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Globalization and Stock Market Returns

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Abstract

With increasing globalization, to what extent do stock market returns reflect global or domestic risk factors? We find a significant relationship between stock market returns and the global market risk factor and macroeconomic factors respectively. In particular, global factors offer four times more explanatory power than domestic factors for developed market stock returns. Yet domestic factors are as important as global ones in emerging economies. Our method allows for the proxies of the state variables to be endogenously determined. The relationship between macroeconomy and stock market returns is robust after accounting for the market factor, firm size and book-to-market characteristics.

KEYWORDS: globalization, macroeconomic risk factors, global risk factors, domestic risk factors

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INTRODUCTION

Globalization, at its basic level, is an economic force between people (and economic entities) that live in different countries (rather than in the same country). Trade, foreign direct investments and capital market flows are some measures that the World Bank used to evaluate globalization trends and its attendant costs and benefits.[1] Yet, if the stock market is widely seen by researchers and market participants as a barometer reflecting the general health of an economy, would it not also reflect the intensity of such cross-border transactions?

This study asks the empirical question: To what extent does a country's stock market returns reflect global vis-à-vis domestic factors? Most stock exchanges feature a preponderance of locally domiciled companies.[2] Therefore, the degree to which stock market returns covary with global vis-à-vis domestic factors is one measure of globalization of a country's financial-economic sector. In this study, we calibrate the relative degree of globalization for each of the 23 developed economies and 26 emerging economies in our sample.

Roll (1992) finds cross-country economic specialization. Heston and Rouwenhorst (1994) identify country specialization to be related to political and institutional structure. Empirical studies, like Rouwenhorst (1999), focus on cross-country correlation analysis of aggregated market returns of emerging markets. In particular, Rouwenhorst (1999) suggests that risk factors that affect a country's stock market performance are distinct from those that drive expected return differences within markets. Combining his findings from correlation analysis with those from risk factor regression analysis, he concludes that emerging markets have been much isolated from world markets during the 1982 – 1997 test period. This finding is consistent with that of Bekaert and Harvey (1995). The latter find that some emerging equity markets have actually become more segmented from world capital markets in spite of the trend towards gradual removal of restrictions in foreign investments and capital flows. Therefore, in this study on globalization, we posit that globalization does not preclude the dominance of domestic risk factors vis-à-vis global risk factors.

As capital markets liberalize and become more developed, exchange traded funds on domestic exchanges become more efficient investible surrogates

[1] The World Bank notes that globalization admits various definitions depending on whether a socioeconomic, political or cultural perspective is being taken. Here we take the most general definition (see http://www1.worldbank.org/economicpolicy/globalization/ag01.html).

[2] Global financial centers like New York and London have relatively more listings of foreign companies by way of dual listings or depository receipts.

for the diversification potential of aggregate market returns than closed end country funds. In fact, Chang, Eun and Kolodny (1995) find that closed-end country funds behave more like host country securities than the underlying securities. The corollary to our research question would then be: To what extent do aggregated market returns offer benefits of geographical and industrial diversification in reflecting domestic risk factors? Our findings have implications for the potential diversification benefits of exchange traded country or regional funds. The results also add to the literature about the significance of market-based or region-based financial research. (Comment: Corrected the font size for this paragraph)

Another stream of empirical research suggests that innovations in US macroeconomic variables could proxy for state variables and represent systematic risk that explain the cross-section of asset returns [Chen, Roll and Ross (1986), Lettau and Ludvigson (2001a,b, 2005), Brennen and Xia (2005)]. Studies on other developed economies also point to a relationship between macroeconomic variables and stock returns [see Asprem (1989), Wasserfallen (1989), Fama and French (1989), and Chen (1991)]. In more recent years, researchers also find this relationship between macroeconomic factors and stock returns in emerging economies [see Harvey (1995a,b), Bilson, Brailsford and Hooper (2001) and Fifield, Power and Sinclair (2002)]. If macroeconomic factors indeed proxy for time varying properties of investor expectations of excess returns, they would offer incremental explanatory power for stock returns in the presence of the market risk factor.

Our study builds on the existing empirical literature on emerging market stock returns at the aggregated level (Bekaert and Harvey, 1995, 1997; Bekaert, Erb, Harvey and Viskanta, 1997; Claessens, Dasgupta and Glen, 1998; Fama and French, 1998; Harvey, 1995a,b; Patel, 1998; Rouwenhorst, 1999). Apart from cross-country comparison, we also compare emerging markets with developed markets.

So, with increasing globalization, to what extent does a stock market reflect the health of the global economy? The proportion of total variation of stock market returns that is explained by the information set used in this study is typically large, measuring 42 and 43 percent for developed and emerging economies respectively. Using regression analysis, we find that global factors are dominant and offer four times more explanatory power than domestic factors for developed market stock returns. On the other hand, local factors offer just about as much explanatory power as global factors for emerging market stock returns. Our method allows for the proxies of the state variables to be endogenously determined. This relationship between stock market returns and global vis-à-vis domestic factors is consistent with the APT and is robust after accounting for firm size and book-to-market characteristics.

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This paper is organized as follows. The next section describes the data. The next discusses the method employed. Then a section analyzes the major results. The last section concludes the study.

THE DATA

In order to provide a comprehensive study, we sample the developed and emerging economies based on the 49 component countries of the Morgan Stanley Capital International (MSCI) World Index and the Morgan Stanley Capital International (MSCI) Emerging Markets Free (EMF) Index. Both indices are free float-adjusted market capitalization indices designed to measure global developed markets' equity performance and global emerging markets' equity performance respectively.

DATA ORIGIN AND DESCRIPTION

The main data sources are the IMF International Financial Statistics Database (August 2002), the DataStream International Limited database and the MSCI website.[3] Monthly data of the stock price indices, market factors, macroeconomic variables and firm specific factors are drawn for this study since time series with more frequent data points tend to offer stronger results. As the MSCI World and EMF Indices run from 1970 and 1988 respectively, the test period for both developed and emerging economies are drawn from the period 1988 through 2001 to allow for cross-sectional evaluation across all 49 developed and emerging economies.

National stock index data are sampled for both the developed and emerging economies for the period 1988 through 2001. In the event that the national stock indices are considerably shorter in time series or unavailable, the MSCI country indices will be used instead. The stock indices in this paper are not adjusted for dividend payments as the volatile component of a stock's return is generally attributable to stock price appreciation and depreciation (Asprem, 1989).

