NOWHERE TO RUN, NOWHERE TO HIDE: ASSET DIVERSIFICATION IN A FLAT WORLD

By

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ABSTRACT

We estimate trends in diversification potential for equity, debt, and real estate within and across countries. After 2000, we uncover a marked and near ubiquitous decline in diversification potential, which coincides with sharply higher levels of investment risk. This decline is associated with country economic development and technology (internet) diffusion. Diversification potential also waned temporarily during the 1992 ERM and 2009-2010 European sovereign debt crises. The results are robust to controls for macro-financial and market liquidity influences and proxies for economic, political, and financial risks. Findings offer a cautionary note regarding asset class and geographic diversification of investment risk in an increasingly flat world.

Keywords: asset return integration and diversification, equities, fixed income, real estate, economic development
JEL Classification: G01, G10, G11, G12, G14, G15

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1. Introduction

Diversification is fundamental to risk mitigation. An early adage to diversify is found in the Book of Ecclesiastes (935 B.C.), which advises, "But divide your investments among many places, for you do not know what risks might lie ahead." In 1710, S. Palmer (Moral Essays on Proverbs, 344) similarly admonishes "not to venture all your eggs in one basket". More recently, the California Public Employees Retirement System (CalPERS) undertakes to diversify pension investments among stocks, bonds, and real estate to maximize returns at a prudent level of risk. Similar strategies are proclaimed by virtually all major pension and investment advisory firms. [4]

During the late-2000s meltdown, anecdotal evidence suggested that diversification was not all that effective. Individual and institutional investors incurred substantial losses because of unforeseen and unprecedented contemporaneous price declines across asset classes and markets. But even prior to that crisis, limitations to diversification were becoming apparent. In the popular media, Thomas Friedman, in his bestseller titled "The World is Flat" (2007), depicted a globalized marketplace where, in the wake of innovations in technology, extension of global supply chains, and widespread accretions to household wealth, geographical divisions were becoming less relevant. In a more connected global economy, investment diversification opportunities should be less readily available. Diversification provides fewer benefits when returns across assets and geographies are highly integrated. Limitations on diversification have major implications for investment strategies, fund composition, and macroeconomic and asset management.

Despite the overwhelming prevalence of asset diversification strategies, few studies have sought to investigate the implications of a more integrated world for diversification potential and related risk mitigation. 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,

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

Errunza and Brandon (2014)). Correlations are commonly connected (inversely) with diversification. Further, international evidence on cross-country correlation is mixed; it is typically lower for emerging equity markets (Berger, Pukthuanthong and Yang, 2011; and Goetzmann, Li and Rouwenhorst, 2005). In contrast, relatively large and rising correlations have been found for tail return dependence (Christofferson, Errunza, Jacobs and Langlois, 2012; and You and Daigler, 2010). The profile of correlations and associated diversification differs for emerging (relatively low) and developed markets (relatively high) (Christofersson, Errunza, Jacobs and Langlois, 2012; Bekaert and Harvey, 2014; Eiling and Gerard, 2014). More generally, Roll (2013) has questioned the link between correlation and diversification potential.

We present new indexes of diversification potential. Little is known about global diversification potential across asset classes (including real estate, sovereign debt and equities) and across countries over the 2000s financial crisis and beyond. We relate our new indexes to the risk of diversified global investment portfolios. We also uncover drivers of the diversification indexes and estimate the roles of macro-financial, economic development and country risk and technology diffusion factors. 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 shocks and policy. Such measures also are vital to macroprudential policymakers that seek to enact regulatory and economic measures to mitigate catastrophic risk associated with economic and financial crises.

Our study commences with estimation of return integration within and among asset classes and global 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 estimate models of return integration within and among equity, fixed income, and real estate asset classes and countries.

We then compute new indexes of diversification potential [defined as 100 –the level of 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 discuss index methodology and compute the indexes over time among cohorts of nations and across developed and emerging nations. We assess implications of a trending down in diversification potential for portfolio investment risk. We also evaluate robustness of findings across market cycle, volatility, and credit risk regimes. We then employ time-series and country panel data to identify factors associated with diversification potential.

Research findings reveal a substantial decline in diversification potential over the period of the financial crisis and beyond within and among asset classes and countries. The decline in diversification potential is widespread among country cohorts and has been precipitous in the post-2000 period. Diversification indexes for equity, sovereign debt, and REIT asset classes decline from a maximum level of 100 in the late-1990s to roughly *half* that level by 2012! A similar result is observed for a global index comprised of all three asset classes. The trend is downward with little evidence of differences in bull and bear markets or during periods of high and low VIX (market volatility).

Older and more established markets display a larger downtrend in the diversification indexes. Further, the generalized downtrend in diversification potential is shown to be associated with higher levels of investment risk. Some countries, however, notably including many Middle Eastern and African nations, persistently display only weak integration with the global economy. While those areas may provide increments to portfolio diversification, they are often subject to substantial security, political, and economic risks along with higher transaction costs and lower liquidity.

We further examine factors associated with trends in diversification potential. Using time-series and 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). Consistent with the "world is flat" hypothesis, we find that developmental factors, and especially, diffusion of internet technology, are associated with declines in diversification indexes among all asset classes. Global events, including the 1992 ERM and 2009-2010 Eurozone crises, also are associated with diminished investment diversification opportunity. These findings are robust to the inclusion of various factors including credit risk as proxied by the TED spread, the Baker and Wugler (2006) measure of investor sentiment, country-specific economic and political risk as computed from the International Country Risk Guide, equity market Implied volatility (VIX) and market liquidity as measured in accordance to Lesmond, Ogden and Trzcinka (1999). Taken together, our findings offer a cautionary note about geographic and asset class diversification as a mechanism to mitigate investment risk.

I. Indexes of Global Diversification

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

a. Literature and Methodological Approach

The starting point is estimation of integration of assets within and among nations and asset classes over time. A review of existing literature suggests substantial variation in methods and geographic focus of related integration research (for a comprehensive review of this topic and related research see Gagnon and Karolyi (2006)). 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), and Eiling and Gerard (2014). Baele et al (2009) and Baker and Wurgler (2012) examine correlations between bond and equity markets. Cotter, Gabriel, and Roll (2014) 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)), in developed markets over long a period (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, Cappiello, Engle and Sheppard (2006) also 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 Conlon, Cotter and Gencay (2015) use wavelet methods, while Longin and Solnik (1995) use cointegration. 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.[5] Clearly, to the extent global factors explain only a small proportion of variance in a country's returns, the country would be viewed as less integrated (see, for example,

[5] 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.

Stulz (1981) and Errunza and Losq (1985)).[6] 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. 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 among alternative asset classes and across a broad set of domestic and international geographhies.

b. Rationale for our Diversification Measure[7]

This section provides a justification for our particular diversification measure. A time-honored (inverse) measure of diversification potential is the correlation between two assets. All standard investment textbooks illustrate the Markowitz principle 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.

The Markowitz principle is correct when dealing with individual assets. However, 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 good enough, then one portfolio

[6] 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. See Pukthuanthong and Roll (2009) for discussion and details.

[7] This section follows Roll (2013).

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. Let's suppose initially that the indexes are so well-diversified that both have negligible remaining idiosyncratic volatility; i.e., for A and B respectively,

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

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

The returns of both indexes are explained entirely by the same underlying systematic factors. Does this mean they are perfectly correlated? In general, that answer is no. Their correlation will be perfect 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.[8] Conceivably, the

[8]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.

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, is a relatively low correlation between stocks and bonds. Of course, this is just an illustrative example and is not meant to imply that equities and bonds are so divergent in sensitivity to the true underlying factors. There could be other systematic factors, such as investor confidence, that drive them in the same direction.

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 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.

In other words, low correlation <u>between bundles of assets</u> fails to properly measure the potential benefits of diversification. 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, for the reasons previously mentioned. 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. To allow for generality, there is still some remaining idiosyncratic risk, as represented by the ε's.

What, then, is the actual diversification benefit available from combining A and B? We can gain some insight about this question by considering as an example the minimum variance portfolio from combining index B with the β_B re-structured portfolio A* composed of assets in A. It is straightforward to show[9] that this portfolio has a weighting w in index B (and 1-w in the re-structured portfolio A*) equal to

$$w = \mathrm{Var}(\varepsilon_{A^*,t}) / [\mathrm{Var}(\varepsilon_{A^*,t}) + \mathrm{Var}(\varepsilon_{B,t})]$$ [10]

[9] Assuming, as usual, that the idiosyncratic terms are uncorrelated with the factors and with each other.

[10] Proof: Because the β's are identical for every factor in B and A*, weighting w in B with 1-w in A* gives the portfolio return $R_p = (1-w)R_{A^*} + wR_B = (1-w)\varepsilon_{A^*} + w\varepsilon_B$. Assuming that the idiosyncratic terms are unrelated, the portfolio's variance is $\mathrm{Var}(R_p) = (1-w)^2 \mathrm{Var}(\varepsilon_{A^*,t}) + w^2 \mathrm{Var}(\varepsilon_{B,t})$. Minimizing the portfolio's variance with respect to w and solving yields the equation in the text, QED.

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 $\mathrm{Var}(\varepsilon_{A^*,t})$ 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. 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. Given the above methodology, we turn now to computation of the new diversification indices.

II. 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 year between 1986 and 2012

inclusive. The global factors are 16 principal components obtained from existing markets pre-1986 but updated each calendar year.

a. Data

The analysis below employs index return data for equity, bond, and real estate markets from Thompson Reuters DataStream©. DataStream provides the most comprehensive set of country-specific indexes available for the three asset classes. [11] The daily data are US dollar denominated and collected for equity, five-year sovereign bonds, and REIT indexes.[12] We choose the index in each market/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 (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. Some markets and asset classes are more liquid than others. To foster estimation, we require at least 50 valid returns per year. This sometimes affects the estimation of the diversification index, especially for small markets, where on a particular year they may not meet this benchmark. For example, a diversification index in a year with at least fifty returns might be followed by a year with no index calculated because of insufficient (<50) 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, debt, and real estate and 23 countries, a total of 40

[11] 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 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.

[12] 5-year sovereign bond indices are chosen as there are more of these than their 10-year counterpart.

dollar-denominated global market indexes,[13] (Bond and real estate indexes are not available for all 23 countries.) For each calendar year from 1986 – 2012, 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).[14] As an additional precaution, for each pre-1986 cohort of countries, separate principal components are estimated after that country was excluded from the calculation.[15]

From the yearly covariance matrices, sorted eigenvalues (low to high) are used to produce the orthogonal out-of-sample principal components that are used in the factor model in each subsequent year. This is repeated for each year fixed-length interval from 1986 through the end of sample to yield 27 years of principal components. (Principal components are obtained each calendar year 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 16 principal components, which explain roughly 90 percent of the volatility in the covariance matrix.[16] Appendix Figure 1 shows the average (over 1986-2012) cumulative percentage of variance explained by the sorted (low to high) eigenvalues from the pre-1986 country cohort covariance matrices. Appendix

[13] 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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US.

[14] 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 45x45 covariance matrix including lags for 3 asset classes in the US and in Canada.

[15] 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.

[16] We also examine the asset classes in isolation, 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 was allowed to vary from 14.

Figure 2 provides a time series plot, by calendar year, of the average percentage of variance explained by the sorted eigenvalues.

c. Return Regressions on Global Factors

The estimated 16 out-of-sample principal components serve as the common global factors in the country-specific regressions. Those regressions are estimated for each country and for each calendar year 1986 – 2012. 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 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 2012. Figure 2 plots the same for 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. The results reveal a substantial downtrend in the global asset diversification indexes. The declines across the global indexes would have been more pronounced for country weighted indexes given the importance of the large developed countries, notably the US and UK, and their respective reduction in diversification potential.

As recently as the late 1990s, the indexes signal nearly full diversification opportunity, with index values approaching 100. Since that time, however, diversification potential has declined markedly to levels of roughly 50-60 for each of asset class by 2012. The diversification index decline is strongest for sovereign debt plummeting during the mid-2000s boom period and then rebounding somewhat during the early years of the financial crisis. Figure 2 displays the world diversification index for the (average) of the three asset classes. Overall, there is a substantial downtrend in diversification opportunity among countries and asset classes over the post-1996 period. Given the harmony of the trends for the three asset classes, a world weighted average based on asset allocation across the three assets would have resulted in similar limiting diversification potential.

It is apparent from Figure 1 that trends in diversification potential are shared by asset classes; further quantitative evidence of common diminished diversification opportunity is given in Appendix Table 1. Appendix Table 1 reports simple contemporaneous correlations in diversification indexes for raw returns by asset class and for the full period and for the pre- and post-2000 period. The contemporaneous correlations for the full sample period are elevated and in the range of .66 for equities and bonds and in excess of .83 for equities and real estate and for bonds and real estate. For equities, these correlations are higher in the post-2000 period; for example, the correlation for equities and real estate reaches a full .98! Appendix Table 1 displays similar and substantially elevated lead correlations among asset classes for the post-2000 period relative to those estimated for pre-2000.

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 show how robust these trends are to the timing of when a country became 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 assigned cohorts for equities include pre-1974, 1974-1983, 1984-1993 and post-1993. In the case of bonds, 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, the cohorts indicate a downtrend in diversification potential from the late 1990s onward. Equities and REITs display more substantial downtrends in older and more established markets.[17] For example, the index value for REITs falls from roughly 100 in the early 2000s

[17] 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.

to about 40 in 2011 for the pre-2000 cohort versus about 80 for the post-2000 group. In the case of sovereign debt, the declines in diversification potential are largely robust to cohort stratification.[18]

III. Portfolio Diversification and Risk

Next, we assess the relation between diversification potential and portfolio risk for global investors. As noted in the introduction, diversification across asset classes and geographies long has been fundamental to risk mitigation. Figure 4 shows global diversification indexes for each asset class (equity, fixed income, real estate) alongside asset-specific risk as proxied by the annual 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. Reduction in the diversification indexes is particularly apparent among all asset classes post-2000. Among global equities, diversification potential fell markedly from an index level of roughly 80 in 2000 to about 60 in 2012. During the same period, equity investment risk moved up sharply, but then fell back some post-crisis.

Among other global assets, including sovereign debt and real estate, the fall-off in diversification opportunity was similarly marked, from index levels in the high 90s in 2000 to close to 55 and 60, respectively, in bonds and real estate, in 2012. For the composite of the three asset classes, the diversification index (average of the asset classes) fell from over 90 in 2000 to roughly 60 in 2012 (see Figure 5). 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 index levels and risk are strongly negatively correlated for each of the three asset classes, with correlation coefficients over the full sample period of -0.648 for equities, -0.462 for bonds, and -0.735 for REITs. The correlation is -0.653 for the three asset class average.

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

IV. Where to Run and Hide

Table 2 provides further details on diversification trends by asset class and country. It provides insight into systematic differences among highly integrated more developed markets and others. For each estimated country/asset class diversification index, Table 2 reports the coefficient and t-statistic from fitting a linear time trend. Trends are given for the full sample and for the pre- and post-2000 periods.

