Rate obtained from DataStream. LIQUIDITY is obtained for each quarter and each asset by counting the capitalisation weighted proportional incidence of observed zero daily returns suggested by Lesmond, Ogden, and Trzcinka (1999). ECONOMIC is the aggregate economic risk index composed of 5 sub-indexes (GDP per Head, Real GDP Growth, Annual Inflation Rate, Budget Balance as a Percentage of GDP, and Current Account as a Percentage of GDP). FINANCIAL is the aggregate financial risk index composed of 5 sub-indexes (Foreign Debt as a Percentage of GDP, Foreign Debt Service as a Percentage of Exports of Goods and Services, Current Account as a Percentage of Exports of Goods and Services, Net International Liquidity as Months of Import Cover, Exchange Rate Stability). POLITICAL is the aggregate

political risk index composed of 12 sub-indexes (Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability, and Bureaucracy Quality).

Table 5
Panel Regression Analysis of Diversification Indexes with Global and Country Developmental Factors

	Global Internet			Country Internet			DEVPC1	
	Equity	Sovereign Debt	REIT	Equity	Sovereign Debt	REIT	Equity	Sovereign Debt
TED	-6.088	-4.320	-15.430	-5.134	-2.917	-13.980	-5.790	-2.269
	0.000	***0.000***	***0.000***	***0.000***	***0.021***	***0.000***	***0.000***	***0.064***
VIX	-0.468	0.063	-0.221	-0.453	0.034	-0.200	-0.458	-0.007
	0.000	***0.244***	***0.016***	***0.000***	***0.535***	***0.028***	***0.000***	***0.892***
SENT	1.298	1.423	1.872	1.488	1.236	2.376	1.546	0.643
	0.000	***0.012***	***0.079***	***0.000***	***0.028***	***0.024***	***0.000***	***0.252***
FEDFUNDS	1.485	1.638	2.778	1.625	1.135	2.838	1.502	0.284
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.233***
ERM	-5.319	-8.704	1.780	-5.652	-7.656	1.847	-0.079	-0.072
	0.000	***0.000***	***0.648***	***0.000***	***0.000***	***0.636***	***0.000***	***0.000***
EUROZONE	3.863	-0.656	11.340	3.371	-1.959	11.390	-5.310	-4.865
	0.003	***0.764***	***0.001***	***0.011***	***0.378***	***0.001***	***0.000***	***0.023***
COVID	-2.374	-2.167	-8.653	-3.867	-1.608	-11.630	-5.027	-0.628
	0.051	***0.265***	***0.003***	***0.001***	***0.401***	***0.000***	**0.000**	**0.740**
Global Internet	-0.194	-0.017	-0.239					
	0.000	***0.364***	***0.000***					
Country Internet				-0.173	-0.059	-0.194		
				0.000	***0.000***	***0.000***		
DEVPC1							-5.027	-0.628
							0.000	***0.740***
Adj. R sq	0.175	0.053	0.208	0.181	0.060	0.208	0.189	0.077
N Obs.	10558	3349	1908	10279	3263	1908	10279	3263

Notes: The unbalanced regressions estimate the relation between the diversification indexes, Equity, Sovereign Debt and REITs, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors, a single variable, proxied three times is included in the regressions. Global INTERNET is an average of all countries INTERNET usage whereas Country Internet represents country level data. The first Principal Component of a set of country level developmental factors, DEVPC1, is also included separately as a developmental factor instead of internet. Results are reported for unbalanced panels with a timeframe 1986-2021. Country fixed effects are included in all regressions. P-values are in bold and italics.

