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Equity Market Risk Premium and Global Integration

by

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Abstract

The equity market risk premium remains one of the most debated issues in corporate finance. Monthly returns for 19 developed equity markets and 16 emerging equity markets between 1970 and 2006 aided in examining the extent of integration of these markets with the U.S. stock market and the Morgan Stanley Capital International (MSCI) World Index. Geweke measures of feedback indicate that although both developed and emerging markets show a slight and gradual increase in integration, emerging markets reflect significant segmentation from the U.S. stock market and the world market index. Greater stock market integration is associated with a more favorable economic and political climate toward business. Additional risk premiums relative to the intertemporal capital asset pricing model (ICAPM) arise because of segmentation of emerging equity markets from the world. Valuing business investments in countries with at least partially segmented equity markets requires an adjusted capital asset pricing model (CAPM).

Keywords: equity market risk premium, international stock market integration, emerging capital markets

Equity Market Risk Premium and Global Integration

The equity market risk premium (EMRP) is one of the most controversial issues in corporate finance. The EMRP reflects the extra return an investor expects to receive to compensate for the additional risk associated with investing in equities as opposed to investing in risk-free instruments. The EMRP is a critical parameter for measuring the cost of equity and, therefore, a firm's weighted average cost of capital. In addition, the EMRP is significant in any business valuation because it affects the discount rate in a variety of valuation models.

Although a simple concept, the quantification of the EMRP is highly dependent on the measurement approach adopted, making it one of the most debated topics in financial literature. Two general methods exist to estimate the EMRP: One involves historical data, and the other is a forward-looking approach involving estimates based on surveys or other projection models. Neither approach is demonstrably correct, resulting in an unresolved issue of considerable practical importance.

This research involved the more popular historic approach. A typical definition of the EMRP included using Ibbotson data (starting in 1926) with the average rate of return on a broad portfolio of stocks (e.g., Standard & Poor's 500) as a proxy for expected market return.[1] Either a short-term (i.e., 3-month T-bill rate) or a long-term government bond yield (e.g., 10-year T-note rate up to 30-year government bond yield) represented investing in a risk-free asset depending on whether one uses the arithmetic or geometric mean respectively for the EMRP.

Fama and French (2002) reported that historical estimates of stock returns for the last half-century were much higher than expected. Dimson, Marsh, and Staunton (2002) found that although over the long haul stocks beat bonds in every country of their study, the equity risk premium was probably not as large as the post-1926 evidence would seem to indicate.[2] U.S. returns have been especially better than the returns of most other countries. Notwithstanding the finding that U.S. historical data may overstate contemporary expected returns, considering the reduction in the volatility of investors' equity portfolios due to opportunities for international diversification, the historic approach is the best indicator of how the market will behave in the future. Two assumptions support this statement: The historic performance of the market influences investors' expectations, and future market conditions will not differ substantially from past conditions.

This study involved investigating the degree of integration or lack thereof (i.e., partial segmentation) of developed and emerging equity markets with the U.S. and world markets. The next section includes a description of the data and methodology used to analyze capital market integration. Thereafter, another section illustrates the results of Geweke measures of feedback to gauge the contemporaneous association between the different equity markets paired with the U.S. equity market and the Morgan Stanley Capital International (MSCI) World Index. The penultimate section involves an analysis of whether a more favorable business environment is associated with higher measures of stock market integration. The final section includes a discussion of implications for business valuation and concludes the paper.

Data and Methodology

The data set consisted of monthly returns (measured in U.S. dollars) for 19 developed equity markets and 16 emerging equity markets. Depending on the country, the sample period spanned from January 1970 or later to December 2006.[3] In addition, the MSCI World Index functioned as a proxy for the world market index. The Datastream database provided access to the required information.

Table 1 shows summary statistics for the 19 developed equity markets, the 16 emerging equity markets, the U.S. stock market, and the MSCI World Index based on available data for each country.

The statistics illustrate some well-known properties of emerging markets' returns. For instance, the average

Table 1
Descriptive Statistics of Monthly Returns for 19 Developed Equity Markets, 14 Emerging Equity Markets, the United States, and the MSCI World Index (Based on Available Data for Each Country)

