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Foreign Investment and Equity Valuation Differences in Emerging Markets

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Introduction and Overview

What is an Emerging Market?

As defined by most economists, an emerging market is a region that demonstrates (and is expected to continue to experience) extraordinary GDP and infrastructural growth. These countries are "emerging" in the sense that their economies are rapidly growing and shifting from "developing" to "developed" status. By definition, emerging market economies are characterized by relatively low per-capita GDP. Additionally, governments of emerging market countries often enact economic reforms that are specifically designed to spur growth and facilitate the transition from "developing economy" to "developed economy." [1] According to its "World Economic Outlook Update" published in July 2012, the International Monetary Fund considers twenty-four countries to be emerging markets: Argentina, Brazil, Bulgaria, Chile, China, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine, and Venezuela. [2] For the sake of comparison, consider the following sample from the list of twenty-six developed countries published by Standard and Poor's in May 2012: Australia, Austria, Canada, Finland, Germany, Japan, Luxembourg, Singapore, Sweden, Switzerland, the United Kingdom, and the United States of America. [3]

What Risks are Associated with Emerging Markets?

Naturally, each emerging market country also carries a high risk profile relative to its "developed market" counterparts. These risks include an increased risk of capital controls being

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[1] Noeth, Bryan, and Rajdeep Sengupta. "Emerging Markets: A Source of and Destination for Capital." *Regional Economist* (2012): 10-11. *Federal Reserve Bank of St. Louis*. Web. 26 Mar. 2013. <http://www.stlouisfed.org/ publications/re/articles/?id=2194>.

[2] "New Setbacks, Further Policy Action Needed." *World Economic Outlook Update* 16 July 2012: n. pag. *International Monetary Fund*. Web. 26 Mar. 2013. <http://www.imf.org/external/pubs/ft/weo/2012/update/02/pdf/0712.pdf>.

[3] "Equity Indices." *S&P Global BMI* 31 May 2012: n. pag. *Standard & Poor's*. Web. 26 Mar. 2013. <https://www.sp-indexdata.com/idpfiles/citigroup/prc/active/ factsheets/fs-sp-global-bmi-ltr.pdf>.

implemented (due to the fact that emerging economies use relatively less-stable currencies),

political risk (due to heightened political instability), risk of nationalization, risk of

expropriation, legal differences (for example, laws in many emerging market countries differ

from those in developed market countries, specifically the United States, regarding firms'

misallocation of funds, inappropriate distribution of resources to insiders, etc.), and differences

in investors' ability to effectively monitor the activities of managers. Certain industries in

emerging markets are significantly more exposed to these heightened risks, including the

transportation, communication, and public utilities industries (i.e. industries focused primarily on

serving the domestic market). In the words of Campbell R. Harvey (Duke University and the

National Bureau of Economic Research), "in contrast to decisions made in efficient and

integrated capital markets, capital raising in emerging economies must address issues as

fundamental as property rights and as subtle as the differences in information available to

domestic and foreign investors."[4]

Why Invest in Emerging Markets?

Due to this increased risk profile, investment opportunities in emerging markets generally

offer the potential for outsized returns. This is also logical from a macro perspective when one

considers the extraordinarily high growth rates associated with these countries. For example,

emerging markets' collective global output increased by approximately 7% year-over-year in

2010 (growth figures for individual countries: Brazil 7.5%, Russia 4.3%, India 8.4%, China

10.4%).[5] When compared with mature economies' meager 2.6% collective increase (USA 2.4%,

Euro area 2%), it becomes clear why investors find the growth potential of emerging markets to

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[4] Harvey, Campbell R., Marc L. Lipson, and Francis E. Warnock. "Capital Raising in Emerging Economies." *Journal of Financial Economics* (2008): 425-29. Print.

[5] Suttle, Philip, et al. *Capital Flows to Emerging Market Economies*. N.p.: Institute of International Finance, 2012. Print.

be attractive. Increasing capital outflows to emerging markets suggest that investors believe developed markets are becoming increasingly saturated. For those investors who view investment opportunities in developed markets as limited, emerging markets provide an opportunity to earn high returns. While the quality of investment opportunities and level of risk associated with each aforementioned "emerging market" country vary drastically across countries, most economic professionals agree that certain emerging markets offer significantly better investment prospects than others. As was stated previously, this paper will focus on four of these "elite" emerging markets: Brazil, Russia, India, and China (also known as the BRIC countries).

Methods for Investing in Emerging Markets

There are two ways in which foreign market participants (for example, investors in the United States) can invest in emerging markets: foreign direct investment (FDI) and foreign portfolio investment (FPI). FDI is a large-scale investment that requires the investor to obtain some sort of ownership or controlling stake in the target area. For example, this could include an investment in a factory or land in an emerging market. As a general rule, the investor must take a minimum of a 10% ownership stake in the target entity for the investment to be considered FDI. Since FDI generally establishes a direct connection between the investor and factors of production in the target area, these investments tend to be less volatile than FPI (this direct connection minimizes communication breakdowns between foreign owners and local managers). However, like any investment in emerging markets, FDI still carries a tremendous amount of risk (for example, broken contracts with foreign-owned entities in the Argentinian utilities industry in the early 2000s). FDI inflows to emerging markets have increased significantly and relatively steadily since the 1990s. As a result, FDI has become the largest component of emerging

markets' net capital inflows.[6] However, FDI valuation methods are rather esoteric and are often

conducted on an ad-hoc basis. Since there is no existing market for most FDI investments, there

can be no continuous market-determined valuations. As a result, the valuation of FDI

investments will not be a focal point of this paper.

FPI is an investment that is made without obtaining a controlling stake in the target firm.

As opposed to FDI, FPI investments are generally made for the sole purpose of earning a return.