Table 6

Panel regression analysis for Developed, Emerging and Frontier equity markets with Global and Country Developmental Factors

	Global Internet			Country Internet			DEVPC1		
	Developed	Emerging	Frontier	Developed	Emerging	Frontier	Developed	Emerging	Frontier
TED	-6.018	-6.312	-10.290	-5.313	-6.274	-9.305	-4.179	-6.302	-9.818
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
VIX	-0.550	-0.356	-0.081	-0.480	-0.341	-0.144	-0.592	-0.348	-0.111
	0.000	***0.000***	***0.185***	***0.000***	***0.000***	***0.017***	***0.000***	***0.000***	***0.060***
SENT	1.256	1.465	0.727	2.008	1.400	0.468	1.231	1.434	0.643
	0.006	***0.009***	***0.259***	***0.000***	***0.013***	***0.467***	***0.006***	***0.011***	***0.315***
FEDFUNDS	1.479	1.349	1.559	2.194	1.391	1.160	0.633	1.314	1.368
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.001***	***0.000***	***0.000***
ERM	-5.776	-3.993	-0.015	-8.031	-3.036	0.304	-4.237	-3.067	-0.003
	0.000	***0.040***	***0.994***	***0.000***	***0.121***	***0.884***	***0.008***	***0.116***	***0.999***
EUROZONE	3.978	4.044	3.873	3.602	4.127	3.478	4.864	4.806	3.966
	0.022	***0.043***	***0.091***	***0.040***	***0.041***	***0.128***	***0.004***	***0.017***	***0.083***
COVID	0.136	-5.898	-7.296	-4.246	-6.031	-5.482	-2.819	-6.648	-6.890
	0.935	***0.001***	***0.001***	***0.009***	***0.001***	***0.009***	***0.073***	***0.000***	***0.001***
Global Internet	-0.273	-0.078	-0.012						
	0.000	***0.000***	***0.572***						
Country Internet				-0.158	-0.084	-0.076			
				0.000	***0.000***	***0.000***			
DEVPC1							-0.145	-0.031	-0.016
							0.000	***0.000***	***0.002***
Adj. R sq	0.244	0.090	0.049	0.229	0.085	0.054	0.274	0.090	0.052
N Obs.	6228	4330	2919	6228	4051	2919	6228	4051	2919

Notes: The unbalanced regressions estimate the relation between the diversification indexes, Developed, Emerging and Frontier Equity, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors, a single variable, proxied three times is included in the regressions. Global INTERNET is an average of all countries INTERNET usage whereas Country Internet represents country level data. The first Principal Component of a set of country level developmental factors, DEVPC1, is also included separately as a developmental factor instead of internet. Results are reported for unbalanced panels with a timeframe 1986-2021. Country fixed effects are included in all regressions. P-values are in bold and italics.

Table 7