	Mean	Median	Max	Min	Std dev	Skewness	Kurtosis	Jarque-Bera	Probability	Obs
					Developed					
ASTR	0.007	0.005	0.248	-0.447	0.069	-0.69	8.27	549	0.00%	444
AUST	0.010	0.006	0.279	-0.234	0.059	0.48	5.98	181	0.00%	444
BELG	0.009	0.010	0.262	-0.192	0.055	0.16	5.89	157	0.00%	444
CNDA	0.008	0.010	0.175	-0.223	0.055	-0.47	4.85	80	0.00%	444
DNMK	0.010	0.009	0.243	-0.173	0.054	0.16	4.05	22	0.00%	444
FIND	0.017	0.013	0.324	-0.318	0.086	0.10	4.51	29	0.00%	300
FRNC	0.009	0.010	0.262	-0.238	0.064	-0.04	4.49	41	0.00%	444
GERM	0.009	0.007	0.224	-0.244	0.061	-0.22	4.42	41	0.00%	444
HGKG	0.015	0.011	0.877	-0.436	0.106	0.94	14.07	2333	0.00%	444
ITAL	0.007	0.005	0.308	-0.216	0.072	0.27	3.87	20	0.01%	444
JPAN	0.010	0.007	0.242	-0.194	0.064	0.25	3.58	11	0.47%	444
NETH	0.009	0.010	0.249	-0.182	0.052	-0.32	5.02	83	0.00%	444
NZEA	0.008	0.010	0.272	-0.381	0.075	-0.24	5.93	110	0.00%	300
NWAY	0.011	0.009	0.253	-0.280	0.075	-0.15	3.97	19	0.01%	444
SING	0.011	0.012	0.528	-0.414	0.084	0.48	8.83	647	0.00%	444
SPAN	0.006	0.006	0.261	-0.278	0.064	-0.07	4.73	56	0.00%	444
SWDN	0.012	0.013	0.228	-0.225	0.068	-0.12	3.56	7	3.14%	444
SWIT	0.010	0.009	0.242	-0.178	0.053	-0.07	4.45	39	0.00%	444
UTDK	0.008	0.008	0.555	-0.217	0.065	1.32	14.90	2747	0.00%	444
Developed	0.010	0.009	0.317	-0.267	0.067	0.09	6.07	377	0.19%	429

(Continue)

	Mean	Median	Max	Min	Std dev	Skewness	Kurtosis	Jarque-Bera	Probability	Obs
					Emerging					
ARG	0.018	0.008	0.619	-0.282	0.096	0.94	7.34	347	0.00%	372
BRA	0.018	0.007	0.372	-0.207	0.089	0.79	5.26	83	0.00%	264
HIL	0.017	0.022	0.395	-0.594	0.113	-0.87	7.06	303	0.00%	372
OLB	0.014	0.008	0.523	-0.501	0.133	0.12	5.58	74	0.00%	264
MEX	0.013	-0.001	0.685	-0.336	0.106	1.11	8.18	493	0.00%	372
VEN	0.016	0.010	0.469	-0.294	0.101	0.73	6.28	142	0.00%	264
KOR	0.015	0.006	0.533	-0.355	0.121	0.68	5.49	89	0.00%	264
PHI	0.012	0.011	0.352	-0.244	0.079	0.36	4.08	26	0.00%	372
TAI	0.007	0.008	0.536	-0.313	0.092	0.66	8.88	399	0.00%	264
IND	0.010	0.001	0.357	-0.352	0.094	0.59	6.02	115	0.00%	264
THA	0.009	0.004	0.469	-0.338	0.100	0.32	6.03	149	0.00%	372
JOR	0.009	0.000	0.309	-0.129	0.055	1.24	7.19	343	0.00%	347
NIG	0.013	0.013	0.992	-0.707	0.121	1.09	26.60	6179	0.00%	264
ZIM	0.021	0.009	1.293	-0.927	0.186	1.74	17.14	3289	0.00%	372
Emerging	0.014	0.008	0.565	-0.399	0.106	0.68	8.65	859	0.00%	316
All	0.011	0.008	0.422	-0.323	0.084	0.34	7.17	582	0.11%	381
USAM	0.007	0.009	0.173	-0.215	0.044	-0.32	4.88	73	0.00%	444
WRLD	0.007	0.009	0.143	-0.171	0.041	-0.43	4.36	48	0.00%	444

Note. The statistics are based on the monthly percentage change—calculated as $((*PI_i - *PI_{i-1})/*PI_i)$—in the price index (*PI) of each country. The series are defined as follows: ASTR = MSCI AUSTRIA U$, AUST = MSCI AUSTRALIA U$, BELG = MSCI BELGIUM U$, CNDA = MSCI CANADA U$, DNMK = MSCI DENMARK U$, FIND = MSCI FINLAND U$, FRNC = MSCI FRANCE U$, GERM = MSCI GERMANY U$, HGKG = MSCI HONG KONG U$, ITAL = MSCI ITALY U$, JPAN = MSCI JAPAN U$, NETH = MSCI NETHERLANDS U$, NWAY = MSCI NORWAY U$, SING = MSCI SINGAPORE U$, SPAN = MSCI SPAIN U$, SWDN = MSCI SWEDEN U$, SWIT = MSCI SWITZERLAND U$, UTDK = MSCI UNITED KINGDOM U$, USAM = MSCI UNITED STATES U$, WRLD = MSCI WORLD U$, ARG = S&P/IFCG ARGENTINA U$, BRA = S&P/IFCG BRAZIL U$, HIL = S&P/IFCG CHILE U$, OLB = S&P/IFCG COLOMBIA U$, MEX = S&P/IFCG MEXICO U$, VEN = S&P/IFCG VENEZUELA U$, KOR = S&P/IFCG KOREA U$, PHI = S&P/IFCG PHILIPPINES U$, TAI = S&P/IFCG TAIWAN, CHINA U$, IND = S&P/IFCG INDIA U$, MAL = S&P/IFCG MALAYSIA U$, PAK = S&P/IFCG PAKISTAN U$, THA = S&P/IFCG THAILAND U$, JOR = S&P/IFCG JORDAN U$, NIG = S&P/IFCG NIGERIA U$, ZIM = S&P/IFCG ZIMBABWE U$.

compounded monthly return in developed markets is 12.3%, but 17.8% for emerging markets.