An example of FPI would be purchasing a foreign firm's bonds or shares of its equity.[7] There are

numerous advantages of choosing FPI over FDI. First, FPI generally requires significantly less

capital. Second, FPI allows investors to obtain a claim on the firm's assets without being

required to get involved with its daily operations. Third, FPI investments are often considerably

more liquid than FDI investments (equity and bond markets are strictly regulated and are open to

virtually all investors, including retail investors; sales of FDI investments are not regulated and

only draw interest from large companies in the same industry). Like FDI, FPI investments in

emerging markets still carry a tremendous amount of risk. As Simeon Djankov, Rafael La Porta,

Florencio Lopez-de-Silanes, and Andrei Shleifer point out in their article "The Law and

Economics of Self-Dealing," legal protections for shareholders (especially minority

shareholders) vary drastically between developed and emerging markets. Even more, these legal

protections can be vastly different across different emerging markets.[8] The valuation of FPI,

specifically equity investments (measured by price/earnings ratio, which provides a measure of

the amount of money investors are willing to pay for $1 of a firm's earnings), in firms based in

emerging markets will be the primary focus of this paper.

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[6] Green, Stephen, et al. *Foreign Direct Investment in Emerging Market Countries*. N.p.: HSBC Holdings plc, 2003. Print.

[7] Noeth, Bryan, and Rajdeep Sengupta. "Emerging Markets: A Source of and Destination for Capital." *Regional   Economist* (2012). *Federal Reserve Bank of St. Louis*. Web. 26 Mar. 2013. <http://www.stlouisfed.org/ publications/re/articles/?id=2194>.

[8] Simeon Djankov, Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, The law and economics of self-dealing, Journal of Financial Economics, Volume 88, Issue 3, June 2008, Pages 430-465, ISSN 0304-405X, 10.1016/j.jfineco.2007.02.007. (http://www.sciencedirect.com/science/article/pii/S0304405X08000160)

Recent Investment Trends in Emerging Markets

According to data from the World Bank, FDI inflows to emerging markets accounted for approximately 20% of annual global FDI inflows from 1992-1997. This share plummeted to below 10% of global FDI flows following the onset of the East Asia/Russian Federation financial crisis in 1998. Investors began to regain faith in emerging markets around 2000; since then, this share has been rising relatively steadily and, as of 2010, FDI inflows to emerging markets accounted for nearly 23% of global FDI inflows.[6] According to the Institute of International Finance (IIF), most post-2008 foreign investment in emerging markets has been directed toward Asian markets (Latin American markets are a distant second). China remains the dominant player: in 2011, 75% of all capital inflows to emerging markets in Asia went to China. The IIF also suggests that most inflows to emerging markets in recent years have come in the form of equity investments rather than debt. Of the corporate bonds that are issued by firms based in emerging markets, nearly two-thirds are issued by firms based in Asia.[9]

As was mentioned previously, investors considering opportunities in emerging markets must account for various types of risk. One source of risk that is particularly relevant for emerging markets is political risk: the risk of government instability or political changes affecting the return of an investment. According to Mihir A. Desai (Harvard University and the National Bureau of Economic Research), C. Fritz Foley (Harvard University and the NBER), and James R. Hines Jr.'s (University of Michigan and NBER) paper "Capital Structure with Risky Foreign Investment," multinational corporations account for political risk exposure by adjusting their use of leverage. The authors suggest that for every one standard deviation increase in exposure to political risk, multinational corporations reduce their leverage by approximately

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[9] Suttle, Philip, et al. *Capital Flows to Emerging Market Economies*. N.p.: Institute of International Finance, 2012. Print.

3.5%.[10] Seeing that debt is typically a firm's cheapest source of capital, this risk-management measure naturally causes the multinational corporation's overall cost of capital to increase. Another method of hedging against political risk exposure would be to purchase political risk insurance to protect the firm from downside risk associated with political turmoil. This product is offered by a number of different insurers, including the Overseas Private Investment Corporation (OPIC). According to OPIC, political risk insurance "allows U.S. businesses to take advantage of commercially attractive opportunities in emerging markets, mitigating risk and helping them compete in a global marketplace."[11] The firm goes on to state that "OPIC insurance provides innovative, comprehensive, and cost-effective risk-mitigation products to cover losses to tangible assets, investment value, and earnings that result from political perils." In other words, political risk insurance can be used to hedge against losses that directly result from politically-driven events in emerging markets, such as the nationalization of privately-owned assets.

The BRIC Countries

In terms of countries making the transition from "developing market" to "developed market," the BRIC countries are generally accepted to be among the world leaders. According to the Federal Reserve Bank of St. Louis, Brazil, Russia, India, China, Indonesia, and South Korea are expected to account for nearly 45% of global output by 2025.[12] According to the United Nations Department of Economic and Social Affairs, these same six countries have a combined population that makes up approximately 52% of the world's current population.[10]

As a result of these tremendous growth prospects, the four BRIC countries are among the most common targets of capital flows (both FDI and FPI) from foreign investors. According to

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[10] Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. "Capital Structure with Risky Foreign Investment." May 2006. TS.

[11] "Political Risk Insurance." *OPIC*. N.p., n.d. Web. 31 Mar. 2013. <http://www.opic.gov/what-we-offer/political-risk-insurance>.

[12] Noeth, Bryan, and Rajdeep Sengupta. "Emerging Markets: A Source of and Destination for Capital." *Regional Economist* (2012). *Federal Reserve Bank of St. Louis*. Web. 26 Mar. 2013. <http://www.stlouisfed.org/ publications/re/articles/?id=2194>.

Malvina Pollock and Ibrahim Levent (both of the World Bank's Development Data Group), the

BRIC countries have received nearly half of all net capital inflows to developing markets since

2005. In 2010, developing markets received approximately $1.13 trillion of net capital flows; of

these inflows, BRIC countries received nearly 60%. Data also suggest that the BRIC countries

have been faster to regain investor confidence than other developing markets following the 2008-

2009 global financial crisis: net equity inflows to BRIC countries increased by over 34% from

2009 to 2010, which is significantly greater than the 11% gain experienced by other developing

markets. Similarly, net debt inflows to BRIC countries increased by a factor of 2.5 from 2009 to

2010, while other developing countries only saw net debt inflows increase by a factor of 1.5.

Among the BRIC countries, China consistently receives the largest share of net capital inflows.