Panel Regression Analysis of Diversification Indexes

	No Internet			INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Sovereign debt	REIT	Equity	Sovereign debt	REIT	Equity	Sovereign debt	REIT
TED	-6.727	-3.880	-16.450	-5.245	-4.128	-15.500	-4.786	-3.282	-14.390
	0.000	***0.002***	***0.000***	***0.000***	***0.001***	***0.000***	***0.000***	***0.007***	***0.000***
VIX	-0.365	0.180	-0.172	-0.481	0.210	-0.288	-0.478	0.136	-0.308
	0.000	***0.001***	***0.062***	***0.000***	***0.000***	***0.002***	***0.000***	***0.016***	***0.001***
SENT	2.278	1.749	1.976	1.330	2.074	0.748	1.534	1.322	0.878
	0.000	***0.002***	***0.066***	***0.000***	***0.000***	***0.488***	***0.000***	***0.019***	***0.409***
FEDFUNDS	2.420	1.342	3.980	1.224	1.702	2.667	1.204	0.629	2.111
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.009***	***0.000***
ERM	-6.635	-4.664	-4.173	-4.450	-5.433	-1.549	-4.699	-2.931	0.043
	0.000	***0.028***	***0.288***	***0.000***	***0.011***	***0.692***	***0.000***	***0.173***	***0.991***
EUROZONE	5.766	-3.366	14.760	4.656	-2.967	13.140	5.371	-3.483	13.890
	0.000	***0.125***	***0.000***	***0.000***	***0.176***	***0.000***	***0.000***	***0.111***	***0.000***
COVID	-8.282	-4.232	-12.550	-3.481	-5.780	-7.345	-5.589	-3.103	-9.092
	0.000	***0.025***	***0.000***	***0.004***	***0.003***	***0.011***	***0.000***	***0.102***	***0.001***
Economic	-0.240	-0.637	0.533	-0.088	-0.721	0.764	-0.102	-0.430	0.928
	0.000	***0.000***	***0.001***	***0.086***	***0.000***	***0.000***	***0.041***	***0.000***	***0.000***
Financial	0.222	0.727	0.075	0.194	0.781	-0.219	0.199	0.627	-0.343
	0.000	***0.000***	***0.778***	***0.001***	***0.000***	***0.414***	***0.001***	***0.000***	***0.200***
Political	-0.218	-0.259	-0.131	-0.314	-0.232	-0.180	-0.265	-0.302	-0.141
	0.000	***0.001***	***0.405***	***0.000***	***0.002***	***0.248***	***0.000***	***0.000***	***0.362***
LIQUIDITY	0.848	-7.245	-0.917	0.444	-7.735	-0.028	3.868	-5.921	-1.647
	0.479	***0.001***	***0.827***	***0.708***	***0.000***	***0.995***	***0.001***	***0.008***	***0.690***
INSTOWN	-0.403	0.016	-0.388	-0.324	-0.023	-0.263	-0.316	0.078	-0.209
	0.000	***0.675***	***0.000***	***0.000***	***0.569***	***0.000***	***0.000***	***0.053***	***0.000***
INTERNET				-0.167	0.061	-0.225			
				0.000	***0.006***	***0.000***			
DEVPC1							-0.070	-0.049	-0.138
							0.000	***0.000***	***0.000***
Adj. R sq	0.187	0.094	0.206	0.200	0.096	0.222	0.213	0.100	0.232
N Obs.	10279	3263	1908	10279	3263	1908	10279	3263	1908