[3] As of April 2002 the MSCI World Index consisted of the following 23 developed market country indices: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States. The MSCI EMF Index consisted of the following 26 emerging market country indices: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, Turkey and Venezuela.

For the purposes of this study, the macroeconomic variables are selected based on the findings in prior research and their expected influence on stock returns. We include global variables because increasing economic globalization means that firms do a larger amount of business with counterparts outside their country of domicile, resulting in more complex networks of cross-border relations and dependencies.

We sample macroeconomic variables such as foreign exchange reserves, industrial production index and the US Consumer Confidence Index besides those used in Fifield et al (2002). Although the number of variables chosen is somewhat arbitrary, it is nevertheless inevitable with this type of research (Fama, 1991). We are not able to source all of the domestic variables for some countries as they are either not available or do not exist in monthly series.[4] The macroeconomic data is not seasonally adjusted as the relevant data are generally unavailable for emerging economies. Furthermore, as pointed out by Chen (1991), the use of seasonally unadjusted data does not necessitate the use of future data for its construction. Altogether, fifteen domestic variables and thirteen global variables are collected from the IMF International Financial Statistics Database and DataStream. Firm specific data are sourced primarily from DataStream.[5] For the developed economies, the MSCI World Index serves as the proxy for market risk. As for the emerging economies, the MSCI EMF Index serves as the market risk proxy.

DATA TRANSFORMATION

We use the lognormal transformation to compute the continuously compounded monthly returns on each stock index. Log price relatives are more likely to be normally distributed. Also, this transformation does appear to satisfy the linearity assumption of the regression model (Koop, 2000).[6]

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[4] In the case of the United States (US), the foreign exchange rate is not included. This is because the foreign exchange rate variable for all the other countries are expressed as units of national currency per unit of US dollar.

[5] Firm specific data are available for all countries expect Jordan. Market value of equity (MV) for each stock index constituent is the stock price multiplied by the number of ordinary shares issued. MV is displayed in millions of units of local currency. In order to calculate book to market ratio for each index constituent, net tangible assets (NTA), which is defined as total assets, excluding intangible assets less total liabilities, minority interest and preference stock, is collected. Book to market ratio is then calculated as (NTA/MV). As we are unable to obtain the constituents of the MSCI indices due to their proprietary nature, we use instead the constituents of the respective national stock index. For example, the MV and NTA data for Switzerland are collected from the Swiss Market Index constituents even though we use the MSCI Switzerland Index to compute the stock returns.

[6] The assumption of homocedasticity is also readily accepted when natural logarithms are used in a regression analysis (Bomhoff, 1994).

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With the exception of the interest rate series, all time series of the macroeconomic principal components are transformed into rates of change by the formula $Ln(PC_t/PC_{t-1})$ where PC_t is the principal component extracted in month t and PC_{t-1} is the principal component extracted in month t-1. This minimizes any autocorrelation problem that comes with using time series of macroeconomic variables.

The market risk proxies for both developed and emerging economies are the continuously compounded monthly returns on the MSCI World Index and the MSCI EMF Index respectively. For the firm specific factors, we construct SMB (small minus big) and HML (high minus low) portfolios of stock returns that mimic risk factors relating to firm size and book to market equity respectively. Our method follows that used by Fama and French (1993).

METHOD

PRINCIPAL COMPONENT ANALYSIS OF MACROECONOMIC VARIABLES

We apply principal component analysis to summarize information that is extracted from the large set of macroeconomic variables into a few principal components.[7] There are three main advantages associated with the use of principal component analysis. Firstly, it allows a large number of theoretically significant macroeconomic variables that may affect the stock returns of developed and emerging economies to be considered. As such, omitted variables bias will be kept to a minimum because it does not limit the number of macroeconomic variables *a priori*. Secondly, this method does not impose a linear structure on any relationship between stock returns and the macroeconomic variables. Thirdly, as the dominant principal components are orthogonal to each other, the multicollinearity problem is minimized.

To derive a more meaningful interpretation of principal components in terms of the variables, Varimax factor rotation as suggested by Kaiser (1958) is used to rotate the estimated factor loadings.[8] The dominant principal components are extracted and used as inputs in multiple regression analysis to explain the stock returns of both developed and emerging economies.

REGRESSION ANALYSIS

[7] Principal components retain most of the information in the original variables. A principal component is not directly observable and it needs to be inferred from the input variables that load heavily on that particular factor.

[8] Such a technique will not modify the overall fit of the data but instead causes each principal component to load high on a smaller number of variables and low on other variables.

In the first part of the analysis, monthly stock index returns of each country are regressed on the contemporaneous market risk proxies - the MSCI World Index returns and the MSCI EMF Index returns for the developed and emerging economies respectively.

The next part of the regression analysis focuses on the explanatory power of the macroeconomic factors. The extracted principal components are inputs in the regression analysis. We adopt a three-step procedure. Firstly, the monthly country stock index returns are regressed on the contemporaneous time series of the market risk proxy and the first three global principal components. Other than observing the proportion of variance of stock returns explained, we also compare the adjusted R-squares before and after adding the global factors. An increase in the adjusted R-square means that the global macroeconomic variables are significantly related to the country stock index returns.

Secondly, the domestic principal components are added to the regression model. By doing so, we isolate the incremental change in explanatory power of the model through the incorporation of the domestic principal components. A decrease in the adjusted R-square may imply that the country is a relatively open economy and domestic factors can hardly explain the country's stock index returns.[9]

We next evaluate the robustness of the relationship between macroeconomy and stock market returns in the presence of Fama and French (1993) three-factor asset pricing model. We add the factor mimicking portfolios for firm size and book to market equity (*SMB* and *HML)* in the regression analysis. To check for robustness in each of these regression models, we add the lags of each of the explanatory variables up to four months. We also account for lags of the dependent variable if there is a presence of high serial correlation in the monthly returns on the country stock index. The results are analyzed in the next section.

RESULTS AND ANALYSES

The descriptive statistics of monthly returns on stock market indices of each developed and emerging country for the 14-year period, 1988 through 2001 point to the emerging economies offering higher mean returns that are more volatile than developed economies. The mean monthly return on the 26 emerging economies is 1.5 percent while that for developed economies is 0.8 percent.

[9] In our robustness tests, we vary the order in which the global and domestic principal components are added in the regression analysis. We find that the results are quite stable.

Correspondingly, the average standard deviation on emerging and developed stock market returns is 11.6 percent and 6.1 percent respectively.

To interpret the economic significance of the dominant principal components, Table 1 presents the factor loadings of each dominant principal component.[10] In this study, a macroeconomic variable is deemed to load heavily on a particular principal component if the extent of correlation is at least 85 percent.