However, while emerging markets have experienced high average returns, most of these markets reflect volatility (e.g., the average annualized standard deviation is 40.5% for the emerging markets and 22.9% for the reported developed markets). The wider range of monthly returns for the emerging markets (i.e., from -39.9% to 56.5% versus the developed markets' -26.7% to 31.7%) further indicates volatility. All distributions of monthly stock market returns are skewed and peaked (leptokurtic) relative to the normal distribution. Therefore, finding that only two of the return distributions satisfy the conditions for normality was unsurprising (see the Jarque-Bera statistic).

Geweke feedback measures aided in investigating the relationship between movements in the U.S. stock market and foreign markets. Geweke (1982) developed measures of feedback based on log-likelihood ratio statistics, which provide a cardinal measure of the degree of comovement. A higher Geweke measure reflected the magnitude of the stock market integration for a particular country versus the U.S. and the MSCI World Index.

The Geweke measures of feedback provide a more appropriate framework than the vector autoregression (VAR) model. According to Mukherjee and Naka (1995), "The VAR approach is deficient in its failure to incorporate potential long-term relations and, therefore, may suffer from specification bias" (p. 226). The Geweke measures of feedback allow for different variable lag lengths whereas the traditional VAR model lags all variables equally. VAR models are overparameterized, making many of the coefficient estimates insignificant, and the regressors are likely to be highly collinear so that *t* tests on individual coefficients are not reliable (Enders, 2003). Estimated coefficients and successive lags tend to oscillate, and complicated cross-equation feedbacks occur

in autoregressive systems (such as VARs), making them difficult to describe succinctly and especially difficult to understand by examining the coefficients in the regression equations themselves (Sims, 1980).

Three Geweke measures of feedback were estimated for the U.S. stock market returns (and then MSCI world stock market returns) paired with each of the foreign stock market returns. Each Geweke measure represented a log-likelihood ratio statistic for the following null hypotheses:[4]

$H_0$1: No contemporaneous relationship exists between monthly U.S. stock market returns (y_t) and foreign stock market returns (r_t) (i.e., $GCFM_{y*r}$ is not significant).

$H_0$2: Foreign stock market returns last month (r_{t-1}) do not lead current U.S. stock market returns this month (y_t) (i.e., $GUFM_{r->y}$ is not significant).

$H_0$3: U.S. stock market returns last month (y_{t-1}) do not lead current foreign stock market returns this month (r_t) (i.e., $GUFM_{y->r}$ is not significant).

The asymptotic distribution of each Geweke feedback measure indicated, under the alternative hypotheses, that feedback was present. This approach provided an important advantage over other means of hypothesis testing, such as the Wald *F* test, because Geweke measures are cardinal measures of comovement in stock market returns and, as such, are better measures of integration between markets.

International Equity Market Integration with the U.S. and World Stock Markets

An issue concerning international investors has been the idea that the world is becoming a global market. Specifically, equity markets worldwide are reacting to each other with higher correlation than in the past, thereby reducing the effects of diversification. As global capital markets become more integrated, one could argue that a more global perspective is required on the appropriate definition of the cost of capital. Some studies indicate that correlation in country portfolio returns increases during periods of turbulence in capital markets (Jacquier & Marcus, 2001; Longin & Solnik, 1995). If so, benefits from diversification would be lost exactly when needed the most, as Roll (1988) illustrated for the crash of October 1987.

Bekaert and Harvey (1995) explained that completely integrated capital markets involve assets with the same risk having identical expected returns irrespective of the market. Risks refer to exposure to some common world factor. The covariance of a market segmented from the rest of the world with a common world factor may have little or no ability to explain its expected return.

Few financial analysts believe that fully integrated capital markets exist, particularly with respect to the emerging capital markets of the world. The basis of this belief may be caused by country-specific and currency risks. A simple test to examine the extent of segmentation involves investigating whether the correlation and the beta of a foreign country equity market index versus the U.S. or MSCI World Index are materially different from 1.0. Calculations of all metrics for market integration included monthly rates of change in the equity price index $[(P_t - P_{t-1})/P_t]$ for the 19 developed capital markets, the 16 emerging markets, the U.S. stock market, and the MSCI world market index.

The average simple correlation[5] between the 19 developed stock market indexes and the U.S. stock market index is 0.46. The average correlation with the MSCI world market index is 0.61 over the last 30 years (no data for Finland and New Zealand for the first 10 years). Dividing the series into three subperiods illustrates that the average correlations increase each time: from 0.32 (1976-1985) to 0.44 (1986-1995) to 0.60 (1996-2006) for the U.S. returns, and from 0.51 (1976-1985) to 0.60 (1986-1995) to 0.70 (1996-2006) for the MSCI World Index returns.