The unbalanced panel regressions estimate the relation between the diversification indexes, Equity, Sovereign debt and REIT, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors, a single variable, is included in the regressions. INTERNET represents country level data. The first Principal Component of a set of country level developmental factors, DEVPC1, is also included separately as a developmental factor instead of internet. Results are reported for unbalanced panels with a timeframe 1986-2021. Country fixed effects are included in all regressions. P-values are in bold and italics.

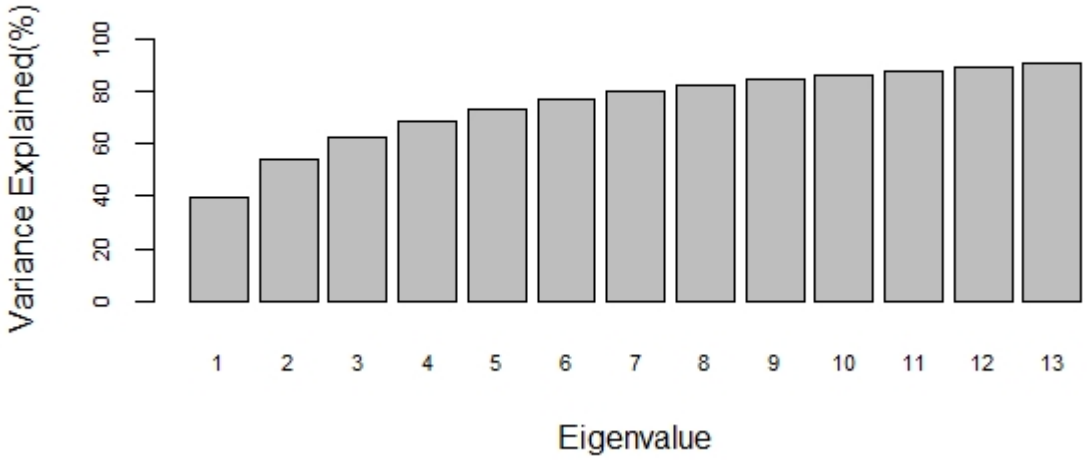
Table 8
Panel Regression Analysis for Geographical Cohorts