Table 2 also reports those findings for a global equal weighted index (labelled world index) for each asset class. Each asset class-specific global index displays a significant downward trend that would have been even more pronounced if country weights were applied. For the entire sample, the strongest downtrend is for real estate followed closely by equities, where the t-statistics are highly significant. Consistent with results cited above, the estimated global index time trends for each of the three asset classes switch from positive in the pre-2000 period to negative and highly statistically significant post-2000.

At the country level, the estimated time trends further reveal striking turnarounds in diversification potential between the pre- and post-2000 periods. Pre-2000, negative and statistically significant trend coefficients, indicating reduced diversification potential, were estimated only for a few country-specific equity indexes. In fact, for sovereign debt, *positive* and significant time trends were estimated for many developed nations pre-2000, notably including Austria, Denmark, France, Germany, Ireland, Japan, and the Netherlands, signifying enhanced opportunities for diversification in early years. In the case of REITs pre-2000, a negative and significant time trend coefficient was estimated only for the U.S.

However, as suggested above, by the more recent post-2000 period, country- and asset class-specific opportunities for diversification have turned largely and significantly negative. But there are some notable exceptions. A number of Middle Eastern nations, including Egypt, Jordan, Lebanon, Oman, Saudi Arabia, and the UAE, do not exhibit a significant decline in their index of equity diversification. This is similarly the case for several developing Asian and African nations, including

Ghana, Kazakhstan, Kenya, Nigeria, Pakistan, and Zambia. In the market for sovereign debt, the only exceptions to significant country-specific declines in the diversification index are China and Japan. Also, among REIT diversification indexes, Greece and Japan fail to show significant declines in diversification potential. Note, however, that while the above-identified Middle Eastern and African and Asian nations offer higher levels of diversification potential, some are subject to other country-specific risks, including barriers to investment, political instability, inadequate legal infrastructure, civil unrest and sectarian violence, and the like.

Table 3 shows results of estimation of a linear time trend for portfolios comprised of all 3 assets for individual nations and for the different sample timeframes. Only a limited number of advanced western nations allow estimation of those trends for a 3 asset class portfolio. Among the 12 country indexes, the single outlier to an estimated negative and significant diversification trend coefficient is Japan. For Japan, the estimated coefficient switched from positive and significant in the pre-2000 period to negative and insignificant in the post-2000 period.

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, diversification potential trends down in the post-2000 period, relative to earlier years, especially among developed economies. Specifically, the diversification indexes plotted in Figure 6 move down markedly post-2000 for developed economy equity and real estate markets; in contrast, only limited trending down in diversification opportunity was found for emerging equity markets. In the case of debt markets, the divergence between developed and emerging

markets is less apparent, reflecting in part sovereign debt crises in the latter half of the 2000s and beyond in a number of advanced European economies.

Results of fitting of time trends to the developed and emerging country groups are as anticipated. As shown in Table 4, the estimated diversification trends switch from positive and insignificant in the pre-2000s for all asset classes to negative and statistically significant for the post-2000s period. Further, for all asset classes, the estimated trending down in diversification opportunity post-2000 was substantially larger in the case of developed relative to emerging countries.[19]

Finally, Figure 7 displays diversification indexes for equity, bond, and real estate asset classes as well as for the composite (average) of the asset classes for the United States. Broadly speaking, the plots reveal substantial downtrends in the diversification indexes since 2000. Relative to the global indexes, however, diversification opportunity across asset classes moved up during the mid-2000s boom prior to falling back sharply before, during and after the subsequent downturn period. The post-boom downtrend in the diversification indexes was especially pronounced for equity and real estate asset classes.

V. Robustness of Diversification Trends

Prior research has provided evidence of higher correlations among international markets during downturns (bear markets) than during upswings (bull markets); e.g.; see, for example, Longin and Solnik (2001), Pukthuanthong and Roll (2009). Pukthuanthong and Roll (2009), for example, show

[19] 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.

slight increments to return integration among global equities in bear markets. Appendix Figure 3 distinguishes global equity, bond, and real estate asset class diversification potential by NBER recession periods (red bars) and non-recession periods. The dating of US recessions by the NBER is similar to the dating of global recessions by the IMF.[20] As is evident, the plots in Appendix Figure 3 do not suggest systematic variation across recession and upswing periods in the global asset class diversification indexes. Instead, as described above, they indicate long-term secular downtrends in diversification potential dating from roughly 2000.

We further assess robustness of diversification results to periods of bear versus bull equity markets, high and low equity market volatility (S&P Index Options VIX Index), and high and low perceived credit risk in the economy (TED Spread).[21] These stratifications elucidate whether diversification opportunity varies according to the state of the financial markets. As shown in Panel A of Appendix Figure 4, we plot average annual returns for each asset class against the difference between asset-specific diversification index annual values for low and high return days. Average annual returns by asset class are computed from daily return observations in each year. The difference between bear and bull asset-specific diversification values is computed as the difference in the diversification index for low and high return periods for a given year, where the low and high groups are based on being below and above the median annual return value.

We employ the same stratification protocol in Panels B and C of the chart, where we plot the average annual VIX and TED spread against the difference between the asset-specific diversification

[20] The dating of NBER and IMF recession periods is almost identical from the 1970s to 2009. The only exception is the Russian crisis of 1998 which is designated as a global recession by the IMF but not as a US recession by the NBER. The IMF changed its recession dating methodology in 2009. In the new methodology, the US dot-com bust of 2001-02 is absent from the IMF list of global recessions. Source: IMF World Economic Outlook: Crisis and Recovery, April 2009 (http://www.imf.org/external/pubs/ft/weo/2009/01/pdf/text.pdf).

[21] The CBOE Volatility Index (VIX Index) is a barometer of equity market volatility. The VIX Index is based on real-time prices of options on the S&P 500 Index and is designed to reflect investors' consensus view of future (30-day) expected stock market volatility. The VIX Index is often referred to as the market's "fear gauge." LIBOR measures the interbank lending rate so as the spread between The TED spread, defined as the basis point differential between the 3-month LIBOR and the 3-month T-bill, measures perceived credit risk in the general economy. A rising TED spread shows an accelerating lack of trust between banks and a corresponding tightening of credit for all other counterparties.

index values for high and low VIX and TED spread days, respectively.[22] We also compute the simple correlations between the diversification indexes for bear minus bull returns and average returns for the three asset classes. We do the same for high and low VIX and TED spread periods. Those correlations are displayed in Appendix Table 2.

Results of the stratification analysis reveal only limited opportunity for enhanced diversification across periods of market downturn, volatility, and credit risk. For example, as depicted in Appendix Figure 4 and Appendix Table 2, the correlations between the bear-bull diversification indexes and asset class returns are very low for both equities and REITs—on order of magnitude of 10 percent or less for both equities and REITs and for the full period of analysis. While those correlations rise somewhat in the post-2000 period, they never exceed .24. Appendix Table 2 displays similarly low correlations between the diversification index for high-low VIX periods and average VIX returns for all asset classes and time periods. In the case of global credit risk, as embodied in the TED spread, Appendix Table 2 reveals somewhat elevated correlations between the diversification index for high-low TED spread and average TED spread—roughly .40--for both equities and REITs for the pre-2000 period. Those correlations fall back in the post-2000 period.

Appendix Table 3 displays the mean difference between diversification potential stratified by bear minus bull market returns, high minus low VIX, and high minus low TED and related t-statistics. These differences are statistically insignificant in all cases exclusive of bear minus bull returns for global equity markets and for high minus low TED spread in the case of sovereign debt.

We hasten to note, however, that the above exercises are essentially univariate. They simply assess diversification potential in periods, respectively, of bull vs. bear markets, high vs. low volatility,

[22] As shown in Panel B of Appendix Figure 4, we plot the average annual VIX against the difference between the asset-specific diversification index values for high and low VIX days. We do this for each of the three equity, bond, and real estate asset classes. Average annual VIX values are computed from daily VIX observations in each year. The difference between high and low asset-specific diversification values is computed as the difference in average R-square for the diversification index between high and low VIX periods for a given year, where the high and low groups are based on being above and below the median annual VIX value. As is broadly appreciated, the mean VIX runs up sharply and then substantially contracts during the run-up and aftermahth to the 2000s crisis period. In a similar manner, in Panel C of the Appendix Figure 4, we plot the average annual TED spread against the difference between the asset-specific diversification index for high and low TED spread days.

and high vs. low credit conditions. They do not simultaneously control for these or other possible influences on diversification. In the next section (VII), we offer a multivariate analysis of diversification potential.

VII. 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 among equity, sovereign debt, and real estate asset classes and for a large sample of 89 countries. The larger sample allows us to assess drivers of diversification potential across developed, emerging, and frontier markets and for pre- and post-2000s periods. We undertake the analysis using global aggregations of country level diversification potential as well as country-specific panels. The latter allow us to assess associations between country level diversification potential and a extensive set of macro-financial and development factors. We do this using both unbalanced and more restricted balanced panels. The analysis is further parsed in our choice of determinants where we assess the effects of both global and country level factors.

Table 5 lists diversification factors and Table 6 reports their simple correlations. 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). Further, consistent with the "world is flat" hypothesis, we include controls for economic developmental and technology (internet) diffusion. The factors included are credit risk, asset return volatility, investor sentiment, Fed Funds Rate, market liquidity, economic development, internet diffusion, political and economic risk as well as controls for ERM and European sovereign debt crises.[23] As shown in Table 6, simple correlations among the various factors posited to effect diversification potential are relatively small in magnitude with the exception of internet diffusion and the first principal component of a set of World Bank developmental factors.

[23] 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.

We start with aggregate time-series analyses. In Table 7, we report on associations between global factors and global diversification trends. 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 sentiment index (SENT), respectively. Prior studies also have modelled credit risk using the US default premium 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 (2014)). Other factors included in the analysis are the FED FUNDs rate, internet diffusion, and categorical indicators for the ERM and European sovereign debt crises.

Table 7 displays results for each asset class, for all asset classes combined and for equity diversification indices stratified among developed, emerging, and frontier 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. The timeframe of the analyses is 1986 -2012. We also provide results for specific countries mirroring those reported in Table 3, where the three asset classes, equities, bonds and REITs are available.

As would be expected, global internet diffusion, a proxy for ongoing enhancements to global telecommunications and related investor connectivity, is uniformly associated with damped diversification opportunity. The estimated internet diffusion coefficients are sizable and highly significant for all asset classes and among all country-specific estimates at a 1 percent significance level, with the exception of New Zealand. Further, the 1992 European exchange rate mechanism (ERM) crisis is largely associated with significantly damped diversification opportunities for many combinations of assets and for all European economies in the individual country regressions. Mixed

findings are reported for the other variables in terms of significance, but it is noteworthy to see the negative relation between credit risk (TED) and diversification potential for bond markets.

In Table 8, we turn from global aggregate to country panel analysis of diversification trends. Columns (1) – (3) report on modelled factors identical to those in Table 7. In columns (4) – (6), we assess robustness of results to a country-specific rather than aggregate global measure of internet use. Finally, in columns (7) – (9), we replace the internet diffusion factor with the first principle 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 5). 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 technological innovation associated with this factor over our study timeframe. As suggested in Table 6, there is a high correlation between the internet diffusion and DEVPC1 factors, 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.

Overall, results in Table 8 indicate substantial robustness of results to country-specific panel estimation. Indeed, panel findings in columns (1) – (3) are highly similar in direction and significance of modelled factors to those obtained using the global time-series (Table 7). The key significant terms throughout are proxies for country economic development and related internet technology diffusion. Further, as evidenced in columns (4) – (6), findings are little changed by the substitution of country-specific internet utilization for a global measure thereof.[24] As shown in columns (7) – (9), the first principal component of the World Bank country development indices (as shown in columns (7) – (9)) is similarly negative and significant across equity, bond, and real estate asset classes, indicating as expected that gains in economic development are associated with reduced asset diversification potential. As such, results are robust to the substitution of a more general proxy for country stage of development for the internet diffusion measure. Also note the ERM crisis is associated with diversification potential for all panels, and the Eurozone crisis is associated with a reduction for bond markets.

In Table 9, 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] The large number of asset markets gives rise to a challenge in capturing sufficient coverage for the panel variables. Accordingly, 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 illiquidity measure is the capitalization-weighted proportional incidence of observed zero daily 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 markets (see Bekaert et al (2011); Carrieri et al (2013); and Bekaert et al

[24] The one exception is that increases in U.S. short-term interest rates, as proxied by the Fed Funds Rate, is now significantly associated with increased diversification potential in bond markets.

[25] We estimate models throughout for balanced country panels. For instance, those results that mirror Table 8 are contained in Appendix Table 4. The balanced panels are estimated for the 1996-2010 timeframe whereas the unbalanced panels span the years 1986-2012. In general, findings are robust to estimation of balanced panels.

(2007)). Diversification potential is often available but not fully executable in small illiquid markets as illiquidity is a barrier to foreign investment.

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 (2014)). 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. It 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 (2014), we use the aggregate series and hence avoid high levels of correlation between some sub-indexes in the panel regressions. Table 6 provides evidence of limited correlation among the ICRG risk indices.

As shown in columns (1) – (3) of Table 9, baseline modelled factor estimates are largely robust to the inclusion of the ICRG country risk and liquidity indices. As anticipated, elevated diversification potential is associated with less liquid markets as investors face a challenge in accessing those markets. The estimated liquidity coefficient is largely positive and significant. Among the ICRG risk factors, higher levels of country-specific economic risk are associated with significantly reduced diversification potential among equity and debt asset classes for models without a developmental

[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.

factor. This significance largely disappears on inclusion of developmental proxies. Similar findings are reported for political and financial risk.[27] In columns (4) – (6) and (7) – (9) of Table 9, we alternately add the internet diffusion and the first principal component of World Bank development indices as proxies for communications technology diffusion and stage of development. As anticipated and similar to Table 8, both internet diffusion and stage of country development are associated with significantly damped investment diversification opportunity across asset classes.

In Table 10, we assess variation in equity market diversification potential across developed, emerging, and frontier markets. As noted above, our large sample size of equity markets allows us investigate drivers of diversification potential for a break out of less developed markets, classified as emerging and frontier markets. While the latter have not been previously examined for diversification trends, Berger et al (2011) have documented lower integration in these markets. The table reports results of full model specification inclusive of the proxies for market liquidity, ICRG risk controls, and internet diffusion.[28] Similar to above, all models include country-specific fixed effects.

As would be expected, columns (1) – (3) of Table 10 provide evidence of variation in the effect of diversification drivers across developed, emerging, and frontier equity markets. The 1992 ERM crisis period is associated with significantly damped equity diversification opportunity in developed markets and the opposite for frontier markets. Similarly, the 2009-2010 European sovereign debt crisis period is associated with sizable and significantly damped diversification opportunity in developed and emerging markets. Among the ICRG risk factors, higher levels of country economic risk are associated with statistically damped equity diversification only in developed and emerging markets. Similarly, higher levels of country political risk are associated with statistically damped equity diversification opportunity only in emerging and frontier markets. As above, an increase in internet diffusion is associated with sizable and significant declines in diversification opportunity throughout. Overall, the model fit is relatively higher for developed equity markets.