For all the developed and emerging economies taken together, three dominant global principal components have been identified. The variables that load heavily on each of the three principal components are necessarily the same for the same sample period. These findings of the principal component analysis shed light on unobservable state variables in an APT framework.

For example, the factors that load heavily on the first principal component relate to production (IPROD), inflation (WCPI), trade (WEXP, WIMP, INTLR) and leading indicators of aggregate economic activity in the US (CBI). The primary factor loadings of the second principal component are US interest rates (FED, DIS).

[10] Factor loadings are the correlations between the principal components and the original variables. They point to the variables that are associated with each principal component and the extent of that association.

Table 1

Results of Principal Component Analysis

Results of the principal component (PC) analysis of the 15 domestic and 13 global macroeconomic variables. We apply the Kaiser (1960) criterion where PCs that have eigenvalues greater than one are deemed as dominant and will be retained for further analysis. Panel A and Panel B list the macroeconomic variables whose factor loadings account for most of the variation in the respective dominant PC. For the purpose of this study, a macroeconomic variable is deemed to load heavily on a particular PC if the correlation between that variable and the PC is at least 85 percent.

Panel A: Macroeconomic variables with substantive factor loadings for the dominant PCs of the 23 developed economies

Country	Principal Component 1	Principal Component 2	Principal Component 3
Australia	WPI, EXP, M0, M1, M2	FXR	TB
Austria	FR, CPI, EXP, IMP, M0, M1, M2	TB	N.A.
Belgium	FR, CPI, IR, GEXP, M1	DEBT	N.A.
Canada	WPI, EXP, IMP, IND	CPI	FR
Denmark	FR, CPI, PPI, EXP, IMP, IR, IND, M0	M1, M2	N.A.
Finland	IR, IND, M1	M2	FXR
France	EXP, IMP, IND, M1, M2, DEBT	WPI	FR
Germany	PPI, EXP, IMP, M1, DEBT	FR	TB, IR
Greece	FR, CPI, PPI, FXR, M1, M2	GEXP, DEBT	IND
Hong Kong	CPI, EXP, IMP, IND, UEMP, M0, M1, M2	FXR	IR
Ireland	CPI, EXP, IMP, TB, M0, M1	FXR	N.A.
Italy	CPI, WPI, EXP, IMP, IR, IND, FXR, M0, M1, M2, DEBT	FR	N.A.
Japan	FR, IMP, M0, M1, M2	IND	TB
Netherlands	CPI, PPI, EXP, IMP, IND, M1, M2	FXR	N.A.
New Zealand	CPI, EXP, IMP, M0, M1, M2	FR, WPI	TB
Norway	FXR	FR, IR	N.A.
Portugal	IMP, TB	IR	IND
Singapore	M1, M2, DEBT	CPI, FXR	N.A.
Spain	CPI, PPI, EXP, IMP, IR, GEXP, M0, M1, M2, DEBT	TB	N.A.
Sweden	PPI, EXP, IMP, TB, IR, IND, FXR, M1, M2, DEBT	FR, M0	N.A.
Switzerland	FR, CPI	IND	PPI
UK	CPI, PPI, EXP, IR	TB	N.A.
US	CPI, PPI, EXP, IMP, TB, IND, M0, M2	FR	N.A.
Global	**IPROD, WCPI, WEXP, WIMP, INTLR, CBI**	**FED, DIS**	**PMI**

Panel B: Macroeconomic variables with substantive factor loadings for the dominant PCs of the 26 emerging economies

Country	Principal component 1	Principal component 2	Principal component 3
Argentina	FR, CPI, PPI, EXP, IMP, TB, IND, IR, M0, M1, M2	N.A.	N.A.
Brazil	CPI, WPI, EXP, GEXP, FXR, M0, M1, M2	IMP, TB	N.A.
Chile	FR, CPI, PPI, EXP, IMP, IND, FXR, M1, M2	DEBT	TB
China	FR, TB, M0, M2	DEBT	N.A.
Colombia	CPI, PPI, FXR, M0, M1, M2	IMP, TB	N.A.
Czech Rep.	EXP, FXR,	FR, TB	N.A.
Egypt	FXR	IR	N.A.
Hungary	FR, CPI, WPI, IMP, FXR, M0, M1, M2	IR	N.A.
India	FR, CPI, PPI, EXP, IMP, IND, FXR, M1, M2	IR	TB
Indonesia	FR, CPI, WPI, FXR, M0, M1, M2	IMP, IND	N.A.
Israel	FR, CPI, WPI, EXP, IND, FXR, M0, M1, M2	TB	N.A.
Jordan	FR, IND, M2	IR, FXR	N.A.
Korea	CPI, PPI, EXP, IMP, IND, M1, M2	TB, UEMP	IR, M0
Malaysia	FR, CPI, EXP, IMP, IND, M1, M2	TB, FXR, M0	N.A.
Mexico	FR, CPI, PPI, EXP, IMP, IND, FXR, M1	TB, DEBT	M0
Morocco	FR, CPI, PPI, EXP, IMP, IR, M0, M1, M2	DEBT	N.A.
Pakistan	CPI, WPI, EXP, IMP, FXR, M0, M1, M2	TB	N.A.
Peru	FR, CPI, WPI, EXP, GEXP, FXR, M0, M1, M2	IMP, TB	N.A.
Philippines	FR, PPI, EXP, IMP, IND, FXR, M1, M2	CPI, TB	IR
Poland	CPI, PPI, EXP, IMP, TB, FXR, M0, M1, M2	IND	N.A.
Russia	CPI, PPI, UEMP, FXR, M0, M1, M2	GEXP	TB
South Africa	FR, CPI, PPI, FXR, M1, DEBT	GEXP	M0
Taiwan	IR, IND, UEMP	CPI, M1	N.A.
Thailand	FR, EXP, IMP, GEXP, IND	TB, FXR, DEBT	M0
Turkey	WPI, FXR, M1, M2	IMP, TB	IR
Venezuela	CPI, WPI, EXP, IMP, GEXP, FXR, M0, M1, M2	IR	N.A.
Global	**IPROD, WCPI, WEXP, WIMP, INTLR, CBI**	**FED, DIS**	**PMI**

The domestic variables are FR-Foreign Exchange Reserves, CPI-Consumer Price Index, PPI-Producer Price Index, WPI-Wholesale Price Index, EXP-Exports, IMP-Imports, TB-Net Trade Balance, IR-Interest Rate, GEXP-Government Expenditure, IND-Industrial Production Index, UEMP-Unemployment Rate, FXR-Foreign Exchange Rate, M0-Monetary Base, M1-M1, M2-M2 and DEBT-Debt. The global variables are IPROD-Index of Total Industrial Production, WCPI-OECD CPI, WEXP-World Exports, WIMP-World Imports, INTLR-International Reserves, CBI-US Conference Board's Leading Indicator Index, FED-US Federal Funds Rate, DIS-US Discount Rate and PMI-US ISM Purchasing Manager's Index. N.A. means “not applicable”.