	Geographical Cohorts Equity		
	Developed	Emerging	Frontier
TED	-5.281	-4.939	-8.959
	0.000	***0.000***	***0.000***
VIX	-0.570	-0.376	-0.117
	0.000	***0.000***	***0.053***
SENT	1.322	1.414	0.942
	0.004	***0.011***	***0.139***
FEDFUNDS	1.181	1.254	1.362
	0.000	***0.000***	***0.000***
INTERNET	-0.255	-0.050	-0.005
	0.000	***0.008***	***0.817***
ERM	-5.281	-4.119	0.757
	0.001	***0.033***	***0.717***
EUROZONE	4.902	4.023	3.821
	0.004	***0.042***	***0.091***
COVID	-1.194	-6.889	-7.981
	0.469	***0.000***	***0.000***
Economic	0.021	-0.163	-0.301
	0.749	***0.046***	***0.002***
Financial	0.150	-0.005	0.234
	0.090	***0.959***	***0.031***
Political	-0.355	-0.109	-0.188
	0.000	***0.036***	***0.000***
LIQUIDITY	1.974	0.505	-2.354
	0.213	***0.786***	***0.306***
INSTOWN	-0.214	-0.402	-0.499
	0.000	***0.000***	***0.000***
Adj. R sq	0.263	0.109	0.076
N Obs.	6228	4330	2919

The unbalanced regressions estimate the relation between the diversification indexes and proxies for macro-financial and developmental factors. Results are reported for unbalanced panels with a timeframe 1986-2021. A geographical breakout is presented for Developed, Emerging and Frontier markets. Due to a lack of country level diversification indexes this geographical analysis is completed for equities only. Country fixed effects are included in all regressions. The identification of developed and emerging economies uses the United Nations Human Development Index that incorporates a number of distinguishing features such as income and education. The United Nations country title of 'very high human development' is designated as developed economies and those outside this list as emerging economies. These lists were further stratified by the Standard & Poor's list of Frontier markets to detail markets that were developing but too small to be considered emerging markets. P-values are in bold and italics

Appendix Figure 1

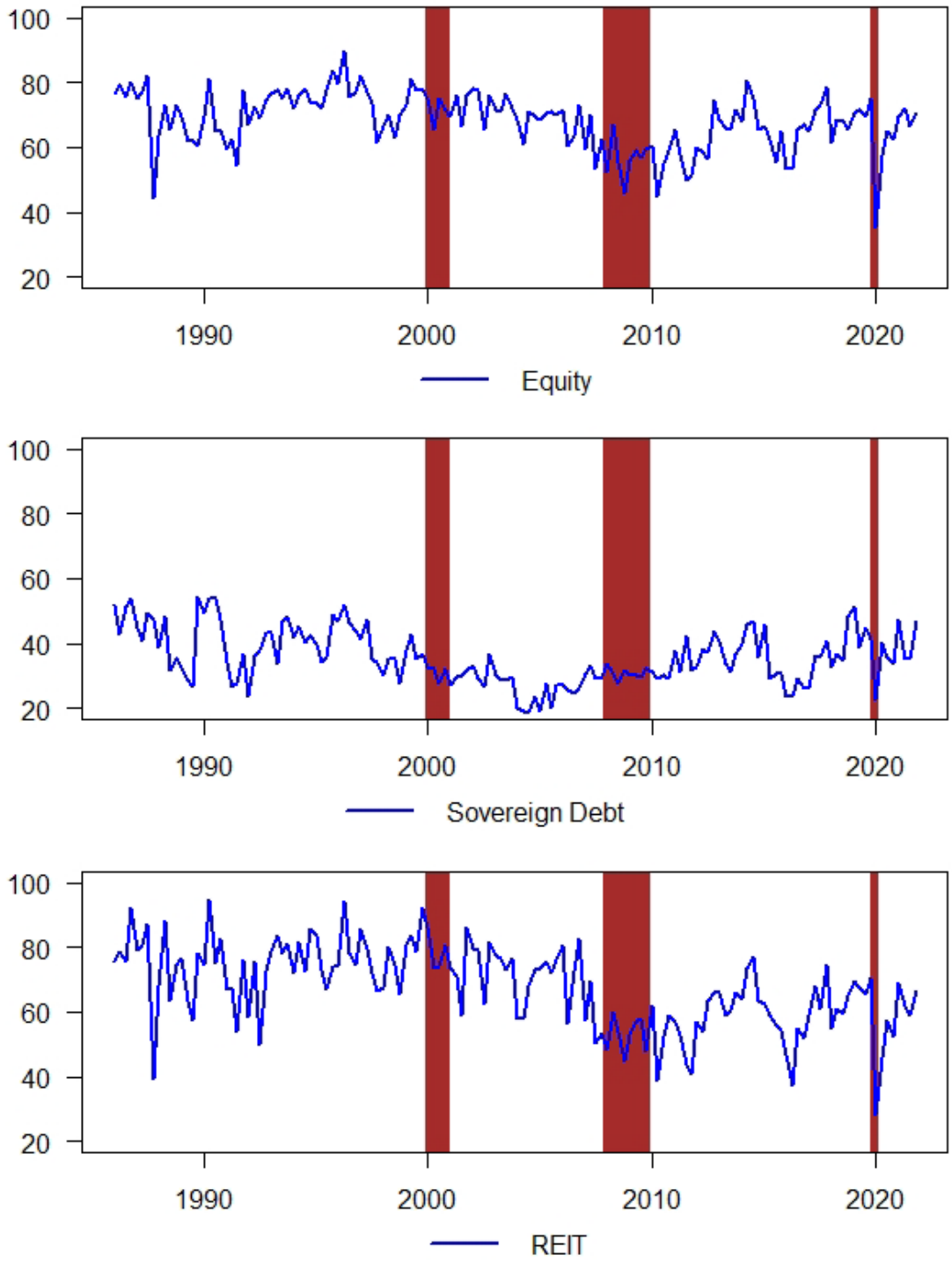
Average Cumulative Percentage of Variance Explained by Sorted Eigenvalues from Pre-1986 Cohort Covariance Matrices