In comparison, the average correlation between the 16 emerging stock market indexes and the U.S. stock market index is only 0.18. The average correlation with the MSCI world market index is 0.21 over the last 30 years and is clearly much lower than for developed markets (no data for Columbia, Venezuela, Philippines, Taiwan, Malaysia, Pakistan, Jordan, and Nigeria for the first 10 years). Dividing the series into three subperiods illustrates that the average correlations increase with time: from 0.02 (1976-1985) to 0.13 (1986-1995) to 0.33 (1996-2006) for the U.S. returns, and from 0.08 (1976-1985) to 0.14 (1986-1995) to 0.37 (1996-2006) for the MSCI World Index returns.

The results indicate that developed and emerging equity markets show significantly increased integration over the past 3 decades. De Jong and de Roon (2005) proved that in the last 2 decades, emerging stock markets have become less segmented from world markets, as documented earlier by Bekaert and Harvey (2000) and Henry (2000). We concur with Bekaert and Harvey (1995) and Stulz (1999) that the degree of segmentation changes only gradually over time.

Another simple test for capital market segmentation involved examining whether the beta for a country's equity index versus that of the U.S. or the global equity market index is materially different from 1.0 (Bruner, 2004). The average beta between the 19 developed equity markets and the U.S. stock market is 0.67 versus 0.46 for the 16 emerging markets. The average beta with respect to the MSCI world market index is 0.94 for the developed markets and 0.55 for the emerging markets in this study.[6] Capital markets, in particular those of the emerging economies, display varying degrees of segmentation due to the difference in volatility in national equity markets (see Table 1) and the difference in correlation between local equity markets with the U.S. and the global equity market.

A more rigorous test for integration or lack thereof (segmentation) involved the Geweke measures of contemporaneous comovement versus the U.S. stock market (see Table 2) and versus the MSCI world market index (see Table 3). They are calculated using monthly rates of changes in the equity price index for the developed and emerging markets versus the U.S. market and MSCI world market index. Each statistic has an approximate chi-square distribution with one degree of freedom under the hypothesis of no contemporaneous relationship.

Table 2

Geweke Test for Contemporaneous Comovement between Foreign Stock Market Returns and the U.S. Stock Market Return (Using Percentage Change in the Monthly Price Index)[1]

	1976-1985	1986-1995	1996-2006	1970-2006	1976-2006	1986-2006
			Developed			
astrpch	18.70***	27.47***	72.19***	121.63***	88.52***	75.80***
austpch	1.36	1.72	20.22***	15.78***	14.80***	12.13***
belgpch	9.42***	37.46***	50.53***	102.37***	83.12***	80.17***
cndapch	75.32***	92.85***	129.94***	329.73***	271.78***	213.64***
dnmkpch	11.53***	14.45***	64.60***	75.93***	72.74***	61.84***
findpch		7.48***	59.94***			58.36***
frncpch	17.37***	31.68***	101.34***	126.33***	109.62***	106.84***
germpch	7.09***	19.42***	102.51***	106.69***	97.20***	97.58***
hgkgpch	5.99**	30.43***	50.49***	59.52***	64.44***	76.06***
italpch	2.58	6.38**	51.18***	39.40***	35.17***	37.95***
jpanpch	6.51**	6.85***	33.84***	44.75***	35.07***	27.79***
nethpch	39.21***	60.70***	97.89***	206.32***	187.82***	154.37***
nzeapch		17.85***	29.44***			42.28***
nwaypch	22.20***	51.08***	57.08***	127.23***	116.07***	101.23***
singpch	16.30***	53.10***	55.52***	115.77***	107.44***	100.76***
spanpch	0.56	30.35***	80.50***	72.42***	71.38***	92.83***
swdnpch	12.60***	31.80***	89.45***	126.07***	116.21***	111.34***
switpch	18.28***	43.01***	51.76***	136.54***	106.14***	92.47***
utdkpch	17.71***	66.30***	108.93***	144.65***	134.11***	150.71***
Developed average	16.63	33.18	68.81	114.77	100.68	89.17
			Emerging			
argpch	0.00	1.13	24.47***		3.09*	8.23***
brapch	0.78	2.28	56.30***		17.04***	24.17***
hilpch	0.48	11.94***	51.80***		13.30***	47.31***
olbpch		1.58	10.30***			7.63***
mexpch	1.80	26.52***	75.73***		55.73***	71.01***
venpch		0.38	9.67***			2.34
korpch	1.25	4.40**	28.99***		27.95***	29.18***
phipch		5.97**	25.82***			23.13***
taipch		2.61	33.55***			18.62***
indpch	0.39	1.04	13.87***		2.73*	2.36
malpch		36.82***	20.78***			48.83***
pakpch		1.02	3.84*			1.42
thapch	2.05	15.49***	37.40***		35.56***	47.15***
jorpch		0.40	0.42			0.58
nigpch		0.19	2.30			1.03
zimpch	1.34	1.05	0.01		0.00	0.12
Emerging average	1.01	7.05	24.70		19.43	20.82
Combined averages	11.63	21.23	48.65	114.77	74.68	57.92

Note. [1]Hypothesis can be rejected if*** (99% level of significance), ** (95% level of significance), and * (90% level of significance).