From 2005-2010, China received approximately half of total net capital inflows to BRIC

countries, with the other half being distributed evenly among Brazil, Russia, and India.[13]   The

following figures (Figure 1, Figure 2, and Figure 3) provide an effective visual display of trends

related to post-1990 net capital flows into BRIC countries.[14]

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[13] Pollock, Malvina, and Ibrahim Levent. "Capital Flows to Developing Countries - BRIC: Where the Action Is." *The World Bank*. World Bank Group, 19 Dec. 2011. Web. 26 Mar. 2013. <http://blogs.worldbank.org/developmenttalk/capital-flows-to-developing-countries-bric-where-the-action-is>.
[14] Data provided by the World Bank
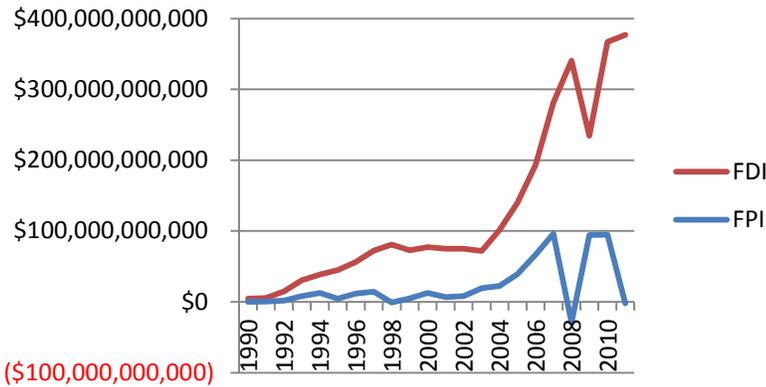
Net Inflows to BRIC Countries

Figure 1 provides a look at total FDI and FPI flows to BRIC countries from 1990-2011. Total FDI flows increased steadily from 1990-2008, then crashed during the 2009 global economic crisis. However, they quickly recovered, eclipsing pre-crisis peak levels.

FPI inflows increased steadily from 1990-2007, then crashed during the onset of the financial crisis in 2008. They recovered in 2009-2010, but crashed again in 2011 as investors pulled money from equities.
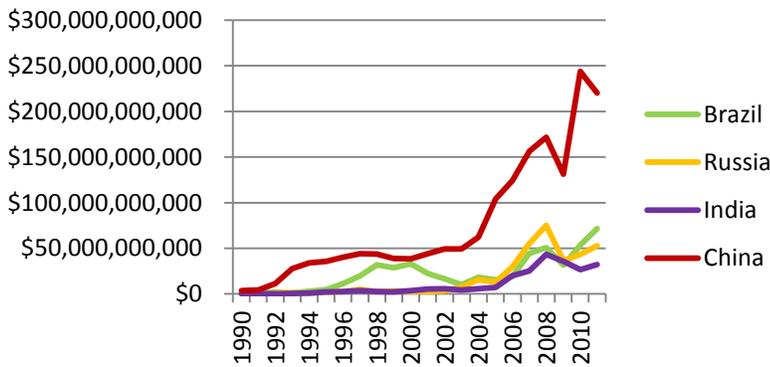
FDI Flows by Country

Figure 2 shows annual FDI inflows to each BRIC country. As is shown in the figure, China dominated FDI inflows for virtually the entire time period. Brazil was a major target from 1997-2003, but soon lost its advantage over India and Russia. Neither India nor Russia was a major FDI target until 2004, when both countries began to steadily increase their FDI inflows each year.

FPI Flows by Country
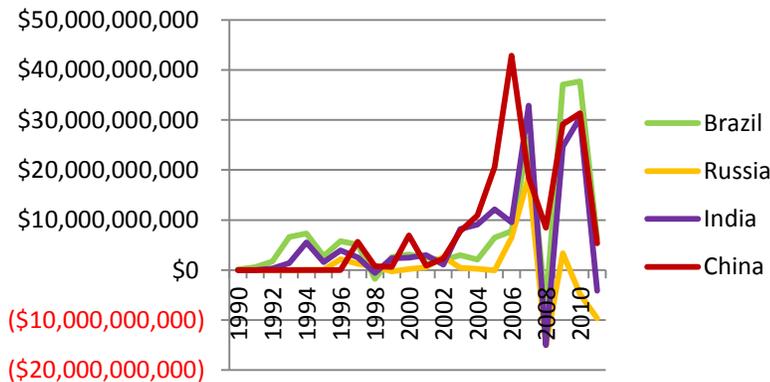
Figure 3 shows annual FPI inflows to each BRIC country. The data clearly shows that FPI inflows are significantly smaller than FDI inflows, which makes sense given that FDI flows represent enormous investments by institutions seeking ownership stakes.

FPI flows are also more volatile. Net FPI inflows follow the same general pattern for each country: slow growth from 1990-2004, significant growth until crashing in 2007, then recovering to pre-crisis levels before crashing again in 2011 (except Russia, which crashed in both 2010 and 2011).

The Capital Raising Process for Large Firms in Emerging Markets

When emerging market-based firms reach a certain size, it becomes necessary for them to utilize major securities exchanges (located in developed markets) in order to raise sufficient capital. These foreign exchanges in developed markets provide a number of significant advantages to large firms over smaller local exchanges. First, they allow large firms to access a significantly more expansive investor base, both in terms of the number of potential investors and their collective buying power. Additionally, listing a firm's securities on a major exchange significantly improves the liquidity of these securities (which can be partially attributed to the larger investor base; other factors include increased trading volume, etc.). Stijn Claessans (International Monetary Fund and the University of Amsterdam, Netherlands) and Sergio L. Schmukler (World Bank) argue in their 2007 paper "International Financial Integration through Equity Markets" that a firm based in an emerging market can actually reduce its cost of equity, and therefore its overall cost of capital, by listing its equity on a major foreign exchange.[15] There are significant barriers to entry that a firm must pass in order for its equity to qualify for most major exchanges. These barriers often include, but are not limited to, a minimum market capital capitalization, significant monetary costs (listing fees, etc.) associated with listing securities on a major exchange, costs related to compliance with international accounting standards, and a mandatory commitment to a considerably high standard of disclosure (relative to the amount of disclosure required by exchanges in most emerging markets). Claessans and Schmukler argue that a firm's ability to overcome these barriers to entry makes its equity appear less risky to investors. As a direct result, investors' required return on the equity falls and the firm's cost of equity decreases.