The third principal component of the global macroeconomic variables is loaded on purchasing managers' expectations (PMI). Gold and oil do not correlate significantly with any of the three dominant principal components of global macroeconomic variables. Our results suggest that gold and oil prices are not economically significant in explaining the underlying macroeconomic state variables that determine stock returns in the sample period.

As expected, our diagnostic tests confirm that the macroeconomic variables that load heavily on the extracted global and domestic principal components are not highly correlated with each other. Their pair wise correlations with the Fama-French three factors are also low.[11]

Our diagnostic tests also suggest the presence of a stationary autoregressive process in stock market returns, with autocorrelations of lag one.[12] Eight of the 23 developed economies and seven of the 26 emerging economies exhibit first order autocorrelations of at least 0.2. As expected, the macroeconomic variables exhibit evidence of higher serial correlation than stock market returns. For example, macroeconomic time series such as the consumer price index and the foreign exchange rate change slowly over time. However, the transformation of the data series into monthly rates of change yields more random changes over time. The transformed macroeconomic data do not present any serial correlation problem.

Since the stock returns are on the whole not highly auto-correlated, we employ a distributed lag model and we do not assign lags to the transformed dependent variables. Table 2 summarizes the results of the regression analyses for developed and emerging economies in Panel A and Panel B respectively. In particular, the table reports the F-statistic for each principal component and its statistical significance The adjusted R-square of each set of regression as well as incremental changes in adjusted R-square are reported to evaluate the relative explanatory power of global and domestic macroeconomic state variables.

[11] The majority of the correlation coefficients in the correlation matrix of each country are less than ten percent. The results of the correlation analysis are available from the authors on request.

[12] For the Augmented Dickey-Fuller tests, the null hypothesis of a unit root is rejected at the 5% significance level for all dependent and explanatory variables, suggesting that all variables are stationary.

Table 2
Results of Regression Analysis (Panel A)

Results of the analyses from regressing (1) the MSCI World Index (MW), (2) the MSCI World Index and the global principal components (GPC), and (3) the MSCI World Index, the global principal components and the domestic principal components (DPC) on the monthly stock market returns of 23 developed economies. Specifically, the F-statistic of each principal component and their significance are reported. Panel A also reports the adjusted R-square of the respective regressions as well as the incremental changes in adjusted R-squares. n.a. means "not applicable".

Country	**Global Principal Components**			**Domestic Principal Components**			**Adjusted R-square**			**Change in Adj R-squares**	
	PC1	PC2	PC3	PC1	PC2	PC3	MW **(A)**	MW & GPC **(B)**	MW,GPC & DPC **(C)**	**(D)** [B-A]	**(E)** [C-B]
Australia	3.720***	6.940***	9.666***	4.008***	11.646***	9.499***	35.2%	36.8%	43.9%	1.6%	7.1%
Austria	1.814**	3.904***	2.472**	1.461*	3.133***	n.a.	9.6%	25.9%	32.5%	16.3%	6.5%
Belgium	1.561**	1.739**	2.856***	1.093	2.683***	n.a.	9.9%	6.8%	0.0%	-3.1%	-6.8%
Canada	6.372***	12.589***	19.089***	7.871***	18.706***	20.097***	53.3%	50.1%	52.1%	-3.2%	2.1%
Denmark	2.432***	2.463***	3.276***	2.074***	3.221***	n.a.	13.2%	18.9%	25.7%	5.7%	6.9%
Finland	3.197***	4.098***	5.992***	2.666***	4.722***	6.312***	20.3%	35.5%	32.1%	15.3%	-3.5%
France	5.691***	8.930***	13.313***	4.274***	15.385***	13.295***	43.9%	46.7%	40.5%	2.8%	-6.2%
Germany	4.597***	7.783***	11.197***	4.141***	12.014***	4.439***	40.0%	40.3%	30.9%	0.3%	-9.5%
Greece	1.213	1.712**	1.720	1.382	0.612	2.057**	6.4%	0.8%	19.7%	-5.6%	18.9%
Hong Kong	2.995***	7.421***	9.041***	3.708***	9.590***	9.078***	33.9%	29.8%	36.9%	-4.1%	7.1%
Ireland	4.226***	6.858***	10.157***	3.857***	11.935***	n.a.	36.3%	40.5%	45.4%	4.2%	4.9%
Italy	3.124***	3.735***	5.537***	3.091***	6.086***	n.a.	22.7%	28.9%	57.0%	6.2%	28.1%
Japan	3.622***	6.692***	9.346***	3.955***	10.046***	9.896***	37.2%	34.9%	29.0%	-2.3%	-5.9%
Netherlands	4.305***	6.491***	9.994***	1.910***	16.260***	n.a.	34.8%	39.7%	59.5%	4.8%	19.9%
New Zealand	0.506	0.491	0.626	0.463	0.573	0.810	0.7%	0.0%	0.0%	-0.7%	0.0%
Norway	2.517***	3.485***	4.669***	4.778***	3.371***	n.a.	19.6%	21.1%	14.6%	1.4%	-6.5%
Portugal	3.024***	4.884***	6.714***	4.984***	7.230***	6.948***	27.6%	31.9%	27.4%	4.3%	-4.5%
Singapore	3.455***	6.867***	10.948***	6.768***	11.181***	n.a.	38.2%	33.3%	50.6%	-4.9%	17.3%
Spain	5.713***	8.386***	12.958***	2.852***	12.098***	n.a.	41.3%	49.6%	54.2%	8.3%	4.6%
Sweden	5.442***	8.344***	11.625***	4.462***	8.709***	n.a.	39.7%	50.0%	52.0%	10.3%	2.0%
Switzerland	5.204***	10.018***	14.211***	10.466***	16.751***	14.643***	45.1%	46.2%	47.3%	1.1%	1.1%
UK	3.567***	4.291***	5.782***	3.283***	5.446***	n.a.	23.7%	34.2%	39.8%	10.5%	5.6%
US	8.768***	17.762***	25.927***	6.715***	26.201***	n.a.	61.1%	59.9%	61.6%	-1.3%	1.8%
Mean							**30.2%**	**33.1%**	**37.1%**	**3.0%**	**4.0%**

Table 2
Results of Regression Analysis (Panel B)

Similarly, results of the analyses from regressing (1) the MSCI EMF Index (ME), (2) the MSCI EMF Index and the global principal components (GPC), and (3) the MSCI EMF Index, the global principal components and the domestic principal components (DPC) on the monthly stock market returns of 26 emerging economies.