[27] Results are mixed across asset classes as regards the role of country-specific financial risk.
[28] Results using the development principal components factor in place of internet diffusion are contained in Appendix Table 5.

In Table 10, we also assess variation in estimation results among temporally stratified panels. Specifically, using the full set of modelled factors, we stratify the unbalanced panel into 1986-1999 and 2000-2012 sub-samples. We estimate models for each of the asset classes and timeframes. By definition, the ERM control is relevant only to the early panels (columns (4) – (6)), whereas the European sovereign debt crisis period control appears only in the case of the later panels (columns (7) – (9)).

Internet diffusion is associated with significantly damped diversification potential in the case of both equity and REIT assets classes in both the pre- and post-2000 periods. As would be expected, the estimated internet effects are more pronounced in the more recent period in the wake of increased internet diffusion. Results also suggest some evolution in diversification drivers over time. For example, our proxy for credit risk, the TED spread, is associated with positive and significant diversification opportunities in both debt and real estate in the 1986-1999 panels. That said, in the more recent 2000-2012 panels, credit risk has a negative influence on diversification opportunity across asset classes. Similarly, while equity market volatility as proxied by the VIX is associated early on with significantly depressed diversification opportunity in both equity and debt markets, those effects are reversed in the 2000-2012 panels for bonds.

VIII. Conclusion

Diversification has long been fundamental to risk mitigation. Recent anecdotal evidence, however, suggests diminished effectiveness of asset diversification strategies in the context of an increasingly integrated world economy. This paper provided confirming empirical evidence using new indexes of investment diversification potential. The diversification indexes derive from estimates of asset return integration based on common global factors. The new indexes are computed within and among equity, sovereign debt, and real estate asset classes and for a large number of countries (89.)

The most striking result is a large decline in diversification potential across country cohorts that is becomes precipitous in the post-2000 period. For example, we estimate declines in diversification potential for each of the equity, sovereign debt, and REIT asset classes from a maximum index level of

100 in the late-1990s to roughly half that level by 2012! These diversification trends are robust to the state of the economy and to other influences.

Our analysis suggests further that declines in diversification potential are associated with numerous factors, notably including country economic development and internet diffusion. Declines in diversification potential also are associated with 1999 ERM and 2009-2010 European sovereign debt crisis periods. These findings are robust to the inclusion of numerous controls for market volatility, credit, economic, liquidity and portfolio risks. The results offer a cautionary note regarding asset class and geographic diversification of investment risk in an increasingly flat world.

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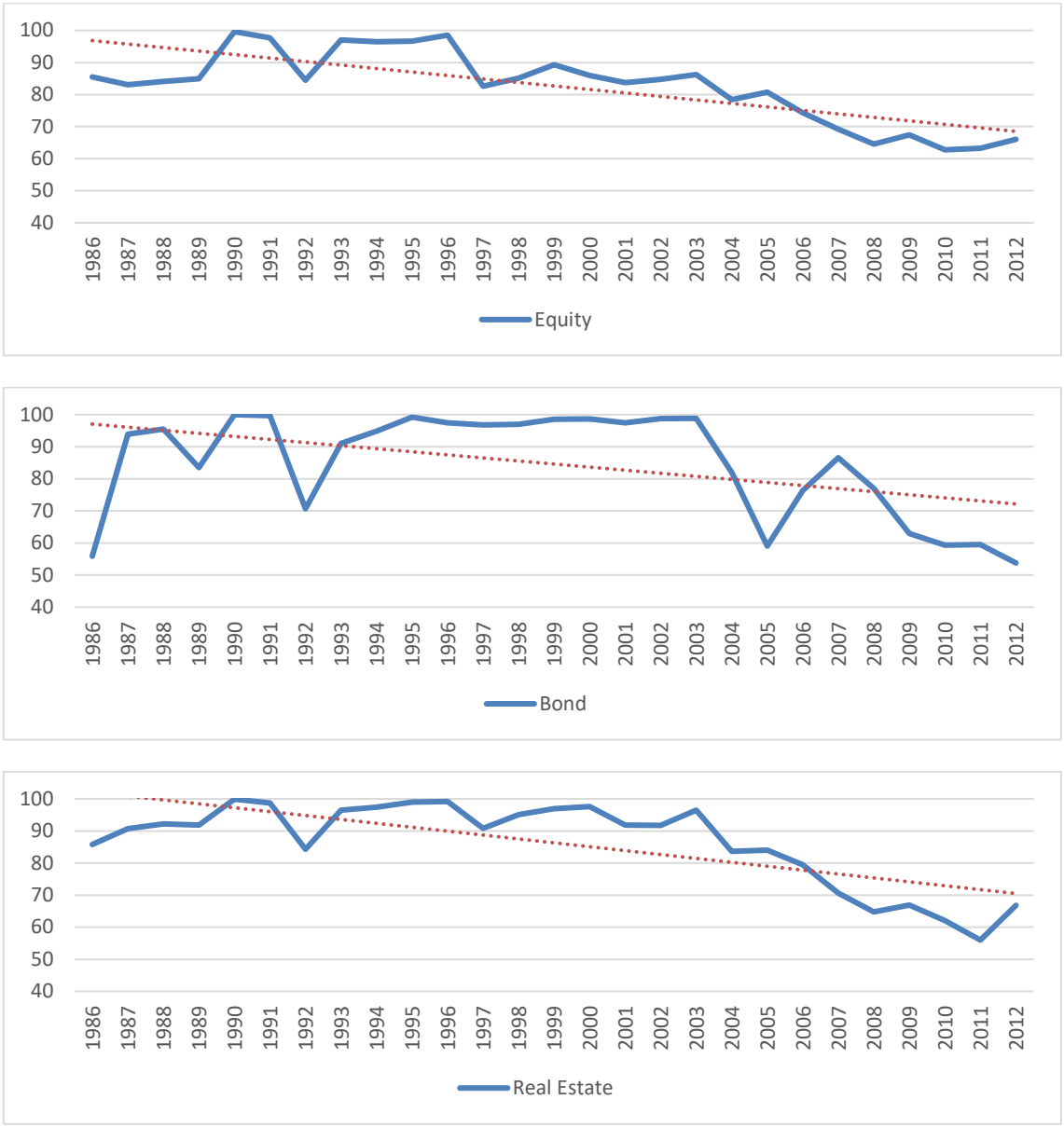
Figure 1

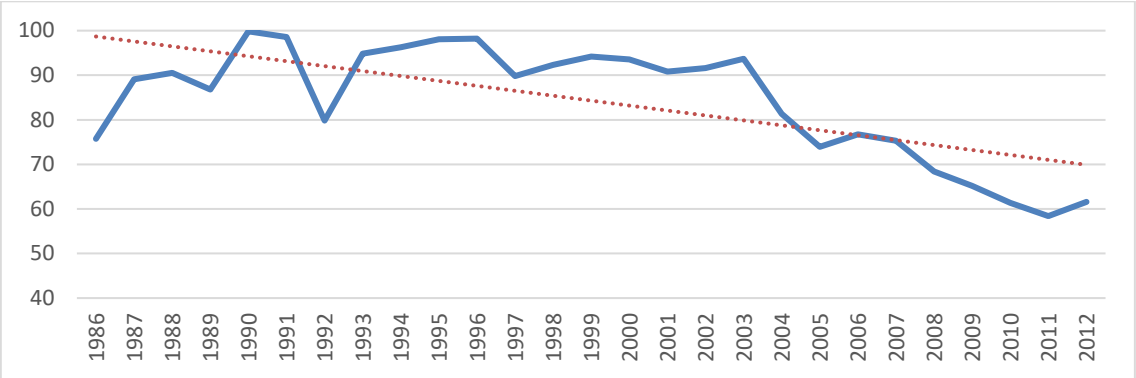
Trends in Global Diversification Indexes by Asset Class



Notes: This figure shows the average diversification indexes for each asset class between 1986 and 2012. There is a time-series plot of the 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year.

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, bonds 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year.

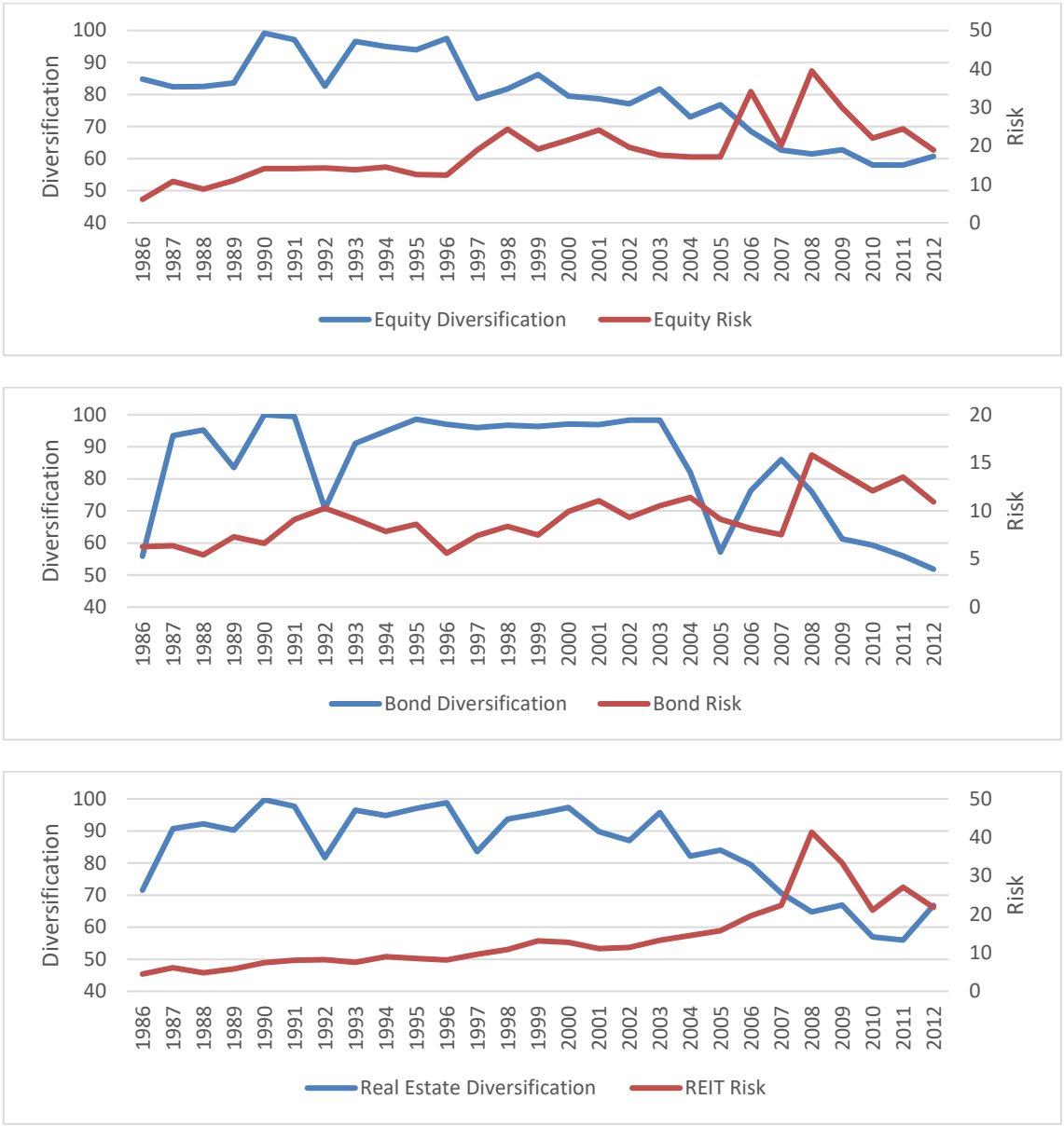
Figure 3

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 2012 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year. Cohorts for equities are pre-1974, 1974-1983, 1984-1993 and post-1993; for bonds they are: pre-1986, 1986-1999 and post-1999; and for REITs they are pre-2000 and post-2000.

Figure 4

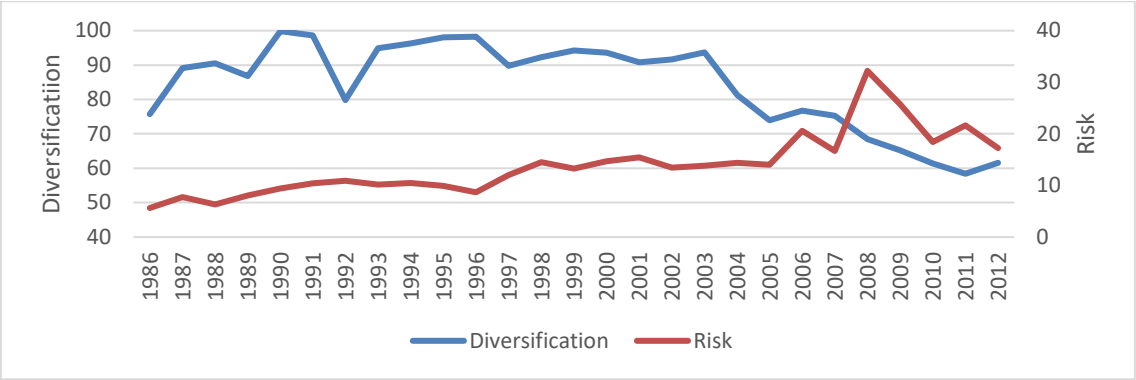
Trends in Global Diversification and Risk by Asset Class



Notes: This figure shows the average diversification indexes for each asset class and associated annual 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year.