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[15] Claessens, Stijn, and Sergio L. Schmukler. "International Financial Integration through Equity Markets." *Journal of International Money and Finance* (2007): 788-813. *ScienceDirect*. Web. 26 Mar. 2013.

While a select few emerging market-based firms do actually have physical shares listed on major exchanges in developed markets, the most common financial instruments used by firms seeking access to major exchanges are depositary receipts. These securities are relatively straightforward: the firm first hires a global financial institution (ex: JPMorgan Chase, Deutsche Bank, Citigroup, Barclays, etc.) that has a presence in both the domestic emerging market and foreign developed market (the market in which the desired exchange is located). The financial institution thoroughly researches the firm and analyzes its financials to ensure that the firm passes each of the aforementioned "barriers to entry." If the firm passes these criteria, it then sells its shares to the financial institution. The bank securitizes these shares into depositary receipts, with each depositary receipt representing a specific number of physical equity shares (a ratio of 1:1 means that each depositary receipt represents one share of the firm's equity, 1:5 means that each depositary receipt represents five shares of equity, 5:1 means that a bundle of five depositary receipts represents one share of equity, etc.). The bank then sells these depositary receipts to investors on the firm's desired major exchange (depositary receipts traded on a United States-based exchange are called American Depositary Receipts [ADRs], etc.).

According to the Bank of New York Mellon's Depositary Receipt Directory, there were 525 separate instances from 2000-2012 in which BRIC-based firms used depositary receipts to issue shares of their equity on major exchanges. Of these 525 issuances, sixty-five were conducted by firms based in Brazil (12.38%), sixty-eight by firms based in Russia (12.95%), 226 by firms based in India (43.05%), and 166 by firms based in China (31.62%). The most common major exchanges used to issue these depositary receipts included the New York Stock Exchange, NASDAQ Stock Market, London Stock Exchange, Singapore Exchange, and Luxembourg Stock Exchange. The amount of money raised by each of these depositary receipt issuances varied

widely; the largest single capital-raising effort was conducted by Neftynaya Companiya-Rosneft (a Russian producer of oil and gas), which raised nearly $6.4 billion in July 2006, while the smallest single issuance raised only $750,649 for Ping An Insurance Company of China (a Chinese life insurance provider) in 2003.[16]

Equity Valuations for Firms Based in BRIC Countries

Based on the information given above, it is clear that BRIC-based firms with equity traded on major exchanges are fundamentally identical to the strongest firms based in developed markets. Firms in each group are large (in terms of market capitalization), have strong financials and business prospects (for BRIC-based firms, this is certified by a respected global financial institution), comply with high standards of disclosure to investors, and adhere to strict international accounting standards. This raises the following question: despite these clear similarities, does increased country-specific risk influence the market to value the equity of firms based in BRIC countries more conservatively than it values the equity of firms based in advanced economies?

As was discussed previously, emerging markets (including the BRIC countries) generally carry heightened risk profiles compared to their developed market counterparts. This additional risk can be broken into several categories, including political risk, socioeconomic risk, and uncertainty surrounding each market's prospects for future growth. When market participants invest in emerging markets, they naturally inherit this country-related risk. As a result, I hypothesize that investors (i.e. the market) directly account for this risk by using more conservative valuations (measured by price/earnings ratio) for the equity of BRIC-based firms than they use for the equity of similar firms located in developed markets. In other words, I

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[16] "DR Directory." *BNY Mellon Depositary Receipts*. BNY Mellon, 2013. Web. 26 Mar. 2013. <http://www.adrbnymellon.com/dr_directory.jsp>.

expect P/E ratios to vary significantly between emerging and developed markets. I also expect

P/E ratios to vary significantly across different emerging markets, with equity valuations in each

country being heavily dependent on the risk profile of that specific market. I chose to focus on

P/E ratios because, as was mentioned previously, this statistic provides a measure of how much

money (all data used in this paper is converted to U.S. dollars) investors are willing to pay for $1

of a firm's earnings. A P/E ratio, thus, provides an approximation of the value assigned by

investors to a firm's earnings.

Testing the Hypothesis: Do P/E Ratios Vary *Significantly* Across Countries?

Simple Comparison

To test this hypothesis, I first compared valuations (P/E ratios) of some of the largest

BRIC-based firms with valuations of their peer firms in developed countries. I selected the eight

firms with the largest depositary receipt capital raisings of the past decade (using the BNY

Mellon Depositary Receipt database): Neftynaya Companiya-Rosneft (Oil & Gas Producers,

Russia), Petroleo Brasileiro-Petrobas (Oil & Gas Producers, Brazil), VTB Bank (Banks, Russia),

Banco Santander Brasil (Banks, Brazil), Sberbank of Russia (Banks, Russia), ICICI Bank

(Banks, India), Vale (Industrial Metals & Mining, Brazil), and China Unicom (Mobile Telecom,

China). This group includes firms located in each BRIC country and covers four different

industries, making it an acceptable introductory sample.

Next, I used Standard Industrial Classification (SIC) codes to establish a list of ten United

States-based peer companies for each firm. For each firm, I selected the ten U.S.-based peer

companies with the most comparable market capitalizations (to minimize any influence that a

firm's size might have on its P/E ratio). I then compared the P/E ratio of each BRIC-based firm

with the median P/E ratio of its U.S.-based peers. For this comparison, I used three P/E ratios:

TTM (trailing twelve months), FY1 (expected P/E ratio for fiscal year 1), and FY2 (expected for

fiscal year 2).