Country	**Global Principal Components**			**Domestic Principal Components**			**Adjusted R square**			**Change in Adjusted R-squares**	
	PC1	PC2	PC3	PC1	PC2	PC3	ME**(A)**	ME & GPC**(B)**	ME,GPC & DPC**(C)**	**(D)** [B-A]	**(E)** [C-B]
Argentina	2.767***	2.697***	3.668***	3.785***	n.a.	n.a.	15.91%	21.13%	69.87%	5.22%	48.74%
Brazil	4.743***	8.608***	12.128***	7.003***	9.987***	n.a.	42.12%	43.26%	63.23%	1.14%	19.97%
Chile	2.335***	3.804***	7.090***	3.411***	5.374***	5.343***	22.27%	30.83%	43.69%	8.57%	12.85%
China	2.370***	4.788***	6.697***	4.007***	6.435***	n.a.	37.20%	32.97%	52.66%	-4.23%	19.69%
Colombia	1.033	3.362***	2.701***	2.455***	1.836**	n.a.	7.14%	15.94%	24.39%	8.80%	8.45%
Czech Rep.	3.020***	5.142***	6.000***	3.868***	3.894***	n.a.	25.50%	38.47%	43.39%	12.97%	4.92%
Egypt	1.279	2.181**	2.591**	2.395**	3.086***	n.a.	11.77%	6.78%	0.94%	-5.00%	-5.83%
Hungary	3.411***	5.117***	7.955***	2.065***	7.293***	n.a.	29.83%	32.09%	23.75%	2.26%	-8.34%
India	1.833**	2.921***	4.614***	1.467*	4.027***	3.855***	15.86%	13.66%	4.44%	-2.20%	-9.22%
Indonesia	2.171***	2.816***	3.817***	2.006***	3.251***	n.a.	16.69%	16.06%	8.52%	-0.63%	-7.54%
Israel	1.904***	4.300***	4.927***	2.206***	5.536***	n.a.	17.13%	14.73%	37.48%	-2.40%	22.74%
Jordan	1.973***	1.647*	0.917	1.330	2.226***	n.a.	0.67%	18.26%	20.91%	17.59%	2.65%
Korea	1.928***	3.148***	4.536***	3.284***	3.470***	4.621***	19.24%	14.81%	21.14%	-4.42%	6.32%
Malaysia	4.208***	8.589***	12.668***	4.444***	7.464***	n.a.	43.15%	36.72%	40.88%	-6.43%	4.15%
Mexico	4.599***	10.240***	14.334***	4.863***	10.805***	16.212***	44.27%	43.38%	46.82%	-0.89%	3.43%
Morocco	1.445	1.388	0.592	2.646***	n.a.	n.a.	0.00%	4.87%	28.70%	4.87%	23.83%
Pakistan	0.735	0.593	1.801*	1.376	0.812	n.a.	0.48%	0.00%	23.21%	-0.48%	23.21%
Peru	2.504***	3.827***	2.428***	9.550***	2.187**	n.a.	8.03%	28.57%	75.17%	20.54%	46.59%
Philippines	1.364	1.636*	2.561***	0.857	2.233***	2.492***	9.92%	0.04%	0.00%	-9.88%	-0.04%
Poland	2.709***	5.446***	6.037***	2.032***	n.a.	n.a.	26.22%	42.57%	55.44%	16.36%	12.86%
Russia	6.090***	9.941***	15.478***	6.260***	14.078***	8.888***	50.35%	58.81%	53.71%	8.46%	-5.09%
South Africa	3.587***	5.707***	8.363***	2.710***	8.673***	8.602***	32.80%	31.47%	28.87%	-1.34%	-2.59%
Taiwan	1.502*	3.222***	3.2634***	2.309***	5.266***	n.a.	14.30%	15.13%	17.17%	0.83%	2.04%
Thailand	3.264***	6.610***	9.200***	4.932***	5.297***	9.662***	34.67%	31.23%	40.75%	-3.45%	9.52%
Turkey	1.722**	3.187***	4.301***	2.744***	2.498***	4.355***	15.79%	19.91%	26.29%	4.12%	6.38%
Venezuela	0.974	1.119	0.923	0.678	0.963	n.a.	1.05%	3.61%	0.00%	2.56%	-3.61%
Mean							**20.86%**	**23.67%**	**32.75%**	**2.81%**	**9.08%**

*** significance at 1 percent; ** significance at 5 percent; * significance at 10 percent

Evaluating the F-statistics for each principal component of the global and domestic macroeconomic variables of developed economies in Panel A, we find that all of them, with the exception of those for Greece and New Zealand, are significant in explaining stock returns.[13] The results suggest that both global and domestic principal components generally affect stock market returns in developed economies. Our results are consistent with Bodurtha, Cho and Senbet (1989) who find that both local circumstances and the international environment affect stock returns in seven developed economies (the US, Canada, UK, France, Germany, Australia and Japan).

The regression analysis results for the emerging economies in Panel B are less significant. The principal components have little explanatory power in Jordan, Morocco, Pakistan and Venezuela and none of the principal components is significant at the 5 percent level in the latter two countries. As in the case of Greece and New Zealand, this suggests that stock market returns in Pakistan and Venezuela are not affected by macroeconomic factors.

The first global principal component (GPC1) is significant in all 23 developed economies except Greece and New Zealand. Based on the factor loadings in Table 1 Panel A, this means that world industrial production, world inflation, world trade and indicators of aggregate economic activity in the US influence stock market returns in the developed world. Our results are consistent with Bodurtha et al (1989) where they find that world industrial production and world inflation influence stock market returns in the UK, US and Japan.

Turning to the results for 26 emerging economies in Table 2 Panel B, the first global principal component is significant in 19 of them (at the 5 percent level). Compared to GPC1, the second and third global principal components (GPC2 and GPC3) have a larger influence on the stock market returns of 21 and 22 emerging economies respectively. This suggests that US interest rates and purchasing managers' index (PMI) have greater influence on emerging stock market returns than world industrial production, world inflation, world trade and indicators of aggregate economic activity in the US.