Table 3

Geweke Test for Contemporaneous Comovement between Foreign Stock Market Returns and the World (MSCI) Stock Market Return (Using Percentage Change in the Monthly Price Index)[1]

	1976-1985	1986-1995	1996-2006	1970-2006	1976-2006	1986-2006
			Developed			
astrpch	48.03***	30.49***	108.99***	180.41***	141.18***	100.14***
austpch	10.07***	11.03***	37.50***	59.04***	54.90***	39.47***
belgpch	37.91***	77.31***	75.33***	220.87***	178.92***	144.45***
cndapch	98.73***	67.20***	155.07***	343.43***	280.54***	199.52***
dnmkpch	29.14***	41.14***	84.75***	155.23***	146.89***	116.11***
findpch		29.55***	76.65***			96.76***
frncpch	49.37***	75.18***	170.81***	265.74***	234.63***	213.98***
germpch	34.24***	45.61***	151.19***	227.42***	201.42***	165.29***
hgkgpch	23.42***	29.39***	64.18***	98.94***	101.95***	88.25***
italpch	15.13***	32.68***	76.53***	113.61***	104.51***	96.73***
jpanpch	51.10***	123.04***	63.15***	258.32***	236.55***	181.02***
nethpch	84.16***	109.14***	154.16***	381.76***	330.70***	252.16***
nzeapch		27.30***	44.73***			66.31***
nwaypch	36.15***	60.50***	85.44***	178.87***	167.91***	140.11***
singpch	34.60***	48.24***	60.83***	156.74***	134.54***	107.24***
spanpch	5.90**	79.81***	120.25***	167.42***	162.10***	190.40***
swdnpch	24.66***	70.16***	128.90***	220.27***	203.87***	190.11***
switpch	56.62***	84.20***	86.58***	276.48***	222.76***	166.67***
utdkpch	60.98***	117.80***	160.58***	287.82***	273.38***	256.44***
Developed average	41.19	61.04	100.30	211.32	186.87	147.96
			Emerging			
argpch	0.14	0.02	29.20***		1.73	3.67*
brapch	0.27	3.23*	77.64***		24.73***	30.46***
hilpch	0.07	2.65	60.63***		13.91***	32.99***
olbpch		1.52	10.51***			8.53***
mexpch	3.10*	10.52***	83.81***		46.12***	51.41***
venpch		0.94	11.40***			2.07
korpch	2.67	11.26***	39.74***		47.51***	46.95***
phipch		10.20***	27.14***			33.45***
taipch		5.82**	35.90***			27.14***
indpch	5.26**	1.70	19.76***		5.40**	2.63
malpch		27.51***	21.11***			46.28***
pakpch		0.04	3.33*			2.09
thapch	0.10	13.38***	43.34***		47.10***	52.40***
jorpch		2.47	0.37			2.05
nigpch		1.35	2.27			2.41
zimpch	2.38	0.31	0.00		0.36	0.04
Emerging average	1.75	5.81	29.14		23.36	21.54
Combined averages	28.57	35.79	67.77	211.32	134.54	90.16

Note. [1]Hypothesis can be rejected if *** (99% level of significance), ** (95% level of significance), and * (90% level of significance).

Larger Geweke measures imply greater magnitude of association.

The Geweke contemporaneous feedback measures are significantly higher for longer periods, so the research involved a 30-year period (Tables 2 and 3 also include 20-year and 10-year subperiod results) even though 2 developed and 8 emerging markets lacked data for the first 10-year period. The 19 developed markets show an average value of 100.7 and 186.9 when measured against the stock markets of the United States and the

world respectively. These measures increase steadily and significantly for each successive 10-year period against both the U.S. and the world stock markets. All of these measures (except Australia vs. the U.S. stock market in the 1986-1995 period) are significant at the 1% level for the entire data range and the two most recent 10-year subperiods. The results strongly support the hypothesis that developed markets are highly integrated with those of the United States and the world.

The 16 emerging markets show a much lower average value for the Geweke contemporaneous feedback measures: 19.4 versus the U.S. market and 23.4 versus the world market index. Even though all equity markets are reflecting more integration, emerging markets seem significantly less integrated than developed markets. This is true for market integration with both the U.S. and the world stock market returns.

Very few of the Geweke measures for Hypotheses 2 and 3, which are tests for average lead/lag relationships between stock market return in a country and the U.S. or the world market index, are significant. This finding could be the result of random comovement based on sampling and may not indicate a systematic lead/lag relationship.[7] The result is not surprising because Johnson and Soenen (2002) showed that the lead/lag relationship between stock market returns spans a matter of days, not months.