The results of this comparison confirmed my suspicions that BRIC-based firms are

generally valued more conservatively than their U.S.-based peers. Of the eight original firms,

seven provided usable data (Brazil-based Vale only had four peer companies in the United

States). Of those seven firms, five had P/E ratios (TTM, FY1, and FY2) noticeably lower than

the median P/E ratio of their peer companies. The two exceptions were ICICI Bank and China

Unicom. For reference, the data for Neftynaya Companiya-Rosneft and its peer firms in the

United States are presented in Figure 4.[17]

					Figure 4
Market Data & Price Multiples (SIC Code: 1311; Currency: USD)					
Name	Price	Market Cap	TTM	FY1	FY2
Neftynaya Companiya-Rosneft	**8.36**	**88,641.91**	**7.06**	**8.52**	**8.89**
APACHE CORPORATION	77.30	32,599.84	12.37	8.38	7.30
CHEVRON CORPORATION	115.92	226,876.40	8.70	9.50	9.46
CONOCOPHILLIPS	58.60	71,134.19	8.71	10.64	9.50
EXXON MOBIL CORPORATION	89.32	402,118.60	9.21	11.33	10.99
HESS CORPORATION	68.21	23,296.92	10.47	10.89	10.77
MARATHON OIL CORPORATION	35.71	25,261.85	13.95	11.99	11.17
MURPHY OIL CORPORATION	61.99	12,047.00	12.43	11.98	9.64
OCCIDENTAL PETROLEUM CORPORATION	85.80	69,513.69	15.13	11.72	10.95
ONEOK, INC.	47.95	9,811.19	28.89	29.44	24.73
PHILLIPS 66	64.76	40,527.21	9.99	8.66	9.36
Median	-	-	**10.47**	**10.89**	**9.64**

These results clearly indicate that the equity of BRIC-based firms is valued more

conservatively (i.e. using lower multiples) than that of their developed-market counterparts.

However, it does not provide a specific reason for this discrepancy (i.e. specific risk factors that

influence P/E ratio). Additionally, it does not indicate whether or not these discrepancies are

statistically significant.

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[17] Data provided by ThomsonOne Banker; data for the other six firms is available upon request

Specific Influential Risk Factors

Which specific country-related risk factors have the greatest impact on equity valuations? To begin, I compiled a database of companies from each BRIC country that have equity listed on the New York Stock Exchange, NASDAQ Stock Market, or London Stock Exchange (either in the form of physical shares or sponsored depositary receipts).[18] After removing companies with negligible or nonexistent P/E ratios (this occurs when the firm's earnings are either negative or minimal), I was left with a database of 249 BRIC-based firms: forty-two from Brazil, fifty-three from Russia, seventy-seven from India, and seventy-seven from China. A median P/E ratio for each country was then determined.[19] I also calculated a median P/E ratio for the United States using the same methodology and an index of 148 large-cap stocks. The resulting median P/E multiples were as follows:

Country	Median P/E Ratio
United States	16.23
Brazil	14.10
Russia	8.60
India	9.10
China	14.80

Based on this information, investors value equities based in each BRIC country more conservatively than they value U.S.-based equities. They value the equity of Chinese companies the least conservatively of the BRIC-based firms, followed by Brazil, India, and Russia, respectively. Based on the assumption that P/E ratios are negatively associated with country risk (in other words, countries with less risk have higher P/E ratios), this suggests that investors view China as being the least-risky BRIC country, followed by Brazil, India, and Russia, respectively.

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[18] Information gathered from the BNY Mellon DR database as well as each of the listed exchanges; full data set is available upon request

[19] This was calculated using ThomsonOne Banker to find each firm's P/E ratio; I chose to use each firm's trailing-twelve-months (TTM) P/E ratio as of December 31, 2012 for the sake of consistency.

Next, I obtained country risk data from the PRS Group, a firm that specializes in political risk analysis. The PRS Group calculates an aggregate political risk rating for every country by rating each country according to twelve categories of risk. The country's aggregate risk rating is the sum of its scores for each category. Each category has a different maximum score; a low score in a certain category indicates a high level of risk. As a result, a low aggregate score is associated with a high level of overall political risk (the maximum aggregate score is 100 points). The twelve categories are: government stability (maximum score of twelve), socioeconomic conditions (twelve), investment profile (twelve), internal conflict (twelve), external conflict (twelve), corruption (six), military in politics (six), religious tensions (six), law and order (six), ethnic tensions (six), democratic accountability (six), and bureaucracy quality (four).[20]

I then calculated a series of correlation coefficients, finding the correlation between P/E ratio and aggregate risk rating as well as correlations between P/E ratio and each of the twelve risk categories. For my original sample, I used each of the five median P/E ratios calculated above (USA and BRICs). The strongest individual correlations, as well as the overall correlation, are shown below in Figure 5:

| | | | | **Figure 5** |
Country	Socioecon. Conditions	Internal Conflict	Overall Risk	P/E Ratio
Brazil	7.0	9.5	69.0	14.1
China	8.0	9.0	62.5	14.8
India	4.5	6.0	58.5	9.1
Russia	5.5	7.5	62.0	8.6
USA	8.5	10.0	81.5	16.2
CORREL	0.954335	0.911992	0.752786	

"Socioeconomic conditions risk" and "internal conflict risk" produced the strongest correlation coefficients (against P/E ratio) of any individual risk factor. These correlation

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[20] For a more detailed explanation of the PRS Group's rating methodology, visit http://www.prsgroup.com/ICRG_Methodology.aspx

coefficients, .95 and .91 respectively, indicate an incredibly strong positive association between a country's risk rating in these two categories and its median P/E ratio. In other words, less risk in these categories is associated with a higher median P/E ratio. The correlation coefficient between aggregate risk rating and P/E ratio was 0.75, which also indicates a strong positive relationship (a higher aggregate risk rating indicates lower country risk, so low country risk is associated with a high median P/E ratio).