We postulate that perhaps US interest rates and purchasing managers' index offer early and accurate reflection of the unobservable state variables that influence the emerging stock markets more than lagged indicators like world industrial production, world inflation, world trade and indicators of aggregate

[13] We thank Michael Cliff for his useful feedback on possible data source problems on New Zealand. We verified that there is no input error from the IMF IFS database. We repeat the preliminary analysis using data drawn from the MSCI Local Price Index for New Zealand. We infer that the New Zealand data drawn from the two data sources (IMF IFS and MSCI Local Price Index) are quite different and could possibly explain why New Zealand may appear to be an outlier in some of our test results. To preserve consistency of the data source, we report the results of data drawn from the IMF IFS database.

economic activity in the US.[14] On the other hand, these lagged indicators like world industrial production, world inflation, world trade and indicators of aggregate economic activity in the US may still be relevant drivers for the developed stock markets that are influenced by changes in the consumption of goods and services, perhaps more so than by changes in manufacturing activities. This is plausible since the service sector is more developed and significant in developed economies than in emerging economies. These findings offer some hints of the characteristics of each of the three dominant global principal components.

Unlike global principal components, domestic principal components carry different factor loadings for different countries. For example, Australia's first domestic principal component has loadings on Australia's wholesale price index, exports and money supply, while the second and third principal components load on her foreign exchange reserves and net trade balance respectively. Japan's first domestic principal component has loadings on Japan's foreign exchange reserves, imports and money supply, while her second and third principal components load on industrial production and net trade balance. Switzerland's first domestic principal component has loadings on Switzerland's foreign exchange reserves and consumer price index, while the second and third principal components load on her industrial production and producer price index respectively. US's first domestic principal component has loadings on US consumer and producer price indexes, trade, industrial production and money supply, and the second principal component loads fully on her foreign exchange reserves.

Columns D and E of Table 2 highlight the incremental explanatory power of the global and domestic principal components respectively by evaluating changes in adjusted R-squares from the regression analysis. For the global principal components as a group, the incremental explanatory power averages three percent for the 23 developed economies, ranging from a high of 16 percent for Austria to a low of -6 percent for Greece (Table 2, Panel A). For the domestic principal components as a group, the incremental explanatory power averages four percent, ranging from a high of 20 percent for Netherlands to a low of -10 percent for Germany. France and Portugal are examples of countries whose stock

[14] "The current procedure for calculating the US Conference Board composite index of leading indicators does not use the most up-to-date information. The composite index methodology ignores currently available data on stock prices, bond prices, and yield spreads in favour of a time-consistent set, (i.e. data for a past month for which most, if not all, components of the index are available). This is a major shortcoming. For the United States, for example, the index of leading indicators published on August 30th uses data from July despite the availability of August values for at least two of the components, namely interest rate spread and stock prices. The problems are most acute in most foreign countries where many indicator series are available with lags of more than one month, sometimes as long as 3 to 5 months" (http://www.globalindicators.org/methodology/Timely.cfm).

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market returns can be explained more by global than by domestic macroeconomic factors. On the other hand, Italy, Netherlands, Greece and Singapore stock market returns are explained more by domestic than by global macroeconomic factors. In the case of Japan, both global and domestic macroeconomic factors have no explanatory power for her stock market returns.

Interestingly, Panel B of Table 2 demonstrates that the explanatory power of domestic principal components relative to global principal components is higher for emerging than for developed stock market returns. For the global principal components as a group, the incremental explanatory power averages three percent for the 26 emerging economies, and ranges from a high of 21 percent for Peru to a low of -10 percent for Philippines. The domestic principal components together offer incremental explanatory power averaging nine percent and ranges from a high of 49 percent for Argentina to a low of -9 percent for India. We infer that these stock prices reflect more of changes in domestic macroeconomic factors rather than global ones.

Table 2 also reports on the extent that stock market returns in developed and emerging economies (Panels A and B respectively) can be explained by their respective market risk proxy (MSCI World Index and MSCI EMF Index respectively). We find that the market risk proxy explains on average 30 percent and 21 percent of stock market returns in developed and emerging economies respectively. For the results on developed economies in Panel A, the MSCI World Index explains as much as 61 percent of US stock market returns and almost nothing for New Zealand at the other extreme. Similarly, in Panel B, the MSCI EMF Index explains as much as 50 percent of the Russian stock market returns and yet almost nothing for Morocco. While there is wide variation with which stock market returns reflect market risk, the market risk proxy tends, on average, to offer higher explanatory power for developed rather than emerging stock market returns.

We find that the market risk proxy is still the dominant explanatory variable for the variation of stock market returns in developed economies, quite different from the inference drawn from Fama and French (1992, 1993). It is interesting to observe that for five out of the six developed economies (Table 2, Panel A) for which the market risk proxy explains 40 percent or more of the stock market returns, the macroeconomic factors offer little explanatory power. It is the same for three out of the four emerging economies (Table 2, Panel B) for which the market risk proxy explains 40 percent or more of the stock market returns.

Going forward, there are three out of 23 developed economies (Austria, Italy and Netherlands) and nine out of 26 emerging economies (Argentina, Brazil, Chile, Israel, Jordan, Morocco, Pakistan, Peru and Poland) for which the global and domestic macroeconomic principal components explain 20 percent or more of the respective stock market returns. On average, the global and domestic

macroeconomic principal components taken together explain 6.9 percent and 11.9 percent of the stock market returns in the 23 developed and 26 emerging economies respectively.

All the above findings suggest that stock returns tend to reflect global market risk, more so in developed economies than in emerging economies, while macroeconomic factors become more significant relative to global market risk in emerging economies. Specifically, among macroeconomic factors, it is the domestic macroeconomic factors that become more significant relative to global macroeconomic factors in the emerging economies.

We venture two explanations for this phenomenon. Firstly, these inferences are consistent with the oft-documented finding that stock markets tend to be more efficient in the developed economies than the emerging economies. Since macroeconomic data (including the US Conference Board Leading Indicator Index) often lag the market, they are of little value in explaining stock market returns in the developed economies. However, such macroeconomic data bear valuable price sensitive information for the less efficient stock markets in emerging economies. Moreover, emerging economies are more likely to be subject to tariffs, trade barriers and various forms of market segmentation. Investors in these partially segmented markets would tend to attach more significance to domestic rather than global macroeconomic factors in their investment decisions.

The second explanation builds on the critique that CAPM does not take account of time-varying investment opportunities given its static single-period specification. Our empirical model allows for time varying macroeconomic factors to make up for the weakness of the static CAPM.