Stock Market Integration and the General Business Environment

To explain why developed markets exhibit more integration than emerging markets, we hypothesized that greater stock market integration is associated with a more favorable economic and political climate toward business. The Economist Intelligence Unit (EIU) overall business environment rating (OBER) measures a wide range of factors associated with a more favorable business environment rating. The ratings range from 1 (unfavorable) to 10 (highly favorable).

The mean and standard deviation of the OBER equaled 7.98 and 0.56 respectively for the developed markets and 5.96 and 1.00 for the emerging markets in this study. A more favorable business environment rating (i.e., a higher OBER) allows resources, which codetermine economic growth, to flow more freely between countries, leading to higher comovement in stock returns in those countries. Countries with an unfavorable business environment rating (i.e., a lower OBER) are more likely to be isolated economically and experience lower comovement in stock returns with the U.S. and the world stock market returns.

The EIU quantifies the attractiveness of the business environment as a score derived as an unweighted average of 10 component category scores.[8] The OBER measure is available from 1995 to 2010 (actual and forecast values). If the OBER proves to be a reliable predictor of the degree of stock market comovement with U.S. and world stock market returns (Geweke and correlation measures), investors may use EIU forecast values as an indication of future stock market integration.

To test the hypothesis that favorable business environment ratings (OBER) are associated with higher measures of stock market integration (Geweke measures and correlations), we estimated the following regression model: $MOI = \alpha + \beta * OBER$. The MOI is the measure of integration between the stock market returns in other countries and the U.S. stock market returns and the MSCI world stock market returns as measured by Geweke measures of contemporaneous feedback and simple correlation coefficients for the period 1986 to 2006. The OBER is the average annual values reported by the EIU for the period 1995 to 2006.

The Geweke measures of contemporaneous feedback are cardinal measures of the degree of comovement between stock market returns (higher Geweke measures indicate greater comovement). As such, these measures can function as the dependent variable in a regression model. Table 4 indicates the ordinary least square (OLS) estimates of the hypothesized regression model.

Table 4
Regression Results for Measures of Stock Market Integration[1] and the EIU OBER

Dependent variables	Constant	Slope coef*	N	R^2
GCFM_USA	-148.92	29.52	33.00	0.55
GCFM_WLD	-219.45	44.22	33.00	0.52
COR_USA	-0.48	0.12	33.00	0.72
COR_WLD	-0.58	0.15	33.00	0.69

Note. [1]Dependent variables: GCFM = Geweke contemporaneous feedback measure between the stock market returns of foreign markets and the stock market returns of the United States or stock market returns based on WLD (MSCI World Index). COR = Correlation coefficient between the stock market returns of foreign stock markets and the stock market returns of the United States or stock market returns based on WLD (MSCI World Index). OBER statistics were not reported for Jordan and Zimbabwe from the original list of emerging markets.

*All slope coefficients are significant at the 1% level.

Based on the *t* statistic, β is significantly positive at better than the 1% level of significance (*p* value = 0).

The graphs in Figure 1 show the relationships between actual measures of integration and fitted estimates based on regression using the OBER as the only explanatory variable.

Conclusion and Implications for Business Valuation

The results of the Geweke measures of feedback show that although the degree of integration among all markets has been increasing very slightly and gradually