Notes: This figure shows the average cumulative percentage of variance explained by the sorted (low to high) eigenvalues from pre-1986 cohort covariance matrices. These eigenvalues represent averages for the period 1986-2021. The principal components are obtained from the pre-1986 markets (equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, UK, US; sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Switzerland, UK, US; REITs: Australia, Netherlands, UK, and US).

Appendix Figure 2

Trends in World Diversification Indexes and Recessions



Notes: This figure shows the average diversification indexes for each asset class and NBER recessions between 1986 and 2021. There is a time-series plot of the diversification indexes and NBER recessionary period (red bars). The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every quarter between 1986 and 2021 for

all markets in the database. The model fits asset returns within each quarter on global factors. The global factors are 16 principal components obtained from the pre1986 markets (equities: Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, UK, US; sovereign debt: Austria, Canada, France, Germany, Ireland, Japan, Switzerland, UK, US; REITs: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 15 valid daily returns per quarter.

Appendix Table 1

Panel Regression Analysis of Diversification Indexes with Alternative Specifications

	Lagged RHS variables - Contemporaneous diversification								
	No Internet			INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	-6.211	-5.840	-14.814	-4.257	-5.877	-12.517	-4.379	-5.245	-12.687
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
VIX	0.018	0.110	0.168	-0.061	0.111	0.082	-0.079	0.071	0.044
	0.589	***0.038***	***0.058***	***0.062***	***0.038***	***0.350***	***0.015***	***0.186***	***0.615***
SENT	2.265	1.323	2.173	1.578	1.331	1.062	1.497	0.883	0.994
	0.000	***0.018***	***0.048***	***0.000***	***0.017***	***0.331***	***0.000***	***0.116***	***0.360***
FEDFUNDS	2.207	1.591	3.600	1.271	1.611	2.113	1.009	0.850	1.560
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
ERM	-5.784	-5.805	-4.237	-4.520	-5.838	-1.373	-3.824	-4.057	0.303
	0.000	***0.006***	***0.292***	***0.000***	***0.006***	***0.730***	***0.003***	***0.057***	***0.939***
EUROZONE	-2.990	1.395	7.030	-4.882	1.435	4.321	-3.686	1.147	5.620
	0.025	***0.519***	***0.050***	***0.000***	***0.510***	***0.224***	***0.005***	***0.594***	***0.111***
COVID	-8.887	3.971	-16.140	-5.471	3.929	-12.268	-5.651	5.532	-11.376
	0.000	***0.193***	***0.000***	***0.005***	***0.200***	***0.006***	***0.003***	***0.070***	***0.011***
Economic	-0.339	-0.608	0.496	-0.153	-0.615	1.032	-0.199	-0.392	0.931
	0.000	***0.000***	***0.003***	***0.004***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
Financial	0.342	0.750	0.406	0.186	0.753	-0.037	0.319	0.650	-0.037
	0.000	***0.000***	***0.141***	***0.003***	***0.000***	***0.894***	***0.000***	***0.000***	***0.892***
Political	-0.214	-0.276	-0.280	-0.262	-0.274	-0.331	-0.262	-0.323	-0.292
	0.000	***0.000***	***0.087***	***0.000***	***0.000***	***0.041***	***0.000***	***0.000***	***0.069***
LIQUIDITY	1.484	-6.776	0.108	2.015	-6.795	-0.047	4.487	-5.434	-0.754
	0.225	***0.002***	***0.980***	***0.097***	***0.002***	***0.991***	***0.000***	***0.015***	***0.858***
INSTOWN	-0.378	0.014	-0.404	-0.244	0.011	-0.165	-0.290	0.079	-0.206
	0.000	***0.721***	***0.000***	***0.000***	***0.807***	***0.011***	***0.000***	***0.051***	***0.001***
INTERNET				-0.139	0.003	-0.257			
				0.000	***0.873***	***0.000***			
DEVPC1							-0.069	-0.051	-0.150
							0.000	***0.000***	***0.000***
Adj. R sq	0.149	0.094	0.167	0.163	0.093	0.191	0.175	0.100	0.198
N Obs.	10255	3250	1904	10255	3250	1904	10255	3250	1904
	Change in levels of all variables (LHS and RHS)								
	No Internet			INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	0.556	-1.004	1.443	0.552	-1.010	1.438	0.57	-0.996	1.491
	0.565	***0.466***	***0.591***	***0.567***	***0.463***	***0.592***	***0.555***	***0.470***	***0.579***
VIX	-0.786	0.191	-0.815	-0.786	0.191	-0.815	-0.786	0.191	-0.815
	0.000	***0.003***	***0.000***	***0.000***	***0.003***	***0.000***	***0.000***	***0.003***	***0.000***
SENT	-3.745	1.730	-2.945	-3.746	1.724	-2.960	-3.733	1.748	-2.847
	0.000	***0.181***	***0.266***	***0.000***	***0.183***	***0.264***	***0.000***	***0.178***	***0.284***
FEDFUNDS	-2.726	0.519	-1.601	-2.733	0.499	-1.603	-2.738	0.513	-1.593
	0.000	***0.469***	***0.259***	***0.000***	***0.487***	***0.259***	***0.000***	***0.474***	***0.262***