We highlight a couple of interesting cases for discussion. Singapore is an open economy with relatively few tariffs and trade barriers. However, empirical evidence on the informational efficiency of the Singapore stock market has been mixed [see Chan, Gup and Pan (1992), Lee (1997) and Sadique and Silvapulle (2001)]. In this study, we find that the global market factor explains 38.2 percent of Singapore's stock market returns as compared with an average of 30.2 percent for the 23 developed economies. Yet her stock market returns can be explained quite significantly (up to 17.3 percent) by domestic macroeconomic factors as compared with an average of 4 percent for all 23 developed economies.

We evaluate Singapore against one polar case for the developed world: the US. US stock market returns can be explained up to 61.1 percent and 1.8 percent by the market factor and domestic macroeconomic factors respectively. The findings for US point to the global market factor as being the single dominant risk factor for her stock market returns. This suggests that component stocks of the Dow Jones tend to be global firms and indeed they are.

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In Singapore's case, we find evidence that her stock market returns reflect global market risk that is likely to be "imported" through her open economy and financial markets although her listed firms tend not to be global in reach and markets. Domestic macroeconomic factors are found to play a significant role in affecting local stock market returns, and such factors are not reflected in and are quite distinguished from the global market risk factor. We highlight the dominant role that the Singapore government played in domestic commercial activities through the Temasek-linked companies (TLCs) throughout the test period.[15] The value added of TLCs account for some 13% of Singapore's GDP. Based on December 2000 figures, TLCs accounted for about 33 percent of the local stock market capitalization.[16]

China is another interesting case to highlight from among the 26 emerging economies in Table 2, Panel B. The global market risk factor explains 37.2 percent of Chinese stock market returns as compared with the average of 20.9 percent for all emerging economies. During the sample period, a high proportion of the Chinese listed firms, being price-competitive, exports substantively to the world. Many of these are state-owned enterprises (SOEs).[17] In this sense, Chinese firms tend to be global firms. It is reasonable to expect that Chinese stock market returns will move responsively to the global market risk factor. At the same time, the importance of domestic macroeconomic factors (observed as economic restructuring policies and reforms being implemented to salvage failing SOEs and Chinese banks laden with bad debts) is reflected by the finding that these explain up to another 19.7 percent of Chinese stock market returns as compared with the average of 9.1 percent for the sample of 26 emerging economies.

When compared to Fifield et al's (2002) results, our regression model is better able to explain the emerging market stock returns as seen in the higher adjusted R-square values.[18] For example, most of the F-statistics of the principal components are significant when compared to Fifield et al's (2002) results. We attribute the improved explanatory power of the regression model to the incorporation of the market risk proxy, the accounting of lags in the dependent variable, a longer sample period and the use of more macroeconomic variables.

In our robustness tests, we ascertain that the relationship between stock market returns and macroeconomic factors remains robust in the presence of the

[15] These government-linked companies were renamed as Temasek-linked companies – TLCs - since the adoption of the Temasek Charter in August 2002. Temasek Holdings (Pte) Ltd is the investment holding company of the Singapore government.
[16] Webb, S. and T. Saywell. 2002. *Far Eastern Economic Review*, 7 November.
[17] And, Chinese state-owned shares represent 58% of the market capitalization on Chinese equity markets as at 31 December 2003 (2003 Fact Book. Shanghai, PRC: Shanghai Stock Exchange.
[18] The majority of the adjusted R-square values in Fifield et al's (2002) are below ten percent.

Fama-French three factors. Table 3 presents the incremental explanatory power of the SMB and HML portfolios in our regression analyses for developed economies (Panel A) and emerging economies (Panel B). In Panel A, we find that SMB and HML factors offer incremental explanatory power for 13 out of 23 developed economies. On average, they contribute another 4.4 percent of the explained variations of stock market returns, with a high of 57.5 percent added for Greece and a low of -9.1 percent for Ireland. In Panel B, the SMB and HML factors offer incremental explanatory power for 16 out of 25 emerging economies.[19] These contribute, on average, another 10.1 percent of the explained variations of stock market returns, with a high of 78 percent for Philippines and a low of -24.4 percent for Colombia.

In the case of Philippines, the Fama-French three factor model explains up to 78 percent of her stock market returns, with 68.1 percent of the returns explained by the SMB and HML factors, and the balance explained by the global market index. Other cases where the Fama-French three factors dominate macroeconomic factors include India, Indonesia and Venezuela. On the other hand, the introduction of the SMB and HML factors apparently eliminate whatever explanatory power that the market and macroeconomic factors had for Colombia.

[19] We did not construct the SMB and HML portfolio returns for Jordan because firm specific data for the country is unavailable.

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Table 3
Robustness Tests with SMB and HML Portfolios

Panel A reports the results from regressing (1) the MSCI World Index (MW), the global principal components (GPC) and the domestic principal components (DPC) and (2) the MSCI World Index, the global principal components, the domestic principal components and the SMB and HML portfolio returns on the monthly stock market returns of 23 developed economies. It reports the adjusted R-squares and the incremental percentage change. Panel B reports the corresponding results for the 26 emerging economies. SML-Small minus Big portfolio returns, HML-High minus Low portfolio returns, n.a.-not applicable.