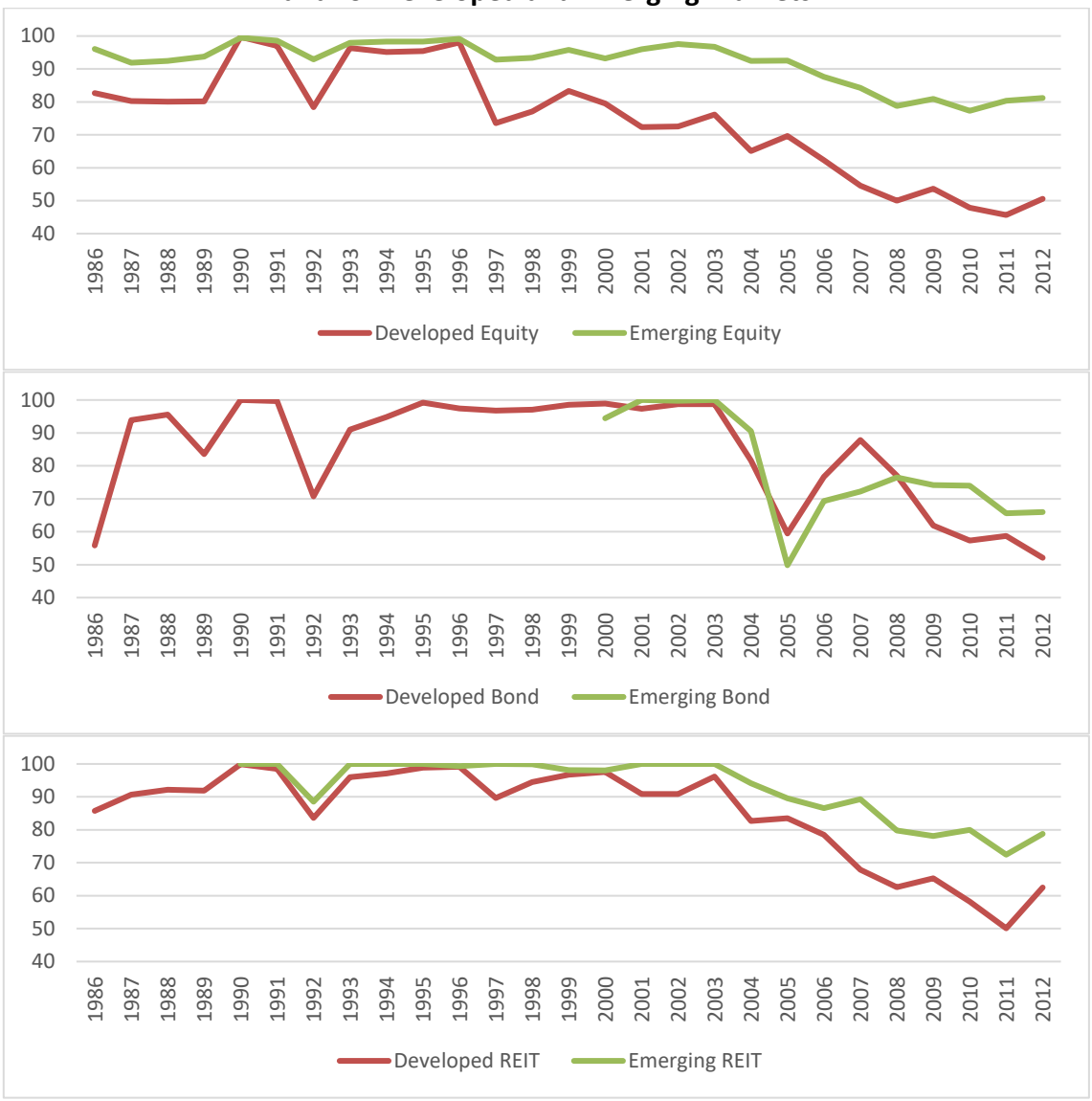
Figure 5

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, bonds 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year.

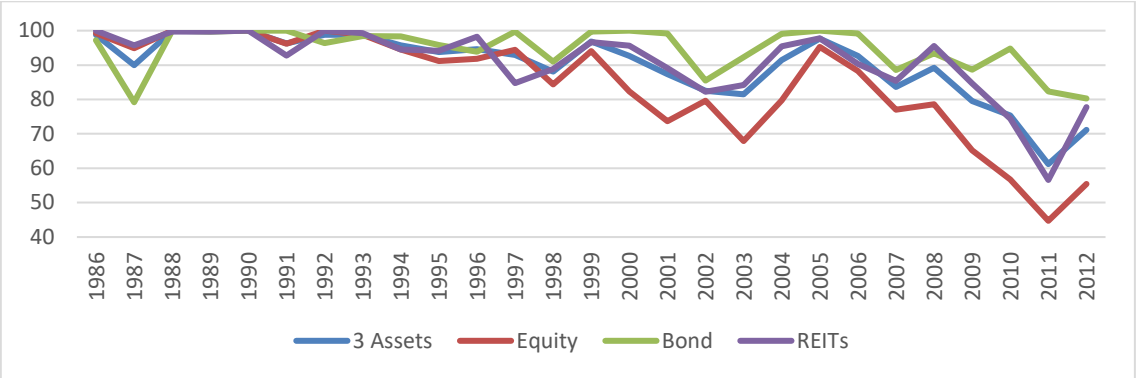
Figure 6
Trends in Global Diversification Indexes by Asset Class and for Developed and Emerging Markets



Notes: This figure shows the average diversification indexes for each asset class between 1986 and 2012 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year. 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.

Figure 7

Trends in U.S. Diversification Indexes Within and Among Asset classes



Notes: This figure shows an average of the diversification indexes for the three asset classes, equities, bonds and REITS and for a single country, the US. There is a time-series plot of the averages of the diversification indexes across asset classes and the diversification indexes for equities, bonds and REITS for the US. The diversification index is 100 minus the average R-square (in percent) from a multi-factor returns model fitted using daily data during every calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US). To be included, a country/asset class must have at least 50 valid daily returns during the year.

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	
	1974-1983	Brazil	Malaysia	Norway	South Korea	Spain	Sweden
	1984-1993	Argentina	Bangladesh	Chile	Colombia	Czech Rep.	Ecuador
		Finland	Greece	Hungary	Iceland	India	Israel
		Jordan	Kenya	Luxembourg	Mexico	Morocco	New Zealand
		Pakistan	Panama	Peru	Philippines	Poland	Portugal
		Slovakia	Sri Lanka	Taiwan	Thailand	Turkey	Venezuela
	Post 1993	Bahrain	Botswana	Bulgaria	China	Cote d'Ivoire	Croatia
		Cyprus	Egypt	Estonia	Ghana	Iceland	Indonesia
		Jamaica	Kazakhstan	Kuwait	Latvia	Lebanon	Lithuania
		Macedonia	Malta	Mauritius	Montenegro	Namibia	Nigeria
		Oman	Qatar	Romania	Russia	Saudi Arabia	Serbia
		Slovenia	Trinidad	Tunisia	Ukraine	UAE	Vietnam
		Zambia					
Bond	Pre 1986	Austria	Belgium	Canada	Denmark	France	Germany
		Ireland	Japan	Netherlands	Sweden	Switzerland	UK
		US					
	1986-1999	Australia	Finland	Italy	New Zealand	Norway	Portugal
		Spain					
	Post 1999	China	Czech Rep.	Mexico	Poland	South Africa	
REITs	Pre 2000	Australia	Belgium	Canada	France	Germany	Netherlands
		South Africa	UK	US			
	Post 2000	Bulgaria	Greece	Hong Kong	Italy	Japan	Malaysia
		Mexico	New Zealand	Singapore	Turkey		

Notes: This table lists the markets used in estimating diversification indexes for equities, bond and REITS broken out by cohort years. There are 89 equity indexes, 25 bond indexes and 19 REIT indexes with data obtained from DataStream. Cohorts for equities are pre1974, 1974-1983, 1984-1993 and post1993; for bonds are pre1986, 1986-1999 and post1999; and for REITs are pre2000 and post2000.

Table 2
Time Trends for Diversification Indexes for Equities, Bonds and REITs

Full Sample							
Equity							
World Index	Argentina	Australia	Austria	Bahrain	Bangladesh	Belgium	Botswana
-1.089	-1.355	-1.968	-3.123	-0.105	NA	-3.387	-0.668
-5.892	***-3.532***	***-5.573***	***-6.155***	***-1.662***	***NA***	***-7.350***	***-0.303***
Brazil	Bulgaria	Canada	Chile	China	Colombia	Cote d'Ivoire	Croatia
-2.292	-3.96	-2.453	-2.191	-0.290	-2.586	-1.761	-3.974
-8.952	***-7.725***	***-9.860***	***-8.674***	***-4.430***	***-5.554***	***-5.598***	***-6.524***
Cyprus	Czech Rep.	Denmark	Ecuador	Egypt	Estonia	Finland	France
-1.998	-3.359	-3.237	NA	-0.740	-2.912	-4.507	-3.812
-0.890	***-6.676***	***-7.647***	***NA***	***-2.253***	***-7.394***	***-8.652***	***-9.511***
Germany	Ghana	Greece	Hong Kong	Hungary	Iceland	India	Indonesia
-3.236	-0.007	-2.511	-1.048	-3.164	-1.844	-1.406	-2.282
-8.21	***-0.690***	***-6.182***	***-3.725***	***-7.275***	***-4.451***	***-6.890***	***-2.348***
Ireland	Israel	Italy	Jamaica	Japan	Jordan	Kazakhstan	Kenya
-2.672	-2.055	-3.478	-0.091	-0.001	0.105	0.941	-0.166
-6.806	***-8.425***	***-8.761***	***-0.674***	***-0.002***	***1.364***	***0.300***	***-1.805***
Kuwait	Latvia	Lebanon	Lithuania	Luxembourg	Macedonia	Malaysia	Malta
-0.140	-3.078	2.071	-5.108	-3.567	-2.439	-0.698	-2.024
-3.148	***-7.511***	***1.490***	***-7.753***	***-3.381***	***-1.910***	***-2.317***	***-6.659***
Mauritius	Mexico	Montenegro	Morocco	Namibia	Netherlands	New Zealand	Nigeria
NA	-2.759	-0.012	-0.901	-0.759	-3.368	-2.14	-0.055
NA	***-12.889***	***-0.073***	***-3.835***	***-0.507***	***-7.165***	***-5.514***	***-1.756***
Norway	Oman	Pakistan	Panama	Peru	Philippines	Poland	Portugal
-2.882	-0.322	0.077	NA	-1.708	-0.521	-3.944	-2.750
-8.167	***-1.826***	***0.626***	***NA***	***-4.920***	***-1.935***	***-9.226***	***-6.104***
Qatar	Romania	Russia	Saudi Arabia	Serbia	Singapore	Slovakia	Slovenia
-0.483	-5.023	-3.571	-0.736	-3.906	-1.559	-0.992	8.476
-1.052	***-7.933***	***-4.662***	***-1.885***	***-2.089***	***-4.714***	***-4.335***	***2.843***
South Africa	South Korea	Spain	Sri Lanka	Sweden	Switzerland	Taiwan	Thailand
-2.577	-1.164	-3.228	-0.026	-3.292	-2.738	-0.897	-0.799
-6.407	***-6.961***	***-8.588***	***-0.398***	***-8.564***	***-5.787***	***-5.361***	***-3.547***
Trinidad	Tunisia	Turkey	Ukraine	UAE	UK	US	Venezuela
0.038	-1.591	-2.615	-3.463	-1.061	-3.449	-1.644	0.077
1.574	***-3.567***	***-7.399***	***-3.704***	***-1.323***	***-10.029***	***-7.783***	***0.623***
Vietnam	Zambia						
-0.259	-0.299						
-2.231	***-1.775***						
Bonds							
World Index	Australia	Austria	Belgium	Canada	China	Czech Rep.	Denmark
-0.958	-2.201	-0.939	-1.182	-1.484	0.008	-4.951	-6.190

-2.623	***-5.803***	***-2.012***	***-2.579***	***-6.085***	***0.205***	***-4.419***	***-4.150***
Finland	France	Germany	Ireland	Italy	Japan	Mexico	Netherlands
-1.675	-4.871	-0.566	-1.020	-2.064	-0.766	-12.176	-3.454
-3.084	***-4.139***	***-1.133***	***-2.899***	***-3.386***	***-1.749***	***-1.850***	***-5.115***
New Zealand	Norway	Poland	Portugal	South Africa	Spain	Sweden	Switzerland
-2.555	-1.812	-7.042	-1.670	-5.640	-1.786	-3.298	-0.153
-6.124	***-3.923***	***-8.776***	***-3.462***	***-6.381***	***-4.082***	***-6.330***	***-0.393***
UK	US						
-0.635	-0.702						
-2.143	***-2.509***						

REITs

World Index	Australia	Belgium	Bulgaria	Canada	France	Germany	Greece
-1.216	-1.491	-4.821	-4.378	-3.178	-3.216	-1.024	-1.216
-5.374	***-5.304***	***-9.290***	***-3.124***	***-6.751***	***-5.334***	***-3.268***	***-5.374***
Hong Kong	Italy	Japan	Malaysia	Mexico	Netherlands	New Zealand	Singapore
1.435	-4.468	0.521	-2.789	NA	-2.321	-5.011	-4.599
1.257	***-6.367***	***0.686***	***-4.992***	***NA***	***-4.666***	***-4.108***	***-3.079***
South Africa	Turkey	UK	US				
-1.781	NA	-2.444	-0.872				
-6.218	***NA***	***-6.963***	***-4.843***				

Pre 2000

Equity

World Index	Argentina	Australia	Austria	Bahrain	Bangladesh	Belgium	Botswana
0.327	-2.549	-1.045	-0.298	NA	0.322	0.113	NA
0.715	***-2.347***	***-0.935***	***-0.279***	***NA***	***0.811***	***0.108***	***NA***
Brazil	Bulgaria	Canada	Chile	China	Colombia	Cote d'Ivoire	Croatia
-0.377	NA	-1.096	-1.883	NA	0.327	0.037	-1.957
-2.029	***NA***	***-1.733***	***-2.280***	***NA***	***0.456***	***0.378***	***-0.582***
Cyprus	Czech Rep.	Denmark	Ecuador	Egypt	Estonia	Finland	France
NA	-3.666	0.817	-0.143	0.086	-0.029	-1.158	-1.086
NA	***-1.380***	***2.017***	***-0.931***	***0.190***	***-0.205***	***-0.811***	***-0.962***
Germany	Ghana	Greece	Hong Kong	Hungary	Iceland	India	Indonesia
-0.487	NA	0.056	-1.105	-3.675	0.177	-0.094	NA
-0.402	***NA***	***0.100***	***-1.240***	***-2.552***	***0.904***	***-0.397***	***NA***
Ireland	Israel	Italy	Jamaica	Japan	Jordan	Kazakhstan	Kenya
0.369	-0.723	0.065	-0.372	0.722	0.460	NA	0.010
0.417	***-2.087***	***0.071***	***1.603***	***1.061***	***1.365***	***NA***	***-0.217***
Kuwait	Latvia	Lebanon	Lithuania	Luxembourg	Macedonia	Malaysia	Malta
-0.095	NA	NA	NA	NA	NA	0.741	1.016
-0.478	***NA***	***NA***	***NA***	***NA***	***NA***	***1.117***	***1.932***
Mauritius	Mexico	Montenegro	Morocco	Namibia	Netherlands	New Zealand	Nigeria