To see if these strong associations held with a larger sample, I added twelve more countries to the sample, using the TTM P/E ratio of a prominent equity index in each country as the country's median P/E value (ex: the P/E ratio used for Germany was that of the DAX index). Though the associations weakened, similar patterns emerged. The strongest individual correlations, as well as the overall correlation, are shown below in Figure 6:

Figure 6

Country	Socioecon. Conditions	Internal Conflict	Overall Risk	P/E Ratio	Country (continuation)	Socioecon. Conditions	Internal Conflict	Overall Risk	P/E Ratio
Australia	10.0	10.0	84.5	20.6	New Zealand	8.5	11.5	87.5	20.4
Brazil	7.0	9.5	69.0	14.1	Norway	10.5	11.0	88.5	13.6
Canada	9.0	11.0	86.5	15.7	Russia	5.5	7.5	62.0	8.6
China	8.0	9.0	62.5	14.8	Sweden	9.0	10.5	87.0	15.0
Denmark	10.0	9.0	84.5	21.5	Switzerland	9.5	12.0	86.0	20.0
France	8.5	10.0	77.5	14.5	Taiwan	10.0	11.0	80.0	21.7
Germany	9.0	10.0	82.5	14.8	U.K.	8.5	8.5	81.0	14.6
India	4.5	6.0	58.5	9.1	United States	8.5	10.0	81.5	16.0
Netherlands	10.0	10.5	86.0	12.4	*CORREL*	0.680449	0.626689	0.595328	

Even with a larger sample size, "socioeconomic conditions risk" and "internal conflict risk" still produced the strongest correlation coefficients against P/E ratio. Though the correlation coefficients decreased to 0.68 and 0.63, respectively, these coefficients still suggest that there is a strong positive association between each of these risk factors and P/E ratio (a higher risk rating indicates lower risk, so low risk in each of these categories is associated with a higher P/E ratio). Likewise, the "overall risk" correlation coefficient of 0.60 indicates a strong

positive association between a country's aggregate risk rating and its median P/E ratio. Though this data clearly shows that there is a strong association between a country's risk rating and its P/E ratio, it does not tell us whether or not these differences in P/E ratios across countries are statistically significant. In other words, thus far we cannot say with certainty if these discrepancies can be attributed to country risk.

*Testing for Statistical Significance: U.S Firms vs. BRIC Firms*

Though the above information clearly suggests that there is a strong association between country risk and price/earnings ratio, are differences in median P/E ratios across countries statistically significant?

To test for significance, I performed two ordinary least squares (OLS) regressions. First, I wanted to test if the apparent discrepancy between the price/earnings multiples of developed market-based firms and emerging market-based firms was statistically significant. To do this, I performed a regression using one dummy "x" variable: each BRIC-based firm was assigned a value of "1" ($x_1 = 1$) and each U.S.-based firm was assigned a value of "0" ($x_1 = 0$). The resulting regression would then produce the following equation:

Model: $Y = \alpha + \beta X$ where (Y = P/E ratio) and ($X = 0$ if U.S.-based, 1 if BRIC-based)

However, the data first had to be transformed. One of the assumptions of an OLS regression is that the response variable sample be normally distributed. Looking at the aforementioned database of 249 P/E ratios for BRIC-based firms and 148 P/E ratios for United States-based firms, it is clear that this data set does not even remotely resemble a normal distribution (see Figure 7 for the visual representation, which displays extreme right skew and "fat tails," i.e. leptokurtosis.):
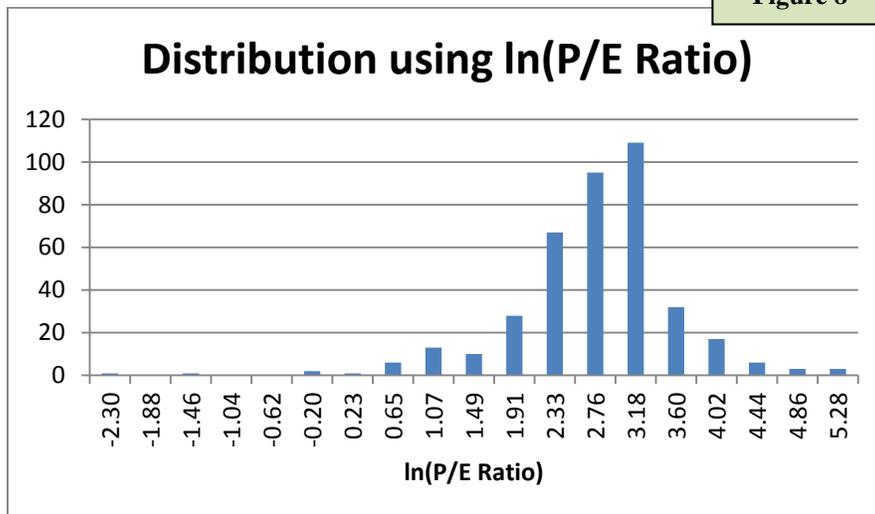
Figure 7
Distribution of Original Data
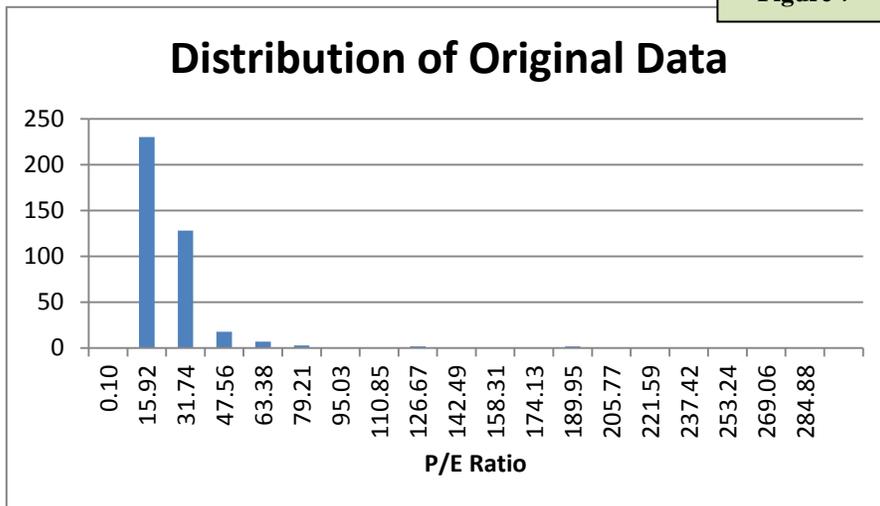
Mean	19.723
St. Dev.	28.534
Skew	5.996
Kurtosis	43.78