ERM	-2.928	2.845	-2.907	-2.920	2.871	-2.883	-2.910	2.882	-2.707
	0.082	***0.255***	***0.570***	***0.083***	***0.251***	***0.574***	***0.084***	***0.250***	***0.598***
EUROZONE	-0.961	-2.181	-0.157	-0.964	-2.195	-0.178	-0.947	-2.170	-0.123
	0.509	***0.326***	***0.968***	***0.507***	***0.323***	***0.964***	***0.515***	***0.328***	***0.975***
COVID	-24.155	-19.591	-23.668	-24.151	-19.578	-23.668	-24.150	-19.589	-23.678
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
Economic	0.618	-0.637	0.816	0.634	-0.577	0.862	0.627	-0.617	0.846
	0.075	***0.263***	***0.489***	***0.069***	***0.318***	***0.471***	***0.071***	***0.283***	***0.474***
Financial	0.116	0.462	-0.442	0.119	0.454	-0.459	0.128	0.453	-0.479
	0.775	***0.535***	***0.784***	***0.770***	***0.543***	***0.776***	***0.754***	***0.544***	***0.767***
Political	-0.323	-0.017	-0.211	-0.325	-0.033	-0.218	-0.325	-0.020	-0.204
	0.181	***0.969***	***0.816***	***0.179***	***0.941***	***0.810***	***0.179***	***0.964***	***0.822***
LIQUIDITY	7.612	-2.626	-8.367	7.564	-2.895	-8.214	7.676	-2.598	-8.369
	0.395	***0.836***	***0.731***	***0.398***	***0.819***	***0.736***	***0.391***	***0.838***	***0.731***
INSTOWN	-0.150	-0.228	-0.488	-0.128	-0.165	-0.439	-0.114	-0.199	-0.376
	0.658	***0.572***	***0.528***	***0.709***	***0.694***	***0.582***	***0.741***	***0.637***	***0.641***
INTERNET				-0.067	-0.100	-0.085			
				0.621	**0.571**	**0.809**			
DEVPC1							-0.078	-0.044	-0.177
							0.431	***0.819***	***0.627***
Adj. R sq	0.077	0.016	0.060	0.077	0.016	0.059	0.077	0.016	0.059
N Obs.	10175	3234	1886	10175	3234	1886	10175	3234	1886
	Change in levels of all RHS variables								
		No Internet		INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	3.208	1.541	2.051	3.121	1.463	2.049	3.264	1.672	1.780
	0.001	***0.289***	***0.453***	***0.001***	***0.311***	***0.454***	***0.001***	***0.249***	***0.514***
VIX	-0.552	0.030	-0.496	-0.554	0.023	-0.496	-0.552	0.032	-0.502
	0.000	***0.652***	***0.000***	***0.000***	***0.732***	***0.000***	***0.000***	***0.635***	***0.000***
SENT	-1.352	3.068	-1.146	-1.354	2.990	-1.151	-1.296	3.357	-1.815
	0.137	***0.025***	***0.670***	***0.134***	***0.028***	***0.669***	***0.154***	***0.014***	***0.501***
FEDFUNDS	2.675	-0.033	5.575	2.473	-0.283	5.573	2.616	-0.133	5.521
	0.000	***0.965***	***0.000***	***0.000***	***0.707***	***0.000***	***0.000***	***0.860***	***0.000***
ERM	-4.569	2.470	-5.377	-4.362	2.788	-5.367	-4.489	3.089	-6.692
	0.006	***0.350***	***0.304***	***0.009***	***0.289***	***0.305***	***0.007***	***0.243***	***0.201***
EUROZONE	1.990	-2.116	-0.704	1.933	-2.289	-0.711	2.061	-1.933	-0.928
	0.177	***0.368***	***0.860***	***0.187***	***0.327***	***0.859***	***0.162***	***0.410***	***0.816***
COVID	-8.353	-9.265	-7.725	-8.256	-9.108	-7.724	-8.327	-9.239	-7.651
	0.000	***0.000***	***0.027***	***0.000***	***0.000***	***0.027***	***0.000***	***0.000***	***0.028***
Economic	0.860	0.375	3.089	1.237	1.104	3.106	0.900	0.704	2.899
	0.014	***0.530***	***0.010***	***0.000***	***0.068***	***0.011***	***0.010***	***0.243***	***0.016***
Financial	-0.184	-1.845	-3.455	-0.120	-1.953	-3.461	-0.132	-2.003	-3.229
	0.654	***0.019***	***0.035***	***0.769***	***0.013***	***0.035***	***0.749***	***0.011***	***0.049***
Political	0.880	0.988	1.675	0.828	0.795	1.672	0.872	0.938	1.633
	0.000	***0.033***	***0.070***	***0.001***	***0.085***	***0.071***	***0.000***	***0.043***	***0.077***
LIQUIDITY	-16.151	-21.182	-21.018	-17.317	-24.435	-20.980	-15.878	-20.699	-20.434
	0.075	***0.114***	***0.391***	***0.055***	***0.067***	***0.392***	***0.080***	***0.122***	***0.404***
INSTOWN	-2.010	-3.841	2.959	-1.483	-3.063	2.977	-1.834	-3.361	2.225