-0.095	-2.152	NA	0.446	NA	0.201	-1.149	-0.033
-0.527	***-4.527***	***NA***	***1.448***	***NA***	***0.149***	***-1.072***	***-1.732***
Norway	Oman	Pakistan	Panama	Peru	Philippines	Poland	Portugal
-0.280	-0.189	-0.380	NA	-1.429	-1.227	-3.803	-3.363
-0.348	***-0.849***	***-0.651***	***NA***	***-2.702***	***-1.940***	***-2.433***	***-2.296***
Qatar	Romania	Russia	Saudi Arabia	Serbia	Singapore	Slovakia	Slovenia
NA	NA	-3.371	NA	NA	-0.497	0.182	NA
NA	***NA***	***-0.595***	***NA***	***NA***	***-0.481***	***0.983***	***NA***
South Africa	South Korea	Spain	Sri Lanka	Sweden	Switzerland	Taiwan	Thailand
-1.197	-0.011	-0.422	-0.155	-0.616	1.348	-0.053	-0.850
-1.188	***-0.046***	***-0.457***	***-1.047***	***-0.534***	***1.162***	***-0.199***	***-1.048***
Trinidad	Tunisia	Turkey	Ukraine	UAE	UK	US	Venezuela
0.551	NA	-0.428	NA	NA	-0.966	-0.750	-1.062
1.495	***NA***	***-1.738***	***NA***	***NA***	***-0.950***	***-3.344***	***-2.540***
Vietnam	Zambia						
NA	NA						
NA	***NA***						

Bonds

World Index	Australia	Austria	Belgium	Canada	China	Czech Rep.	Denmark
1.536	0.580	1.91	1.627	-0.431	NA	NA	1.812
2.006	***1.456***	***1.937***	***1.812***	***-2.068***	***NA***	***NA***	***1.954***
Finland	France	Germany	Ireland	Italy	Japan	Mexico	Netherlands
2.351	2.047	2.434	1.940	2.384	1.729	NA	2.441
1.442	***1.978***	***1.934***	***2.486***	***1.252***	***2.425***	***NA***	***1.976***
New Zealand	Norway	Poland	Portugal	South Africa	Spain	Sweden	Switzerland
0.260	1.480	NA	1.442	NA	0.853	1.497	1.486
0.482	***1.464***	***NA***	***1.934***	***NA***	***1.372***	***1.802***	***1.615***
UK	US						
1.004	0.211						
1.366	***0.550***						

REITs

World Index	Australia	Belgium	Bulgaria	Canada	France	Germany	Greece
0.518	-1.300	-0.032	NA	-1.147	0.868	0.637	NA
1.662	***-1.641***	***-0.173***	***NA***	***-1.750***	***1.988***	***1.153***	***NA***
Hong Kong	Italy	Japan	Malaysia	Mexico	Netherlands	New Zealand	Singapore
NA	NA	NA	NA	NA	1.866	NA	NA
NA	***NA***	***NA***	***NA***	***NA***	***2.505***	***NA***	***NA***
South Africa	Turkey	UK	US				
0.232	NA	0.647	-0.635				
0.783	***NA***	***1.293***	***-2.384***				

Post 2000							
Equity							
World Index	Argentina	Australia	Austria	Bahrain	Bangladesh	Belgium	Botswana
-2.228	-2.956	-3.333	-7.679	-0.105	NA	-4.460	-0.668
-9.009	***-3.346***	***-4.387***	***-8.098***	***-1.662***	***NA***	***-4.071***	***-0.303***
Brazil	Bulgaria	Canada	Chile	China	Colombia	Cote d'Ivoire	Croatia
-4.417	-3.96	-4.020	-3.498	-0.460	-3.919	-2.407	-5.014
-6.478	***-7.725***	***-7.495***	***-6.889***	***-3.585***	***-4.404***	***-5.025***	***-6.179***
Cyprus	Czech Rep.	Denmark	Ecuador	Egypt	Estonia	Finland	France
-1.998	-3.801	-4.721	NA	-1.125	-3.232	-4.641	-2.633
-0.890	***-3.899***	***-4.308***	***NA***	***-1.799***	***-4.875***	***-9.565***	***-4.856***
Germany	Ghana	Greece	Hong Kong	Hungary	Iceland	India	Indonesia
-3.955	-0.004	-2.582	-0.362	-4.383	-2.845	-2.722	-2.282
-9.571	***-0.254***	***-2.091***	***-0.518***	***-4.287***	***-3.071***	***-4.537***	***-2.348***
Ireland	Israel	Italy	Jamaica	Japan	Jordan	Kazakhstan	Kenya
-4.900	-3.349	-3.319	-0.042	0.427	0.000	0.941	-0.187
-6.609	***-4.288***	***-5.584***	***-0.181***	***0.545***	***0.003***	***0.300***	***-0.632***
Kuwait	Latvia	Lebanon	Lithuania	Luxembourg	Macedonia	Malaysia	Malta
-0.265	-3.078	2.071	-5.108	-3.779	-2.439	-2.563	-2.875
-3.809	***-7.511***	***1.490***	***-7.753***	***-3.089***	***-1.910***	***-3.051***	***-7.481***
Mauritius	Mexico	Montenegro	Morocco	Namibia	Netherlands	New Zealand	Nigeria
NA	-3.967	-0.012	-2.498	-0.759	-3.033	-4.317	-0.082
NA	***-6.657***	***-0.073***	***-4.003***	***-0.507***	***-5.889***	***-4.564***	***-1.352***
Norway	Oman	Pakistan	Panama	Peru	Philippines	Poland	Portugal
-4.766	-0.419	-0.004	0.078	-2.677	-0.792	-6.102	-3.158
-6.469	***-1.564***	***-0.049***	***2.690***	***-2.823***	***-0.920***	***-8.113***	***-2.662***
Qatar	Romania	Russia	Saudi Arabia	Serbia	Singapore	Slovakia	Slovenia
-0.483	-5.966	-5.296	-0.918	-3.906	-2.685	-1.343	8.476
-1.052	***-8.481***	***-4.552***	***-1.779***	***-2.089***	***-3.662***	***-2.823***	***2.843***
South Africa	South Korea	Spain	Sri Lanka	Sweden	Switzerland	Taiwan	Thailand
-4.774	-1.119	-1.999	-0.108	-2.932	-3.367	-1.389	-1.46
-4.238	***-1.984***	***-3.187***	***-0.575***	***-6.548***	***-4.578***	***-2.285***	***-3.399***
Trinidad	Tunisia	Turkey	Ukraine	UAE	UK	US	Venezuela
0.007	-1.637	-4.982	-4.423	-1.061	-3.123	-2.344	0.298
0.367	***-2.728***	***-5.073***	***-3.807***	***-1.323***	***-8.331***	***-2.790***	***-1.41***
Vietnam	Zambia						
-0.259	-0.382						
-2.231	***-1.487***						

Bonds							
World Index	Australia	Austria	Belgium	Canada	China	Czech Rep.	Denmark
-3.886	-5.273	-4.612	-4.991	-3.804	0.008	-4.951	-4.063
-5.858	***-5.895***	***-4.652***	***-5.033***	***-5.228***	***0.205***	***-4.419***	***-4.976***
Finland	France	Germany	Ireland	Italy	Japan	Mexico	Netherlands

-4.220	-4.644	-3.885	-3.207	-4.962	-0.371	-12.176	-4.367
-4.354	***-4.630***	***-4.059***	***-3.280***	***-4.699***	***-0.393***	***-1.850***	***-4.602***
New Zealand	Norway	Poland	Portugal	South Africa	Spain	Sweden	Switzerland
-5.539	-5.124	-7.042	-2.557	-5.640	-4.641	-4.598	-2.18
-6.280	***-6.830***	***-8.776***	***-2.396***	***-6.381***	***-4.483***	***-4.606***	***-1.946***
UK	US						
-2.521	-1.095						
-3.834	***-2.560***						
REITs							
World Index	Australia	Belgium	Bulgaria	Canada	France	Germany	Greece
-3.421	-3.038	-6.922	-4.378	-4.566	-8.960	-3.489	3.049
-9.444	***-4.226***	***-11.956***	***-3.124***	***-5.159***	***-8.998***	***-5.056***	***-1.725***
Hong Kong	Italy	Japan	Malaysia	Mexico	Netherlands	New Zealand	Singapore
1.435	-4.468	0.521	-2.789	NA	-6.831	-5.011	-4.599
-1.257	***-6.367***	***0.686***	***-4.992***	***NA***	***-10.14***	***-4.108***	***-3.079***
South Africa	Turkey	UK	US				
-3.939	NA	-5.634	-1.715				
-9.014	***NA***	***-13.955***	***-2.444***				

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). The first panel is for the full period, followed by pre-2000 in the second panel and post-2000 in the final panel. NA refers to cases where no trend statistics can be computed. This may have occurred for markets where there was at least one year of insufficient returns to calculate a diversification index in a year (a minimum of 50 daily observations are required) after the countries joined the database or where there were insufficient annual 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 calendar year, 1986-2012. 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 16 principal components obtained from the pre-1986 markets. Countries and asset classes in separate regression are for equities: 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; for bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and for REITs: Australia, Netherlands, UK, and US).

Table 3

Time Trends for Diversification Indexes Across Three Asset Classes

Full Sample					
Australia	Belgium	Canada	France	Germany	Italy
-1.858	-2.144	-1.929	-2.371	-1.430	-1.840
-6.392	***-5.300***	***-8.240***	***-6.194***	***-4.074***	***-5.125***
Japan	Netherlands	New Zealand	South Africa	UK	US
0.143	-2.125	-2.001	-1.829	-2.176	-0.940
-0.628	***-5.048***	***-5.654***	***-5.531***	***-7.900***	***-5.991***
Pre 2000					
Australia	Belgium	Canada	France	Germany	Italy
-0.674	1.208	-0.486	0.920	1.261	1.113
-0.968	***1.480***	***-1.650***	***1.146***	***-1.434***	***-1.332***
Japan	Netherlands	New Zealand	South Africa	UK	US
1.226	1.503	-0.320	-0.055	0.228	-0.391
-2.165	***1.518***	***-0.450***	***-0.087***	***0.353***	***-1.663***
Post 2000					
Australia	Belgium	Canada	France	Germany	Italy
-3.881	-5.458	-4.130	-5.413	-3.776	-4.250
-5.328	***-13.906***	***-7.265***	***-31.009***	***-10.473***	***-11.207***
Japan	Netherlands	New Zealand	South Africa	UK	US
0.147	-4.744	-4.574	-4.784	-3.759	-1.718
-0.216	***-13.82***	***-5.549***	***-6.59***	***-14.203***	***-2.950***

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, bonds and REITs are available. The indexes represent portfolios containing the three asset classes together. The first panel is for the full period, followed by pre2000 in the second panel and post2000 in the final panel. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 50 valid daily returns per year.

Table 4

Time Trends for Diversification Indexes for Developed and Emerging Markets for Equities, Bonds and REITs

Full Sample					
Equities		Bonds		REITs	
Developed	Emerging	Developed	Emerging	Developed	Emerging
-1.720	-0.629	-0.989	-2.908	-1.357	-1.070
-7.249	***-5.332***	***-2.664***	***-3.318***	***-5.539***	***-5.914***
Pre 2000					
Equities		Bonds		REITs	
Developed	Emerging	Developed	Emerging	Developed	Emerging
0.068	0.117	1.536	NA	0.475	0.232
-0.105	***0.606***	***2.006***	***NA***	***1.461***	***0.565***
Post 2000					
Equities		Bonds		REITs	
Developed	Emerging	Developed	Emerging	Developed	Emerging
-2.849	-1.726	-4.017	-2.908	-3.810	-2.349
-9.493	***-6.954***	***-5.926***	***-3.318***	***-9.695***	***-9.400***

Notes: This table shows the coefficient from fitting a linear trend to the average diversification indexes for developed and emerging markets followed by the associated t-test (in bold and italics). The first panel is for the full period, followed by pre2000 in the second panel and post2000 in the final panel. NA refers to cases where no trend statistics are reported. This may have occurred for markets where there was at least one year of insufficient returns to calculate a diversification index in a year (minimum 50 required) after the countries joined the database or where there were insufficient annual diversification index values to fit a time-trend. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). 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. 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.

Table 5

Variables Associated with Diversification Indexes

TED Spread, Percent, Annual, Not Seasonally Adjusted. 1986-2012. From FRED.
VIX, Annual. 1990-2012. From FRED.
SENT, Investor sentiment data, Annual, 1986-2010, From Jeffrey Wurgler.
FEDFUNDS, US FEDERAL FUNDS RATE (MONTHLY AVERAGE), Annual, 1986-2012, From DataStream.
ECONOMIC, Economic Risk is the aggregate of all the respective sub-indexes obtained from the International Country Risk Guide (ICRG), Annual, 1986-2012, From the PRS Group.
FINANCIAL, Financial Risk is the aggregate of all the respective sub-indexes obtained from the International Country Risk Guide (ICRG), Annual, 1986-2012, From the PRS Group.
POLITICAL, Political Risk is the aggregate of all the respective sub-indexes obtained from the International Country Risk Guide (ICRG), Annual, 1986-2012, From the PRS Group.
LIQUIDITY, Liquidity is obtained using the measure suggested by Lesmond, Ogden, and Trzcinka (1999), Annual, 1986-2012, From DataStream.
GLOBAL INTERNET, Percentage of Individual Using the Internet, Aggregate of all countires, Annual, 1986-2012, From World Bank WDI.
EDUCATION, Government expenditure on education, total (% of GDP), Annual, 1986-2012, From World Bank WDI.
LITERACY, Literacy rate, adult total (% of people ages 15 and above), Annual, 1986-2012, From World Bank WDI.
ATM, Automated teller machines (ATMs) (per 100,000 adults), Annual, 1986-2012, From World Bank WDI.
EXPECTANCY, Life expectancy at birth, total (years), Annual, 1986-2012, From World Bank WDI.
BROADBAND, Fixed broadband subscriptions (per 100 people), Annual, 1986-2012, From World Bank WDI.
CELL, Mobile cellular subscriptions (per 100 people), Annual, 1986-2012, From World Bank WDI.
SERVERS, Secure Internet servers (per 1 million people), Annual, 1986-2012, From World Bank WDI.
ENROLLMENT, School enrollment, secondary (gross), gender parity index (GPI), Annual, 1986-2012, From World Bank WDI.
HOSPITAL, hospital beds/1000 people, Annual, 1986-2012, From World Bank WDI.
PHYSICIANS, physicians/1000 people, Annual, 1986-2012, From World Bank WDI.
MORTALITY, Maternal mortality ratio (modeled estimate, per 100,000 live births), Annual, 1986-2012, From World Bank WDI.
RESEARCH, Research and development expenditure (% of GDP), Annual, 1986-2012, From World Bank WDI.
INTERNET, Percentage of Individual Using the Internet, Country level, Annual, 1986-2012, From World Bank WDI.
DEVPC1, The first Principal Component of a set of 13 individual developmental factors from World Bank WDI , Annual, 1986-2012, From authors calculations
1992- ERM crises dummy, 1 for year and 0 for other years
2009-10 - Eurozone bond crises dummy, 1 for years and 0 for other years

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 annual for the timeframe 1986-2012 inclusive, except VIX which is from 1990-2012, and SENT which is from 1986-2010. 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. Country level data is for countries only with available data in any given year. LIQUIDITY is obtained for each year 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). 1992 is an ERM crises dummy, 1 for year and 0 for other years. 2009-10 is a Eurozone bond crises dummy, 1 for years and 0 for other years.