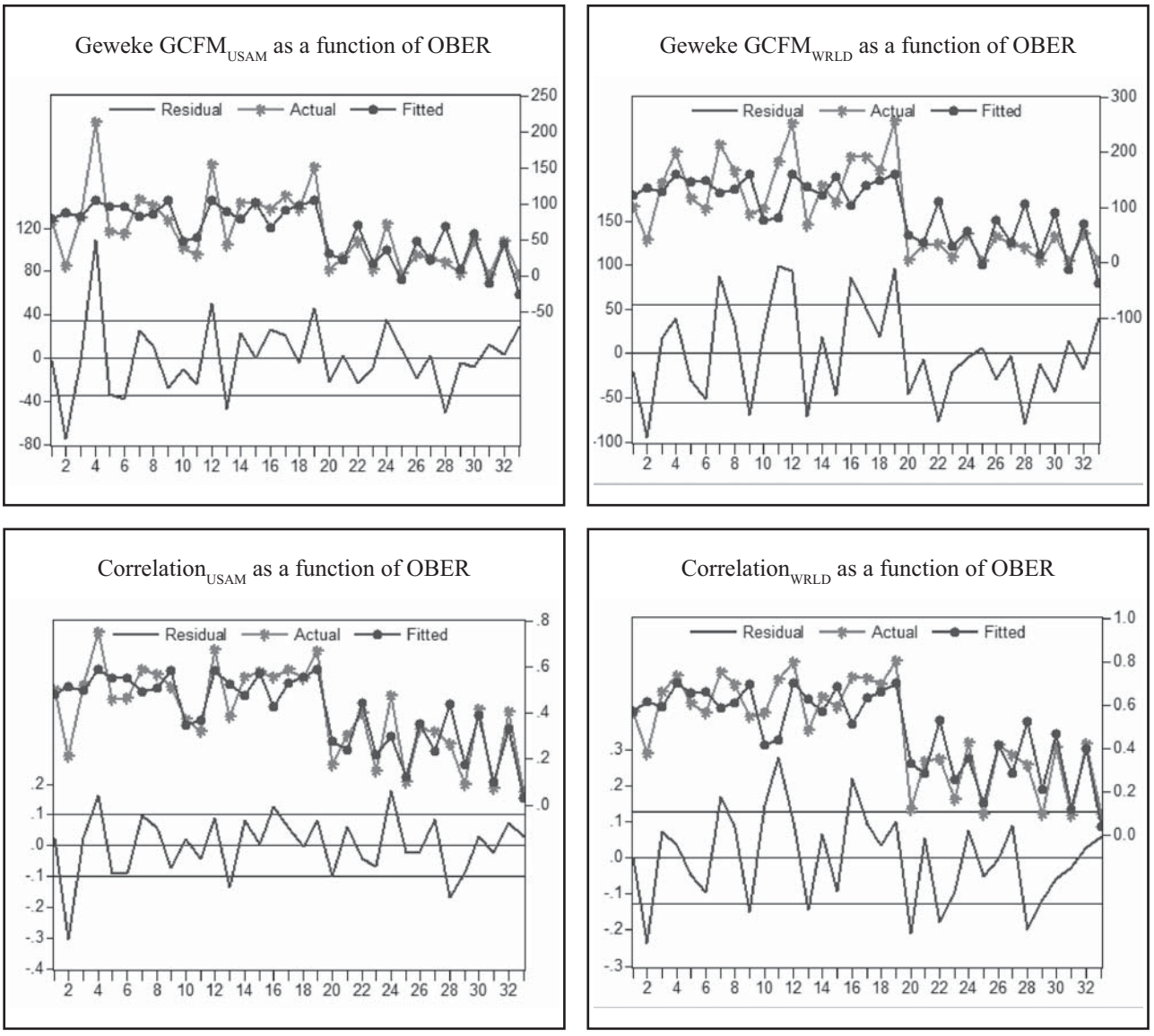

Figure 1. Relationship between actual measures of integration (using Geweke measures and correlation measures) and fitted estimates based on regression using OBER as the only explanatory variable.*

*The fitted values are based on the regression models summarized in Table 4.

Based on the regression results and the graphical representations, stock market returns for countries with higher OBERs exhibit more integration with stock market returns in the United States and the world as measured by the MSCI world stock market index.

over the past 3 decades, emerging equity markets remain significantly segmented from those of the United States and the world. Hence, the standard international capital asset pricing model (ICAPM) (Adler & Dumas, 1983) cannot be applied to emerging stock markets. In a completely segmented market, standard asset pricing models indicate that a country's expected returns are proportional to the

local return variance and not the covariance of its returns with the world market portfolio.

Like de Jong and de Roon (2005), we conclude that additional risk premiums relative to the standard ICAPM may arise because of segmentation of a given country from the world. Because the U.S. equity market accounts for about half of the market value of the global portfolio, the same conclusion holds with regard to using the U.S. equity market risk premium for (partially) segmented markets. Using an adjusted capital asset pricing model (CAPM) is recommended (i.e., CAPM adjusted for segmentation and political risk). Adjustments are necessary in valuing business investments in country settings with segmented equity markets where political or country risk is different from that of the home market. The country risk premium method suggested by Lessard (1996) and Godfrey and Espinoza (1996) offers a useful and practical approach to accommodate the necessary adjustments to the classic CAPM in calculating the appropriate cost of equity for investments in emerging capital markets.

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Footnotes

1 Bekaert and Harvey (2000) and Fama and French (2002) argued that estimates from fundamentals, especially the estimate from the dividend growth model, are more precise than estimates from the average market return.

2 Survival bias obviously affects historical analysis (i.e., observed historical returns reflect the returns of companies that have continued to trade in their markets and do not necessarily capture the negative or zero returns associated with companies that have failed or exited the market.

3 The sample included all MSCI developed markets and Standard & Poor's (S&P)/International Finance Corporation (IFC) emerging markets with data available for minimum 20 years.

4 The development of the Geweke measures for each of the three hypotheses appears in the appendix. See also Geweke (1982) and Bracker, Docking, and Koch (1999) for the theoretical development of this measure. The appendix includes definitions of the variables $GCFM_{y*r}$, $GUFM_{y>r}$, and $GUFM_{y<r}$

5 The simple correlation coefficients for various periods are available from the authors upon request.

6 This paper does not illustrate individual country betas, but readers may obtain the betas from the authors. Calculation of the betas involved all available data, but the betas were not significantly different when using only the last 20 years of data.

7 To save space, this paper does not include detailed results for Hypotheses 2 and 3, but the results are available from the authors.

8 The ten component categories are as follows: market opportunities, macroeconomic environment, political environment, infrastructure, policy towards private enterprise,

labor market, tax regime, financial market, foreign trade and exchange, and policy towards foreign investment.