As a result, the original data had to be transformed in order to satisfy the "normal distribution" condition. To do this, I simply took the natural logarithm (ln) of each price/earnings ratio in the data set. This approach worked well, producing an improved data set more closely approximating normality (see Figure 8):

Figure 8
Distribution using ln(P/E Ratio)

Mean	2.575
St. Dev.	0.892
Skew	-0.633
Kurtosis	4.535

Once the response data was approximately normally distributed, I could move forward with the first OLS regression.[21] This regression produced the following results (Figure 9):
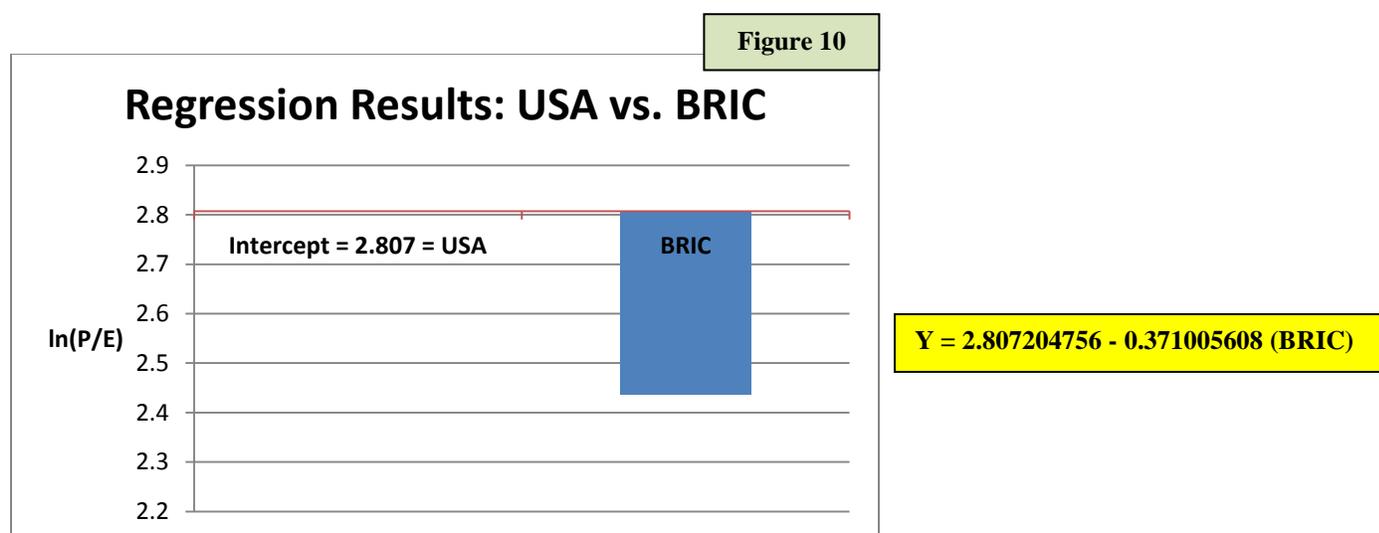
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[21] I assumed that all other OLS conditions, such as independence of the explanatory variables, were satisfied.

Figure 9

SUMMARY OUTPUT (BRIC vs. USA Regression)						
Regression Statistics						
Multiple R	0.201407244					
R Square	0.040564878					
Adjusted R Square	0.038135928					
Standard Error	0.874681465					
Observations	397					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	12.77707675	12.77707675	16.70058394	5.30309E-05	
Residual	395	302.2017274	0.765067664			
Total	396	314.9788042				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	2.807204756	0.071898373	39.04406484	1.1327E-137	2.665853427	2.948556086
BRIC	-0.371005608	0.090785114	-4.086634794	5.30309E-05	-0.549488041	-0.192523174

These results provide a tremendous amount of information. First, under the Analysis of Variance (ANOVA) output, we see that our calculated F-value (16.70) is greater than our critical F-value (3.87; this value can be found on an F-distribution table using: significance level $\alpha = 0.05$, numerator degrees of freedom = 1, and denominator degrees of freedom = 395). This tells us to reject the null hypothesis (H_0: $\mu_{us} = \mu_{bric}$), which states that the coefficient to the BRIC dummy variable should be equal to zero (in other words, the null hypothesis states that Y will be the same for both USA-based and BRIC-based countries). Instead, the data suggests that the alternative hypothesis (H_A: $\mu_{us} \neq \mu_{bric}$; the Y-value should be different for USA-based and BRIC-based firms) is likely true. Second, we see that the P-value of the BRIC coefficient is approximately 0.000053. This essentially tells us that if the null hypothesis were true, the probability of observing a data set at least as extreme as this one would be approximately 0.0053%. Since this probability falls below our predetermined significance level of 5% ($\alpha = 0.05$), it provides further confirmation that we should reject the null hypothesis. Finally, we can examine the R-Square value of 0.0406 and the 95% confidence interval. The R^2 value tells us that approximately 4.06% of the variation in the Y variable (lnP/E) can be explained by variation

in the X variable (i.e. whether or not the firm is based in a BRIC country). While there is still a lot of P/E variation that is not explained by the company location, this figure suggests that "U.S. vs. BRIC location" plays a relatively significant role in determining a firm's P/E ratio. The 95% confidence interval tells us that we can expect, with 95% confidence, the X variable (BRIC) coefficient to fall somewhere between -0.549 and -0.193. In conclusion, this regression output tells us that the difference between the average P/E ratio for a US-based firm and that of a BRIC-based firm is statistically significant. As a result, we can use the equation provided by the regression: $Y = 2.807 - 0.371(BRIC)$, where Y is equal to the natural logarithm of a firm's price/earnings ratio. This equation is represented visually in Figure 10.

Figure 10

Regression Results: USA vs. BRIC

Intercept = 2.807 = USA   BRIC

ln(P/E)

$Y = 2.807204756 - 0.371005608 \ (BRIC)$

Testing for Statistical Significance: U.S vs. Brazil vs. Russia vs. China vs. India-based Firms

The previous OLS regression was helpful in that it informed us that equity valuation (P/E ratio) discrepancies between U.S. and BRIC-based firms were statistically significant (i.e. whether a firm is US-based or BRIC-based can influence the market's valuation of its equity in a statistically significant way). However, it is lacking in the sense that it does not allow us to analyze the statistical significance of valuation differences across individual countries. In other

words, do equity valuations vary significantly in the United States, Brazil, Russia, India, and

China due to each country's unique risk profile?