Table 6

Correlations of Variables Associated with Diversification Indexes

	TED	VIX	SENT	FED FUNDS	INTERNET	ERM	Euro	FINANCIAL	ECONOMIC	POLITICAL	DEVPC1
TED	1.000	0.424	0.063	0.308	0.118	-0.109	-0.198	-0.036	0.123	-0.065	0.067
VIX	0.424	1.000	-0.007	-0.308	0.382	-0.169	0.358	0.049	0.328	0.045	0.347
SENT	0.063	-0.007	1.000	0.293	-0.113	-0.016	-0.083	-0.016	0.135	0.003	-0.055
FEDFUNDS	0.308	-0.308	0.293	1.000	-0.676	-0.024	-0.582	-0.167	-0.198	0.035	-0.634
INTERNET	0.118	0.382	-0.113	-0.676	1.000	-0.219	0.632	0.233	0.463	-0.105	0.916
ERM	-0.109	-0.169	-0.016	-0.024	-0.219	1.000	-0.073	-0.060	-0.211	-0.006	-0.242
Euro	-0.198	0.358	-0.083	-0.582	0.632	-0.073	1.000	0.078	-0.023	-0.117	0.510
FINANCIAL	-0.036	0.049	-0.016	-0.167	0.233	-0.060	0.078	1.000	0.425	0.155	0.167
ECONOMIC	0.123	0.328	0.135	-0.198	0.463	-0.211	-0.023	0.425	1.000	0.427	0.497
POLITICAL	-0.065	0.045	0.003	0.035	-0.105	-0.006	-0.117	0.155	0.427	1.000	-0.012
DEVPC1	0.067	0.347	-0.055	-0.634	0.916	-0.242	0.510	0.167	0.497	-0.012	1.000
LIQUIDITY EQUITY	-0.104	-0.056	-0.035	0.014	-0.136	0.057	-0.052	0.015	-0.072	-0.073	-0.146
LIQUIDITY BOND	0.004	-0.068	-0.065	0.108	-0.145	0.114	-0.042	0.062	-0.009	0.090	-0.201
LIQUIDITY REIT	-0.106	-0.091	0.054	0.274	-0.414	0.061	-0.180	-0.148	-0.321	-0.424	-0.512

Notes: The table presents the correlations between the independent variables considered for the panel regressions. Definitions of the independent variables considered for the regressions and their data sources are given in Table 5.

Table 7

Global Regression Analysis of Diversification Indexes

	All Assets	Equity				Bond	REIT
		Full	Developed	Emerging	Frontier	Full	
Intercept	95.718	100.221	103.151	102.441	96.413	80.221	97.565
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
TED	-6.130	-3.658	4.469	-11.729	-10.388	-9.581	-13.115
	0.131	***0.417***	***0.572***	***0.009***	***0.000***	***0.258***	***0.005***
VIX	0.139	-0.144	-0.533	0.136	0.220	0.995	0.335
	0.425	***0.471***	***0.143***	***0.439***	***0.009***	***0.016***	***0.074***
SENT	-1.354	-1.978	-2.888	-2.552	-0.126	-0.060	0.894
	0.404	***0.293***	***0.381***	***0.132***	***0.855***	***0.986***	***0.587***
FEDFUND	0.376	0.092	-0.358	-0.169	0.805	1.020	0.551
	0.590	***0.909***	***0.800***	***0.810***	***0.017***	***0.496***	***0.444***
INTERNET	-1.108	-1.187	-2.378	-0.951	-0.188	-0.917	-1.047
	0.000	***0.000***	***0.000***	***0.000***	***0.013***	***0.014***	***0.000***
ERM	-15.508	-12.069	-16.993	-6.206	-4.846	-24.402	-14.858
	0.001	***0.016***	***0.046***	***0.129***	***0.011***	***0.010***	***0.002***
Eurozone	-2.765	2.415	14.567	-7.342	-8.189	-17.510	-8.631
	0.471	***0.582***	***0.076***	***0.073***	***0.000***	***0.046***	***0.041***
Adj. R2	0.912	0.884	0.888	0.898	0.914	0.746	0.921

	Australia	Belgium	Canada	France	Germany	Italy
Intercept	95.825	89.576	95.656	93.034	89.994	98.402
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
TED	-16.234	-0.540	-16.279	-3.070	1.475	9.063
	0.184	***0.927***	***0.001***	***0.500***	***0.800***	***0.140***
VIX	0.399	0.407	0.039	0.072	0.201	-0.131
	0.450	***0.136***	***0.812***	***0.720***	***0.440***	***0.616***
SENT	-2.179	4.248	-1.621	-0.380	-2.172	0.132
	0.656	***0.099***	***0.302***	***0.839***	***0.374***	***0.957***
FEDFUND	0.402	0.279	1.774	0.728	0.234	-0.744
	0.850	***0.792***	***0.018***	***0.376***	***0.823***	***0.485***
INTERNET	-1.633	-2.172	-1.035	-2.184	-1.599	-2.209
	0.004	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
ERM	-13.997	-31.312	-0.202	-29.799	-30.672	-29.714
	0.247	***0.000***	***0.957***	***0.000***	***0.000***	***0.000***
Eurozone	-6.271	-2.144	-15.752	-0.766	3.397	3.858
	0.590	***0.711***	***0.001***	***0.863***	***0.554***	***0.506***
Adj. R2	0.691	0.940	0.961	0.966	0.885	0.928

	Japan	Netherlands	New Zealand	South Africa	UK	US
Intercept	92.452	87.477	96.717	106.247	92.738	100.712
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
TED	-9.349	3.812	-30.679	-23.081	4.852	8.841

	0.123	***0.550***	***0.004***	***0.015***	***0.345***	***0.088***
VIX	0.353	0.195	0.284	0.552	-0.101	-0.511
	0.183	***0.490***	***0.472***	***0.154***	***0.654***	***0.032***
SENT	-2.032	-1.026	-1.759	-2.243	-0.317	0.623
	0.402	***0.696***	***0.631***	***0.521***	***0.879***	***0.758***
FEDFUND	0.753	0.599	2.402	-1.114	0.452	-0.110
	0.473	***0.600***	***0.146***	***0.464***	***0.619***	***0.900***
INTERNET	-0.744	-2.370	-0.984	-1.795	-2.202	-0.426
	0.006	***0.000***	***0.014***	***0.000***	***0.000***	***0.045***
ERM	-14.453	-31.537	-18.244	-21.438	-25.259	2.925
	0.024	***0.000***	***0.054***	***0.022***	***0.000***	***0.551***
Eurozone	17.830	6.123	-18.027	-15.059	9.321	-1.096
	0.007	***0.333***	***0.053***	***0.085***	***0.077***	***0.819***
Adj. R2	0.618	0.935	0.827	0.854	0.950	0.626

Notes: The OLS regressions estimate the relation between diversification indexes and proxies for macro-financial and developmental factors. Definitions of the independent variables considered for the regressions and their data sources are given in Table 5. The relation is examined for a combination of all Assets, all Equities, Equities for developed and emerging markets, All Bonds, All REITs, and all assets for a number of specific countries. The regressions for the individual countries are for those where the three asset classes, equities, bonds and REITs are available. P-values are in bold and italics. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 8
Panel Regression Analysis of Diversification Indexes with Global and Country Developmental Factors

	Global Internet			Country Internet			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	-0.398	-11.912	-14.001	-7.415	-16.863	-23.034	-5.629	-17.421	-24.156
	0.854	***0.000***	***0.005***	***0.001***	***0.000***	***0.000***	***0.194***	***0.000***	***0.000***
VIX	-0.304	1.069	0.407	-0.084	1.215	0.702	-0.120	1.118	0.569
	0.001	***0.000***	***0.013***	***0.331***	***0.000***	***0.000***	***0.452***	***0.000***	***0.001***
SENT	-3.239	-0.172	2.012	-2.586	0.596	3.301	-1.615	0.304	2.462
	0.000	***0.612***	***0.002***	***0.000***	***0.148***	***0.000***	***0.130***	***0.565***	***0.007***
FEDFUND	-0.161	1.222	-0.013	0.601	1.580	0.599	0.797	1.949	1.514
	0.392	***0.000***	***0.973***	***0.030***	***0.000***	***0.293***	***0.219***	***0.000***	***0.001***
ERM	-9.381	-24.289	-16.614	-10.055	-24.330	-16.232	-14.540	-22.013	-12.473
	0.000	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
Eurozone	7.090	-20.175	-10.182	-3.110	-27.927	-23.577	-1.016	-23.965	-20.923
	0.011	***0.000***	***0.041***	***0.159***	***0.000***	***0.000***	***0.805***	***0.000***	***0.000***
Global INTERNET	-1.602	-0.839	-1.447						
	0.000	***0.000***	***0.000***						
Country INTERNET				-0.626	-0.201	-0.379			
				0.000	***0.000***	***0.000***			
DEVPC1							-8.834	-2.795	-4.210
							0.000	***0.000***	***0.001***
Nobs	1475	452	230	1373	448	227	626	336	188
Adj. R2	0.473	0.620	0.615	0.581	0.613	0.623	0.510	0.556	0.532

The unbalanced regressions estimate the relation between the diversification indexes, Equity, Bond and REIT, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors in table 6, 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 1986-2012. Country fixed effects are included in all regressions. P-values are in bold and italics. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 9
Panel Regression Analysis of Diversification Indexes

	NO Developmental Factor			INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	-22.921	-23.532	-32.967	-9.481	-19.901	-21.489	-8.399	-21.994	-24.711
	0.000	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.049**	**0.000**	**0.000**
VIX	0.681	1.658	1.129	0.034	1.448	0.494	0.115	1.398	0.560
	0.000	***0.000***	***0.000***	***0.715***	***0.000***	***0.016***	***0.563***	***0.000***	***0.005***
SENT	-0.718	1.491	1.118	-0.845	1.450	0.584	0.473	1.160	1.463
	0.393	***0.022***	***0.334***	***0.255***	***0.036***	***0.614***	***0.728***	***0.151***	***0.133***
FEDFUNDS	3.591	2.966	3.270	0.690	2.018	0.244	1.030	2.415	1.296
	0.000	***0.000***	***0.000***	***0.032***	***0.000***	***0.725***	***0.086***	***0.000***	***0.055***
ERM	-8.489	-23.681	-7.524	-15.038	-25.003	-13.248	-20.707	-22.897	-10.310
	0.000	***0.000***	***0.010***	***0.000***	***0.000***	***0.001***	***0.000***	***0.000***	***0.005***
Euro	-23.260	-36.464	-35.013	-7.986	-32.039	-20.216	-6.178	-29.383	-22.356
	0.000	***0.000***	***0.000***	***0.003***	***0.000***	***0.000***	***0.261***	***0.000***	***0.000***
ECONOMIC	-1.786	-0.748	-1.118	-0.418	-0.277	0.606	-0.420	-0.326	0.039
	0.000	***0.000***	***0.013***	***0.008***	***0.225***	***0.287***	***0.121***	***0.156***	***0.943***
FINANCIAL	0.877	0.230	-1.961	0.122	0.135	-2.098	0.219	-0.060	-1.890
	0.001	***0.461***	***0.003***	***0.567***	***0.676***	***0.001***	***0.491***	***0.886***	***0.010***
POLITICAL	-0.278	-0.299	0.193	-0.462	-0.394	-0.202	-0.695	-0.518	-0.305
	0.139	***0.150***	***0.677***	***0.002***	***0.076***	***0.568***	***0.027***	***0.092***	***0.428***
LIQUIDITY	18.508	7.971	3.230	19.481	2.106	3.065	27.902	-0.828	3.880
	0.043	***0.000***	***0.830***	***0.003***	***0.513***	***0.794***	***0.183***	***0.839***	***0.828***
INTERNET				-0.574	-0.126	-0.451			
				0.000	***0.000***	***0.000***			
DEVPC1							-7.992	-1.337	-4.046
							0.000	***0.042***	***0.079***
Nobs	1132	435	213	1074	431	210	514	324	182
Adj. R2	0.499	0.620	0.557	0.642	0.627	0.667	0.607	0.574	0.640

The unbalanced regressions estimate the relation between the diversification indexes, Equity, Bond and REIT, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors in table 6, 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 1986-2012. Country fixed effects are included in all regressions. P-values are in bold and italics. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

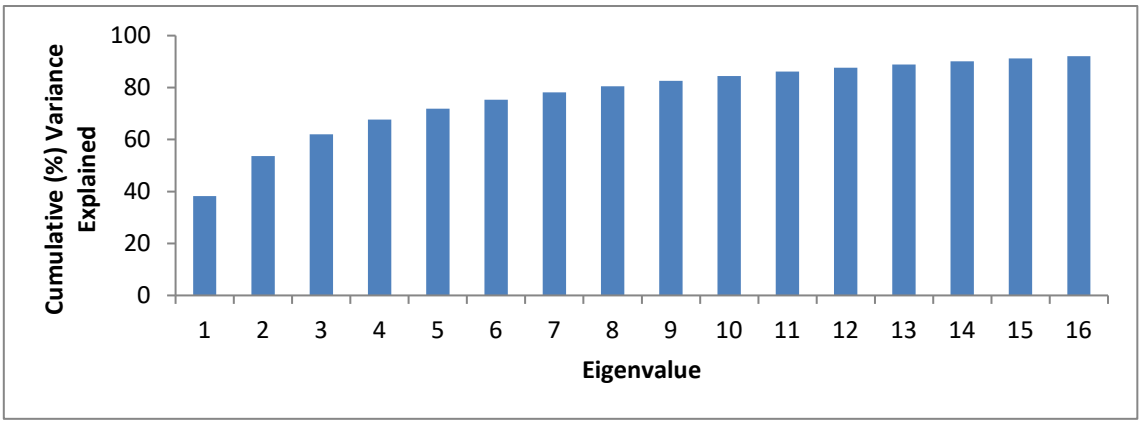
Table 10
Panel Regression Analysis for Geographical and Time Based Cohorts