Panel A	**Adjusted R squares of regressions with the following regressors**		**Δ in Adjusted R-squares**	**Panel B**	**Adjusted R squares of regressions with the following regressors**		**Δ in Adjusted R-squares**
	MW,GPC & DPC **(A)**	MW,GPC,DPC,SMB & HML **(B)**	**(B)-(A)**		ME,GPC & DPC **(A)**	ME,GPC,DPC,SMB & HML **(B)**	**(B)-(A)**
Australia	43.9%	49.8%	6.0%	Argentina	69.9%	68.8%	-1.1%
Austria	32.5%	46.5%	14.0%	Brazil	63.2%	84.7%	21.5%
Belgium	0.0%	0.0%	0.0%	Chile	43.7%	54.9%	11.2%
Canada	52.1%	49.9%	-2.2%	China	52.7%	49.9%	-2.8%
Denmark	25.7%	34.6%	8.8%	Colombia	24.4%	0.0%	-24.4%
Finland	32.1%	30.2%	-1.9%	Czech	43.4%	39.9%	-3.5%
France	40.5%	40.1%	-0.4%	Egypt	0.9%	0.0%	-0.9%
Germany	30.9%	28.6%	-2.2%	Hungary	23.7%	31.0%	7.3%
Greece	19.7%	77.2%	57.5%	India	4.4%	37.6%	33.2%
Hong Kong	36.9%	40.7%	3.8%	Indonesia	8.5%	55.4%	46.9%
Ireland	45.4%	36.3%	-9.1%	Israel	37.5%	15.2%	-22.3%
Italy	57.0%	72.7%	15.7%	Jordan	20.9%	n.a.	n.a.
Japan	29.0%	32.9%	3.9%	Korea	21.1%	18.3%	-2.8%
Netherlands	59.5%	53.0%	-6.5%	Malaysia	40.9%	46.7%	5.8%
NZ	0.0%	0.0%	0.0%	Mexico	46.8%	54.7%	7.9%
Norway	14.6%	30.4%	15.8%	Morocco	28.7%	37.2%	8.5%
Portugal	27.4%	27.6%	0.2%	Pakistan	23.2%	36.9%	13.7%
Singapore	50.6%	51.9%	1.3%	Peru	75.2%	93.2%	18.0%
Spain	54.2%	59.0%	4.8%	Philippines	0.0%	78.0%	78.0%
Sweden	52.0%	45.2%	-6.8%	Poland	55.4%	77.8%	22.4%
Switzerland	47.3%	48.1%	0.8%	Russia	53.7%	46.2%	-7.5%
UK	39.8%	40.1%	0.3%	S. Africa	28.9%	44.0%	15.1%
US	61.6%	59.3%	-2.4%	Taiwan	17.2%	25.0%	7.9%
				Thailand	40.8%	31.1%	-9.6%
				Turkey	26.3%	33.0%	6.7%
				Venezuela	0.0%	24.0%	24.0%
Mean	**37.1%**	**41.5%**	**4.4%**	**Mean**	**32.7%**	**43.3%**	**10.1%**

In this study, we find that the SMB and HML factors continue to add explanatory power for stock market returns in the presence of macroeconomic factors. These findings are inconsistent with those in Liew and Vassalou (2000). Our correlation analyses, not reported here, show that the SMB and HML factors are not significantly correlated with the market risk factor and any and all of the macroeconomic variables.[20] Unless SMB and HML factors proxy for some unobservable systematic risk factors, the use of firm specific characteristics to construct the SMB and HML portfolio returns appears to violate Markowitz's (1959) premise that firm specific risks are diversifiable and will not be priced. Yet recent empirical studies demonstrate that the pricing of idiosyncratic risks can be consistent with time-varying risk premia arising from background risk, investor heterogeneity and costs of participation [see Hirshleifer (1988), Bessembinder (1992), Heaton and Lucas (1997, 2000), Goyal and Santa-Clara (2003)]. We are therefore persuaded that the SMB and HML portfolio returns may proxy for domestic risk factors in a financial economy.

In this study, we have analyzed the relative significance of global and domestic risk factors for developed and emerging stock market returns. The relative measures allow us to calibrate the extent to which the stock index returns on a specific national stock exchange reflect global vis-à-vis domestic risk factors.

CONCLUSION

With increasing globalization, to what extent does a stock market reflect the health of the global economy? Taking the view that national economies are neither totally integrated nor segmented, we find that the proportion of total variation of stock market returns that is explained by the information set used in this study is typically large, measuring on average 42 and 43 percent for developed and emerging economies respectively. Global factors are found to be dominant and offer four times more explanatory power than domestic factors for developed market stock returns. On the other hand, domestic factors increase in relative significance to offer just about as much explanatory power as global factors for emerging market stock returns. Our approach allows us to calibrate the extent that a national stock market reflects the relative significance of global versus domestic factors in that economy.

In this international study of 23 developed and 26 emerging economies for the period 1988 through 2001, we identify the global factors that explain the

[20] While the SMB and HML factors are insignificantly correlated with the global market index and any and all of the macroeconomic factors respectively, the correlation between the SMB and HML factors can range widely from -0.7 to 0.9. For example, the highest and lowest correlations among developed economies are for US (0.52) and Spain (-0.74). Among the emerging economies, the highest and lowest correlations of SMB and HML factors are for Korea (0.87) and Peru (-0.66).

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cross-section of average stock market returns. Quite contrary to some of the earlier empirical findings, we find that market risk proxy for the market portfolio offers significant explanatory power, and global macroeconomic factors offer incremental explanatory power for stock market returns. Acknowledging that these global macroeconomic variables that can proxy for time-varying state variables are endogenously determined within the global economy, we apply principal component analysis to extract the dominant factors. Specifically, the scaling (conditioning) global and domestic macroeconomic factors explain an incremental seven percent in addition to the 30 percent of developed stock market returns that is explained by the global market index.[21] For the emerging economies, these global and domestic macroeconomic factors add a more substantive 12 percent to the 21 percent of stock market returns that is explained by the global market index. We attribute the incremental explanatory power of the global and domestic macroeconomic factors to both the inadequacy of the global market index to proxy for the market portfolio and the time varying innovations of preferences and investment opportunities for any economy. We observe that the relative inadequacy of the global market index to explain cross-sectional returns on stock markets is greater for the emerging economies than for the developed economies.

The corollary is that both global and domestic macroeconomic factors offer relatively greater explanatory power for stock market returns of emerging economies than those of developed economies. While the dominant global principal components are macroeconomic factors common to all economies, the domestic macroeconomic factors have factor loadings that vary country to country. These are independent of the global market risk and global macroeconomic factors. These can proxy for country specific state variables that influence investors' expectations of asset returns in less than perfectly integrated markets.

Our finding that the global market index and (global and domestic) macroeconomic factors explain stock market returns is robust in the presence of the SMB and HML factors. Again, the SMB and HML portfolio returns that are related to firm specific characteristics are found to be independent of the global market and macroeconomic factors. Recent empirical studies demonstrate that the pricing of idiosyncratic risks can be consistent with time-varying risk premia arising from background risk, investor heterogeneity and costs of participation. Consistent with these findings, we are persuaded that SMB and HML portfolio returns may proxy for domestic risk factors in a financial economy.

The results provide support for a multi-factor asset pricing model comprising both global and domestic risk factors for economies that are less than perfectly integrated. Our findings have implications for the potential

[21] Roll (1977) correctly observes that any market index would inadequately proxy for the market portfolio, whether in single or multi-period setting.

diversification effects being offered by exchange-traded funds in global investing, especially in emerging economies or even developed economies like Singapore where domestic risk factors are relatively dominant. Future studies could also evaluate the changing profile of a country's stock market returns as she globalizes.

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