9 The analysis also involved using MSCI world stock market returns instead of U.S. stock market returns.

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Appendix

The Geweke measures are likelihood ratio test statistics estimated from a system of unrestricted equations (Equations 1 & 2) and a system of restricted equations (Equations 3 & 4). Equation 1 postulates that the monthly stock returns in the United States are a function of the lagged returns in foreign stock markets and past U.S. stock market returns and vice versa in Equation 2.

$$y_t = \alpha_0 + \sum_{k=1}^{M_2} E_k\, r_{t-k} + \sum_{k=1}^{M_1} F_k\, y_{t-k} + \varepsilon_{yt} \qquad \mathrm{var}(\varepsilon_{1t}) = \sigma_{\varepsilon y}^{\,2} \qquad (1)$$

$$r_t = \beta_0 + \sum_{k=1}^{M_2} G_k\, y_{t-k} + \sum_{k=1}^{M_1} H_k\, r_{t-k} + \varepsilon_{rt} \qquad \mathrm{var}(\varepsilon_{rt}) = \sigma_{\varepsilon r}^{\,2} \qquad (2)$$

$|Y|$ = Determinant of covariance matrix $Y = \mathrm{cov}(\varepsilon_{yt}, \varepsilon_{rt})$

In the equations, y_t represents the monthly U.S. stock market returns,[9] and r_t represents rates of change in the foreign stock market returns, all in U.S. dollar terms. The disturbance terms, ε_{it}, are assumed to be distributed $N(0,\sigma_i^2)$ i = y&r, not autocorrelated, and contemporaneously correlated with each other in σ_{yr} (Judge, Griffiths, Hill, Lutkepohl, & Lee, 1988). A trend variable accounted for potential market trends.

The objective was to measure the degree to which monthly stock returns of foreign and U.S. markets move together in the same month and the degree to which they lead or lag each other. The coefficients, E_k, in Equation 1 show how monthly stock returns of foreign markets lead changes in the U.S. market. Similarly, the coefficients, G_k, in Equation 2 reflect how changes in the U.S. stock market lead changes in foreign stock returns. The covariance matrix captures the contemporaneous correlation across error terms. These considerations lead to specifying and testing the following three null hypotheses:

- $H_0$1: No contemporaneous relationship exists between y_t and r_t during the same month.
- $H_0$2: r_t does not lead y_t (i.e., $E_k = 0$).
- $H_0$3: y_t does not lead r_t (i.e., $G_k = 0$).

Assuming that H_1, H_2, and H_3 hold, Equations 1 and 2 become the following:

$$y_t = \alpha_0' + \sum_{k=1}^{M_1} F_k'\, r_{t-k} + \mu_{yt}, \qquad \mathrm{Var}(\mu_{1t}) = \sigma_{\mu y}^{\,2} \qquad (3)$$

$$r_t = \beta_0' + \sum_{k=1}^{M_1} H_k'\, y_{t-k} + \mu_{rt}, \qquad \mathrm{Var}(\mu_{2t}) = \sigma_{\mu r}^{\,2}, \text{ with } \mathrm{Cov}(\mu_{yt},\mu_{rt}) = 0 \qquad (4)$$

Equations 1 and 2 are estimated as a system of seemingly unrelated regressions (Judge et al., 1988), and Equations 3 and 4 are estimated with ordinary least squares. The likelihood ratio test formulated with the estimated residual variances and covariances aided in testing the three hypotheses. The likelihood ratio test statistics form the following Geweke (1982) feedback measures:

- $GCFM_{y*r} = (n)\ln[(\sigma_{\varepsilon y}^{\,2} * \sigma_{\varepsilon r}^{\,2})/|Y|]$ is distributed approximately χ^2 one degree of freedom under H_1.
- $GUFM_{r->y} = (n)\ln(\sigma_{\mu y}^{\,2} / \sigma_{\varepsilon y}^{\,2})$ is distributed approximately χ^2 with M_2 (or one) degree of freedom under H_2.
- $GUFM_{y->r} = (n)\ln(\sigma_{\mu r}^{\,2} / \sigma_{\varepsilon r}^{\,2})$ is distributed approximately χ^2 with M_2 (or one) degree of freedom under H_3.

$GCFM_{y*r}$ represents the estimated Geweke contemporaneous feedback measure between y & r; $GUFM_{r->y}$ represents the estimated Geweke unidirectional feedback measure from foreign stock market returns (r) to U.S. stock market returns (y); $GUFM_{y->r}$ represents the estimated Geweke unidirectional feedback measure from U.S. stock market returns (y) to foreign stock market returns (r). In the equations, n is the sample size, |Y| is the estimated determinant of the covariance matrix Y, σ_{ij}^2 represents the estimated variance of the residuals from Equations 1 to 4 where i = ε & μ and j = y & r, and $M_1 = M_2 = 1$. Akaike information criterion measures aided in determining the optimal values of M_1 and M_2, and adding lags beyond 1 did not systematically change the significance of the observed Geweke measures. Previous research showed that daily lags of 5 days capture the lead/lag relationship between Asian equity market returns and Japan (Johnson & Soenen, 2002).