	Geographical Cohorts Equity			Time Cohorts					
	Developed	Emerging	Frontier		Pre 2000			Post 2000	
				Equity	Bond	REIT	Equity	Bond	REIT
TED	-9.281	-17.487	-5.679	-33.819	21.682	30.326	-12.068	-28.801	-19.693
	0.005	***0.000***	***0.031***	***0.001***	***0.003***	***0.030***	***0.000***	***0.000***	***0.079***
VIX	0.015	0.226	0.123	-0.737	-0.550	-0.271	0.221	2.058	0.221
	0.925	***0.154***	***0.382***	***0.004***	***0.000***	***0.283***	***0.117***	***0.000***	***0.646***
SENT	0.323	-1.520	-2.988	-0.642	3.587	5.459	2.057	0.104	3.309
	0.753	***0.351***	***0.001***	***0.644***	***0.006***	***0.000***	***0.154***	***0.970***	***0.487***
FEDFUNDS	1.210	0.565	1.109	4.144	0.831	-0.507	-0.304	3.531	-1.761
	0.020	***0.435***	***0.027***	***0.000***	***0.061***	***0.521***	***0.467***	***0.000***	***0.031***
ERM	-18.613	-5.402	11.975	-13.569	-22.294	-11.335			
	0.000	***0.219***	***0.000***	***0.000***	***0.000***	***0.002***			
Euro	-11.051	-17.864	2.340				-11.653	-32.622	-19.735
	0.004	***0.001***	***0.369***				***0.004***	***0.000***	***0.049***
ECONOMIC	-0.709	-0.589	0.186	0.344	0.395	-0.364	0.091	0.686	1.108
	0.005	***0.030***	***0.451***	***0.040***	***0.046***	***0.106***	***0.813***	***0.299***	***0.303***
FINANCIAL	0.003	0.161	0.234	-0.111	0.051	-0.422	-0.079	-0.287	-2.587
	0.992	***0.601***	***0.592***	***0.302***	***0.799***	***0.531***	***0.831***	***0.642***	***0.001***
POLITICAL	-0.195	-0.496	-0.512	-0.830	-0.210	-0.365	-0.310	-0.404	-0.789
	0.540	***0.000***	***0.062***	***0.000***	***0.236***	***0.175***	***0.123***	***0.285***	***0.219***
LIQUIDITY	20.511	27.961	7.193	5.518	-4.278	-8.024	15.589	-119.557	-26.104
	0.074	***0.008***	***0.199***	***0.357***	***0.169***	***0.558***	***0.144***	***0.366***	***0.317***
INTERNET	-0.524	-0.379	-0.514	-0.237	-0.188	-0.255	-0.465	0.109	-0.709
	0.000	***0.006***	***0.000***	***0.033***	***0.027***	***0.057***	***0.000***	***0.590***	***0.049***
Nobs	590	282	202	390	193	75	684	238	135
Adj. R2	0.700	0.569	0.233	0.391	0.752	0.151	0.448	0.576	0.640

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 1986-2012. 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. The time cohorts break up the regression analysis to pre and post 2000. 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. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Appendix Figure 1

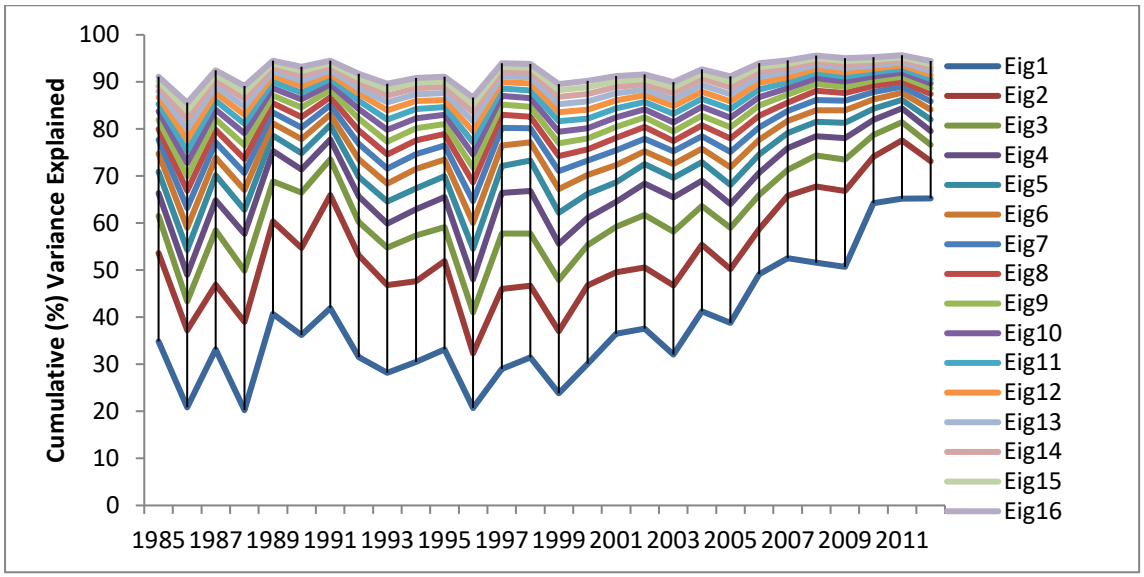
Average Cumulative Percentage of Variance Explained by Sorted Eigenvalues from Pre-1986 Cohort Covariance Matrices



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 1986-2012. The principal components are obtained from the pre-1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US).

Appendix Figure 2

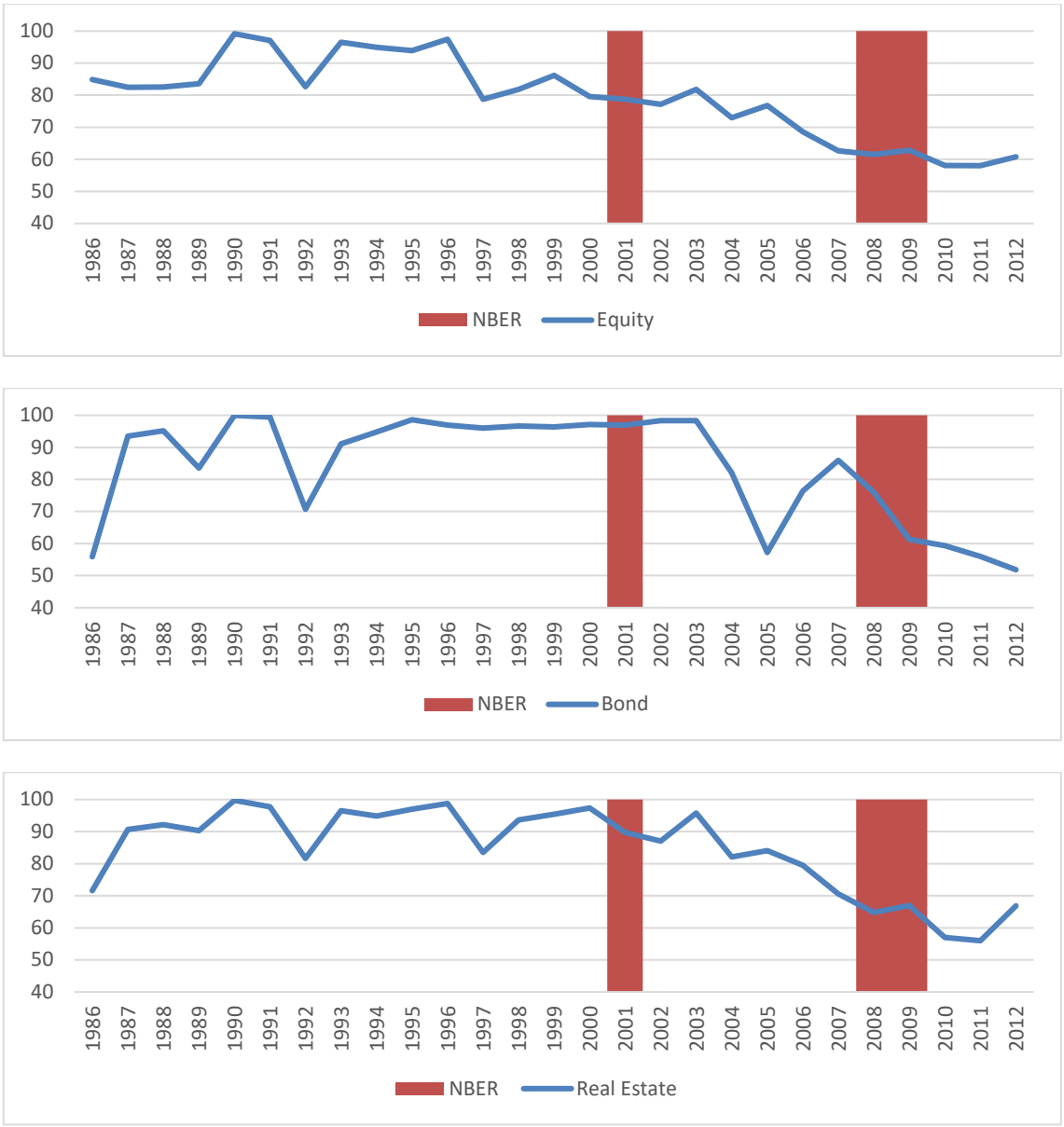
Percentage of Variance Explained over Time by Sorted Eigenvalues from Pre-1986 Cohort Covariance Matrices



Notes: This figure shows the time series of cumulative percentage of variance explained by the sorted (low to high) eigenvalues from pre-1986 cohort covariance matrices. The principal components are obtained from the pre-1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US).

Appendix Figure 3

Trends in World Diversification Indexes and Recessions

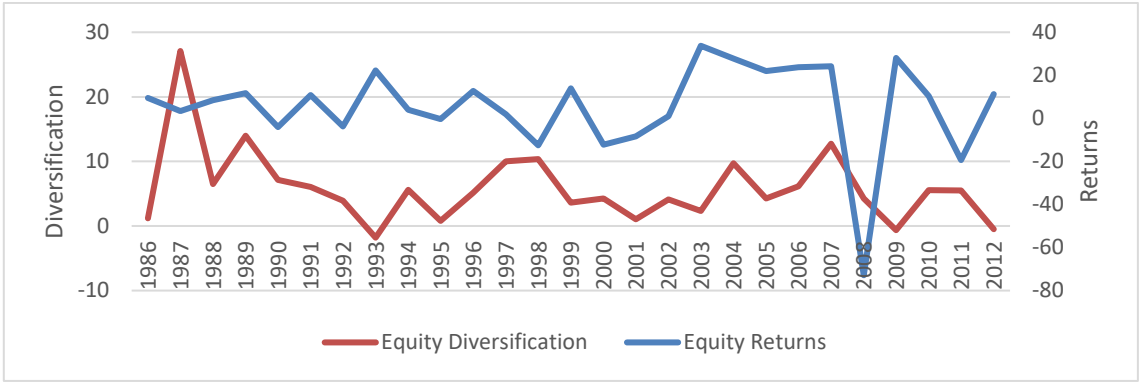


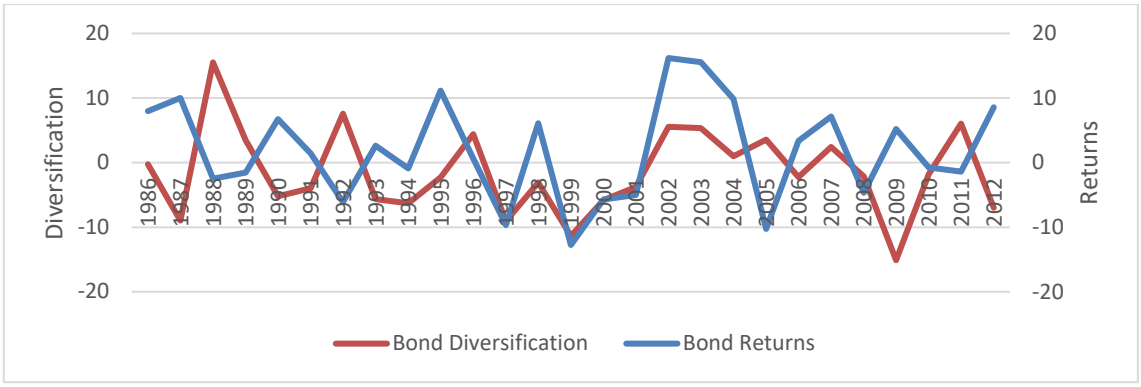
Notes: This figure shows the average diversification indexes for each asset class and NBER recessions between 1986 and 2012. There is a time-series plot of the diversification indexes and NBER recessionary period (red bars). The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 50 valid daily returns per year.

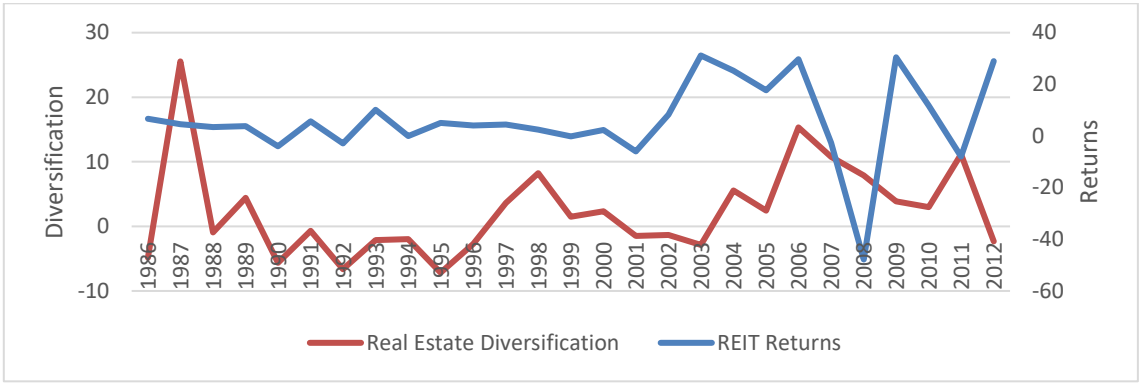
Appendix Figure 4

Trends in Diversification Indexes

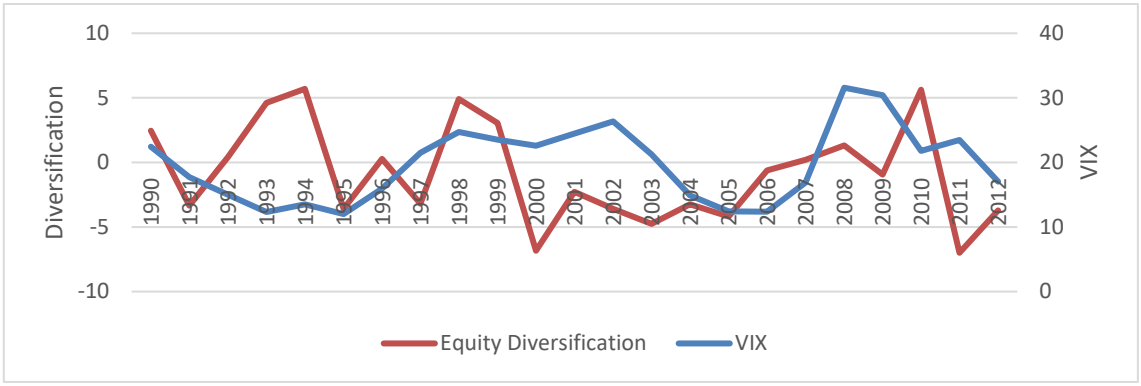
Panel A: Differences in Diversification Indexes for Bear and Bull returns and Mean Returns