	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.007***
INTERNET				-1.585	-1.232	-0.031			
				0.000	***0.000***	***0.930***			
DEVPC1							-0.369	-0.737	1.145
							0.000	***0.000***	***0.002***
Adj. R sq	0.028	0.023	0.031	0.041	0.036	0.031	0.029	0.027	0.036
N Obs.	10255	3250	1904	10255	3250	1904	10255	3250	1904
				Change in levels of INTERNET only					
		No Internet		INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	-6.764	-3.936	-16.230	-6.783	-4.333	-16.177	-6.854	-4.397	-16.273
	0.000	***0.001***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
VIX	-0.358	0.189	-0.201	-0.377	0.167	-0.209	-0.350	0.229	-0.193
	0.000	***0.000***	***0.020***	***0.000***	***0.002***	***0.016***	***0.000***	***0.000***	***0.026***
SENT	2.152	1.644	1.897	2.558	2.074	2.070	2.275	2.076	2.064
	0.000	***0.003***	***0.075***	***0.000***	***0.000***	***0.054***	***0.000***	***0.000***	***0.054***
FEDFUNDS	2.431	1.329	4.063	2.241	1.083	4.008	2.449	1.399	4.089
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
ERM	-6.522	-4.502	-4.370	-5.636	-3.261	-3.958	-6.168	-1.849	-3.157
	0.000	***0.034***	***0.263***	***0.000***	***0.124***	***0.312***	***0.000***	***0.387***	***0.428***
EUROZONE	5.629	-3.561	15.359	6.348	-2.278	15.627	5.994	-3.403	15.358
	0.000	***0.099***	***0.000***	***0.000***	***0.291***	***0.000***	***0.000***	***0.112***	***0.000***
COVID	-26.351	-15.513	-29.376	-26.867	-16.010	-29.588	-27.003	-17.176	-29.893
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
Economic	-0.237	-0.637	0.557	-0.198	-0.533	0.585	-0.185	-0.461	0.616
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
Financial	0.220	0.729	0.066	0.249	0.775	0.063	0.233	0.740	0.070
	0.000	**0.000**	**0.802**	**0.000**	**0.000**	**0.813**	**0.000**	**0.000**	**0.793**
Political	-0.214	-0.261	-0.130	-0.197	-0.280	-0.122	-0.224	-0.293	-0.143
	0.000	***0.000***	***0.407***	***0.000***	***0.000***	***0.436***	***0.000***	***0.000***	***0.360***
LIQUIDITY	0.785	-7.490	-0.508	0.956	-7.672	-0.539	0.892	-6.769	-0.207
	0.509	***0.001***	***0.903***	***0.420***	***0.001***	***0.897***	***0.452***	***0.002***	***0.960***
INSTOWN	-0.402	0.015	-0.390	-0.431	-0.055	-0.402	-0.421	-0.064	-0.404
	0.000	***0.702***	***0.000***	***0.000***	***0.171***	***0.000***	***0.000***	***0.105***	***0.000***
INTERNET				-1.155	-1.151	-0.409			
				0.000	***0.000***	***0.219***			
DEVPC1							-0.572	-1.568	-0.535
							0.000	***0.000***	***0.133***
Adj. R sq	0.196	0.098	0.216	0.202	0.107	0.216	0.199	0.112	0.216
N Obs.	10255	3250	1904	10255	3250	1904	10255	3250	1904

The unbalanced panel regressions estimate the relation between the diversification indexes, Equity, Sovereign debt and REIT, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors, a single variable, is included in the regressions. INTERNET represents country level data. The first Principal Component of a set of country level developmental factors, DEVPC1, is also included separately as a developmental factor instead of internet. Results are reported for unbalanced panels with a timeframe 1986-2021. Country fixed

effects are included in all regressions. P-values are in bold and italics. This table looks at alternative specifications of the model in Table 7 in the paper. We looked at regressions with the change in levels of all variables, the change in levels of internet/DEVPC1 only, the change in levels of all right-hand side variables, and a relationship between lagged right-hand side variables and contemporaneous diversification.