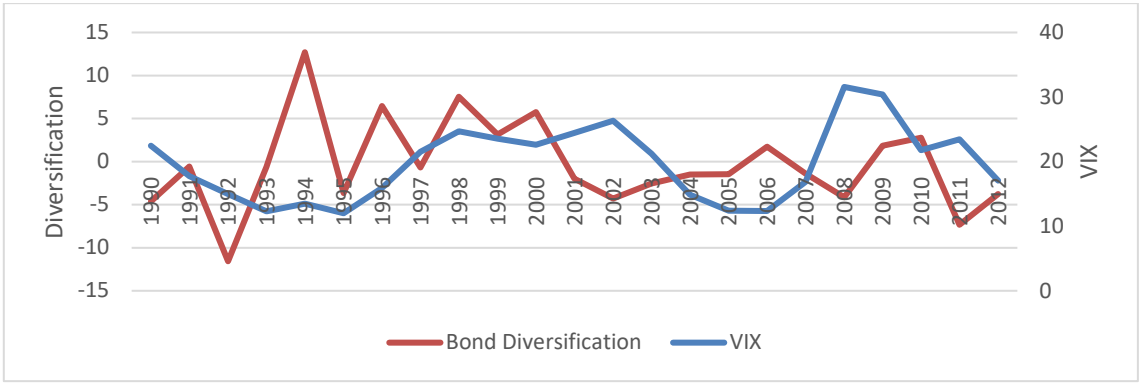


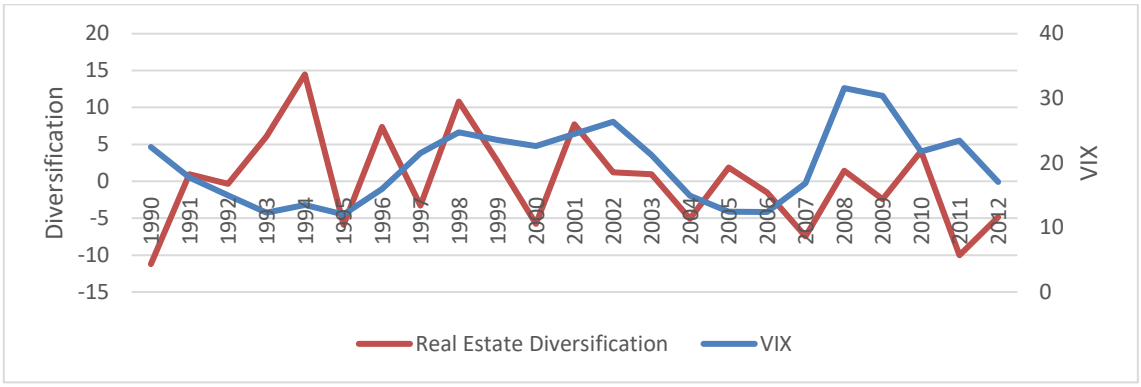




Panel B: Differences in Diversification Indexes for High and Low VIX and Mean VIX







Panel C: Differences in Diversification Indexes for High and Low TED and Mean TED

Notes: This figure uses the average diversification indexes for each asset class between 1986 and 2012. In panel A there are the average returns and the difference in diversification between bear and bull returns using values above (bull) and below (bear) the median return. In panel B there are the average VIX and the difference in diversification between above (high VIX) and below (low VIX) the median VIX values. In panel C there are the average TED spreads and the difference in diversification between above (high TED) and below (low TED) the median TED values. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 50 valid daily returns per year.

Appendix Table 1

Correlations of World Diversification Indexes

Correlations between World Diversification Indexes for Raw Returns

Full Period				Pre2000				Post2000			
Contemporaneous				Contemporaneous				Contemporaneous			
	Equity	Bond	REITs		Equity	Bond	REITs		Equity	Bond	REITs
Equity	1.000			Equity	1.000			Equity	1.000		
Bond	0.664	1.000		Bond	0.363	1.000		Bond	0.729	1.000	
REITs	0.884	0.837	1.000	REITs	0.656	0.874	1.000	REITs	0.977	0.774	1.000
Lead Equity				Lead Equity				Lead Equity			
	Equity	Bond	REITs		Equity	Bond	REITs		Equity	Bond	REITs
Equity	1.000			Equity	1.000			Equity	1.000		
Bond	0.707	1.000		Bond	-0.103	1.000		Bond	0.770	1.000	
REITs	0.786	0.836	1.000	REITs	-0.229	0.711	1.000	REITs	0.885	0.738	1.000
Lead Bonds				Lead Bonds				Lead Bonds			
	Equity	Bond	REITs		Equity	Bond	REITs		Equity	Bond	REITs
Equity	1.000			Equity	1.000			Equity	1.000		
Bond	0.531	1.000		Bond	-0.081	1.000		Bond	0.771	1.000	
REITs	0.922	0.601	1.000	REITs	0.683	-0.069	1.000	REITs	0.979	0.734	1.000
Lead REITs				Lead REITs				Lead REITs			
	Equity	Bond	REITs		Equity	Bond	REITs		Equity	Bond	REITs
Equity	1.000			Equity	1.000			Equity	1.000		
Bond	0.739	1.000		Bond	0.332	1.000		Bond	0.692	1.000	
REITs	0.725	0.742	1.000	REITs	0.137	-0.036	1.000	REITs	0.844	0.813	1.000

Notes: This table shows the contemporaneous, lead and lag correlation coefficients between the average diversification indexes. Correlation coefficients are reported for the full period, a pre2000 period and a post2000 period. The full period is 1986 to 2012 inclusive for all correlations. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 50 valid daily returns per year.

Appendix Table 2

Correlations of Diversification Indexes

Panel A: Correlations between Diversification Indexes for Bear and Bull Returns (Bear minus Bull Returns) and Average Returns			
	Equity	Bond	REITs
Full Period	-0.024	0.080	-0.051
Pre 2000	-0.271	-0.024	0.168
Post 2000	0.111	0.186	-0.236
Panel B: Correlations between Diversification Indexes for high and low TED (High TED minus Low TED) and Mean TED			
	Equity	Bond	REITs
Full Period	0.386	-0.221	0.288
Pre 2000	0.400	-0.050	0.386
Post 2000	0.299	-0.240	0.186
Panel C: Correlations between Diversification Indexes for high and low VIX (High VIX minus Low VIX) and Mean VIX			
	Equity	Bond	REITs
Full Period	-0.022	-0.054	-0.051
Pre 2000	0.127	0.120	-0.146
Post 2000	0.130	-0.127	0.205

Notes: This table shows the correlation coefficients between the diversification indexes for bear and bull returns (bear minus bull returns) and average returns (panel A), correlations between diversification indexes for high and low TED (high TED minus low TED) and mean TED (panel B), and correlations between diversification indexes for high and low VIX (high VIX minus low VIX) and mean VIX (panel C). In each panel correlation coefficients are reported for the full period, a pre2000 period and a post2000 period. The full period is 1986 to 2012 inclusive for all correlations except for the VIX (1990 to 2012) due to availability of this index from 1990 onwards. The differences between bear and bull returns use values above (bull) and below (bear) the median return. The differences for high and low VIX values use above (high VIX) and below (low VIX) the median VIX values. The differences for high and low TED spread values uses above (high TED) and below (low TED) the median TED values. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 50 valid daily returns per year.

Appendix Table 3

Differences in World Diversification Indexes

	Equity	Bonds	REITs
Bear minus Bull Returns	5.868	-1.454	2.408
	5.290	***-1.137***	***1.711***
High minus Low VIX	-0.815	-0.351	0.070
	-1.017	***-0.321***	***0.052***
High minus Low Ted	1.280	-2.800	-2.234
	0.937	***-2.748***	***-1.501***

Notes: The table shows the mean difference between diversifications indexes stratified by bear minus bull returns, high minus low VIX and high minus low TED spreads. These are followed by t-statistics (in bold and italics) of testing whether the differences are significantly different from zero. This table uses the average diversification indexes for each asset class between 1986 and 2012. The difference in diversification between bear and bull returns uses values above (bull) and below (bear) the median return. The difference in diversification for high and low VIX values uses above (high VIX) and below (low VIX) the median VIX values. The difference in diversification for high and low TED spread values uses above (high TED) and below (low TED) the median TED values. The diversification index is measured by the average R-squares from the multi-factor asset returns model fitted using daily data every year between 1986 and 2012 for all markets in the database. The model fits asset returns within each year on global factors. The global factors are 16 principal components obtained from the pre1986 markets (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; Bond: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Sweden, Switzerland, UK, US, and REIT: Australia, Netherlands, UK, and US). A diversification value is obtained for each market assuming there are 50 valid daily returns per year.

Appendix Table 4
Balanced Panel Regression Analysis of Diversification Indexes

	NO Developmental Factor			INTERNET as Developmental Factor			1st PC as Developmental Factor		
	Equity	Bond	REIT	Equity	Bond	REIT	Equity	Bond	REIT
TED	-24.238	-23.912	-33.118	-6.748	-18.698	-11.665	-6.406	-20.822	-18.252
	0.000	***0.000***	***0.000***	***0.023***	***0.000***	***0.184***	***0.129***	***0.000***	***0.023***
VIX	0.906	1.830	1.122	-0.242	1.531	-0.172	-0.059	1.465	0.258
	0.000	***0.000***	***0.000***	***0.089***	***0.000***	***0.673***	***0.784***	***0.000***	***0.395***
SENT	1.521	-1.653	1.242	2.757	-1.584	2.862	3.902	-1.918	0.286
	0.036	***0.012***	***0.224***	***0.007***	***0.018***	***0.106***	***0.014***	***0.021***	***0.858***
FEDFUNDS	2.803	4.211	3.042	-1.369	3.009	-3.143	-0.027	3.103	0.225
	0.000	***0.000***	***0.001***	***0.013***	***0.000***	***0.057***	***0.974***	***0.000***	***0.833***
Euro	-25.074	-31.221	-37.902	-10.964	-26.939	-22.683	-7.247	-23.213	-20.734
	0.000	***0.000***	***0.000***	***0.002***	***0.000***	***0.001***	***0.205***	***0.000***	***0.001***
ECONOMIC	-1.309	-0.370	-0.530	-0.130	0.038	1.350	-0.165	0.144	1.179
	0.000	***0.085***	***0.304***	***0.542***	***0.905***	***0.069***	***0.609***	***0.649***	***0.145***
FINANCIAL	0.748	-0.227	-2.087	-0.564	-0.482	-1.970	-0.654	-0.822	-2.418
	0.032	***0.562***	***0.008***	***0.104***	***0.244***	***0.096***	***0.514***	***0.103***	***0.002***
POLITICAL	-0.310	-0.177	0.430	-0.399	-0.102	0.141	-1.031	-0.256	-0.057
	0.132	***0.406***	***0.386***	***0.015***	***0.627***	***0.783***	***0.009***	***0.341***	***0.911***
LIQUIDITY	23.641	6.032	21.263	36.291	11.219	9.991	72.881	-0.537	89.458
	0.002	***0.632***	***0.059***	***0.001***	***0.528***	***0.792***	***0.005***	***0.978***	***0.045***
INTERNET				-0.653	-0.103	-0.590			
				0.000	***0.024***	***0.000***			
DEVPC1							-7.218	-2.050	-1.822
							0.000	***0.009***	***0.096***
Nobs	870	300	135	615	285	105	0	225	105
Adj. R2	0.369	0.609	0.603	0.607	0.603	0.744	0.547	0.568	0.598

Notes: This table replicates the unbalanced panel regressions in Table 9 with balanced panel regressions. The balanced panel regressions estimate the relation between the diversification indexes, Equity, Bond and REIT, and proxies for macro-financial and developmental factors. Given the high correlation between many developmental factors in table 6, 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 balanced panels with a timeframe 1996-2010. Country fixed effects are included in all regressions. P-values are in bold and italics. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Appendix Table 5
Panel Regression Analysis for Geographical and Time Based Cohorts with Alternative Developmental Factor

	Geographical Cohorts Equity			Time Cohorts					
	Developed	Emerging	Frontier	Pre 2000			Post 2000		
				Equity	Bond	REIT	Equity	Bond	REIT
TED	-5.895	-5.208	-14.848	-19.522	-2.398	-25.088	-17.244	-24.804	-27.108
	0.168	***0.142***	***0.000***	***0.108***	***0.782***	***0.044***	***0.000***	***0.000***	***0.017***
VIX	-0.041	-0.147	0.314	-1.389	-0.386	0.163	0.689	1.658	0.659
	0.841	***0.360***	***0.080***	***0.000***	***0.039***	***0.559***	***0.001***	***0.000***	***0.156***
SENT	2.209	-3.317	1.850	-1.334	-0.389	-3.287	5.709	-2.752	6.153
	0.138	***0.259***	***0.092***	***0.504***	***0.778***	***0.470***	***0.030***	***0.255***	***0.169***
FEDFUNDS	1.092	0.714	0.687	4.557	2.622	2.951	0.422	3.042	-1.089
	0.041	***0.533***	***0.128***	***0.000***	***0.000***	***0.002***	***0.534***	***0.000***	***0.335***
ERM	-22.817	-16.970	-1.539	-16.808	-20.123	-9.907			
	0.000	***0.086***	***0.547***	***0.000***	***0.000***	***0.019***			
Euro	-9.426	-2.355	-16.301				-14.295	-20.252	-17.330
	0.097	***0.585***	***0.000***				***0.006***	***0.015***	***0.081***
ECONOMIC	-0.942	0.136	-0.131	0.172	0.406	-0.334	1.071	1.435	2.760
	0.001	***0.612***	***0.787***	***0.436***	***0.034***	***0.092***	***0.015***	***0.007***	***0.014***
FINANCIAL	-0.355	0.529	0.021	-0.206	0.229	0.995	-0.209	-1.340	-1.832
	0.183	***0.000***	***0.962***	***0.056***	***0.245***	***0.002***	***0.776***	***0.054***	***0.023***
POLITICAL	0.280	-0.808	-0.058	-0.699	-0.437	-0.312	-0.511	-0.416	-0.495
	0.587	***0.000***	***0.751***	***0.000***	***0.057***	***0.216***	***0.269***	***0.380***	***0.507***
LIQUIDITY	42.058	73.944	17.906	-0.603	1.208	-5.083	59.288	-334.890	-4.813
	0.027	***0.000***	***0.007***	***0.959***	***0.735***	***0.771***	***0.009***	***0.366***	***0.875***
DEVPC1	-7.891	-8.480	6.619	-2.073	2.265	7.509	-1.454	-1.344	-2.733
	0.000	***0.000***	***0.000***	***0.344***	***0.001***	***0.062***	***0.390***	***0.544***	***0.220***
Nobs	373	76	65	210	148	65	304	176	117
Adj. R2	0.695	0.612	0.290	0.465	0.730	0.201	0.450	0.540	0.594

This table replicates the unbalanced panel regressions in Table 10 with the use of an alternative developmental factor. The first Principal Component of a set of country level developmental factors, DEVPC1, is included separately as a developmental factor instead of internet. 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 1986-2012. 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. The time cohorts break up the regression analysis to pre and post 2000. 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. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.