I performed a second OLS regression to examine this question further. The data set used

in this regression was identical to the data set used in the previous regression: the natural

logarithm of P/E multiples for 148 U.S., 42 Brazil, 53 Russia, 77 India, and 77 China-based

firms. As opposed to the previous regression, in which I used only one independent dummy

variable ($x_1 = 1 \rightarrow$ BRIC, $x_1 = 0 \rightarrow$ USA), I used four independent dummy variables for this

regression: x_1 (Brazil), x_2 (Russia), x_3 (India), and x_4 (China) (U.S.-based firms were assigned a

value of 0 for each of the four dummy variables; this will allow the U.S. to serve as the baseline

in the regression output). Figure 11 shows how firms based in each respective country were

coded for the regression:

					Figure 11
Firm	ln(P/E)	x₁(Brazil)	x₂(Russia)	x₃(India)	x₄(China)
Banco Santander Brasil	2.501435952	1	0	0	0
Sberbank of Russia	1.945910149	0	1	0	0
Steel Authority of India	2.379546134	0	0	1	0
China Unicom	3.642835516	0	0	0	1
Bank of America Corp.	3.832979798	0	0	0	0

As was discussed previously, the data set is normally distributed. The outputs of this regression

(USA vs. Brazil vs. Russia vs. India vs. China) are summarized in Figure 12:

Figure 12

SUMMARY OUTPUT (USA vs. BRAZIL vs. RUSSIA vs. INDIA vs. CHINA)

Regression Statistics	
Multiple R	0.282346227
R Square	0.079719392
Adjusted R Square	0.070328773
Standard Error	0.85991944
Observations	397

ANOVA

	df	SS	MS	F	Significance F
Regression	4	25.10991868	6.27747967	8.489258951	1.40973E-06
Residual	392	289.8688855	0.739461443		
Total	396	314.9788042			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept (USA)	2.807204756	0.070684943	39.71432467	1.7989E-139	2.668235749	2.946173764
X Variable 1 (Brazil)	-0.09652919	0.150341564	-0.64206589	0.521205693	-0.392105833	0.199047453
X Variable 2 (Russia)	-0.632090661	0.137653419	-4.591899459	5.92607E-06	-0.902721978	-0.361459344
X Variable 3 (India)	-0.545356237	0.120829452	-4.513437975	8.44557E-06	-0.782911061	-0.307801413
X Variable 4 (China)	-0.166661494	0.120829452	-1.379311845	0.168585006	-0.404216318	0.070893329

Much like the results of the first regression, the results of the second regression provide an abundance of useful information. First, take a look at the calculated F-value under the Analysis of Variance (ANOVA) results. This value (8.489) is greater than the critical F-value of 2.395 (the critical F-value can be found on an F-distribution table using: significance level α = 0.05, numerator degrees of freedom = 4, and denominator degrees of freedom = 392), which suggests that we should reject the null hypothesis (H_0). In this case, the null hypothesis is H_0: μ_{usa} = μ_{brazil} = μ_{russia} = μ_{india} = μ_{china} (in other words, the average ln[P/E] value should be identical across all five countries, meaning that the coefficient for each respective BRIC country [x_1, x_2, x_3, and x_4] should be equal to zero.). Instead, the evidence suggests that the alternative hypothesis (H_A) is correct. In this case, the alternative hypothesis is H_A: μ_{usa} ≠ μ_{brazil} ≠ μ_{russia} ≠ μ_{india} ≠ μ_{china}. In other words, the coefficients for at least some of the dummy independent variables should have non-zero values.

Next, take a look at the calculated P-value for each respective BRIC country (X variable 1 through 4). The P-value for Brazil is 0.521, which is much greater than the predetermined

significance level of $\alpha = 0.05$. This P-value tells us that, if the null hypothesis is true, we can expect to observe Brazilian data at least this extreme approximately 52.1% of the time. This tells us that the results for Brazil are not statistically significant. Russia's P-value of .0000059 is lower than the significance level. This tells us that Russia's results are statistically significant; if the null hypothesis were true, we would expect to observe Russian data at least this extreme only .00059% of the time. India's P-value of .0000084 is also lower than $\alpha = 0.05$, meaning that India's results are also statistically significant. If the null hypothesis were true, we would expect to observe Indian data at least this extreme only 0.00084% of the time. Finally, China's P-value of .1686 tells us that China's results are not statistically significant. If the null hypothesis were true, we would expect to observe Chinese data at least this extreme approximately 16.86% of the time. For further confirmation, examine the 95% confidence intervals for each country. The two countries with non-significant results, Brazil and China, each have 95% confidence intervals that include both positive and negative coefficients. On the other hand, both Russia and India have 95% confidence intervals that only include negative coefficients.

Lastly, look at the R-square value of approximately 0.0797. This value suggests that approximately 7.97% of variation in the Y variable (ln[P/E]) can be explained by variation in the X variables (whether the firm is located in Brazil, Russia, India, China, or the United States).

Since the results for both Brazil and China were non-significant, we cannot use the X_1 and X_4 coefficients in our equation. As a result, we are left with the following equation:

$$Y = 2.80720 - 0.63209 \text{ (Russia)} - 0.54536 \text{ (India)}$$

This equation suggests that the natural logarithm of a U.S.-based firm's P/E ratio should be approximately equal to $Y = 2.80720 - 0.63209(0) - 0.54536(0) = 2.80720$. Similarly, the natural logarithm of a Russian-based firm's P/E ratio should be approximately equal to $Y = 2.80720 -$

0.63209(1) – 0.54536(0) = 2.17511 and the natural logarithm of an Indian-based firm's P/E ratio

should be approximately equal to Y = 2.80720 – 0.63209(0) – 0.54536(1) = 2.26185. These

results can be seen in Figure 13:

Figure 13
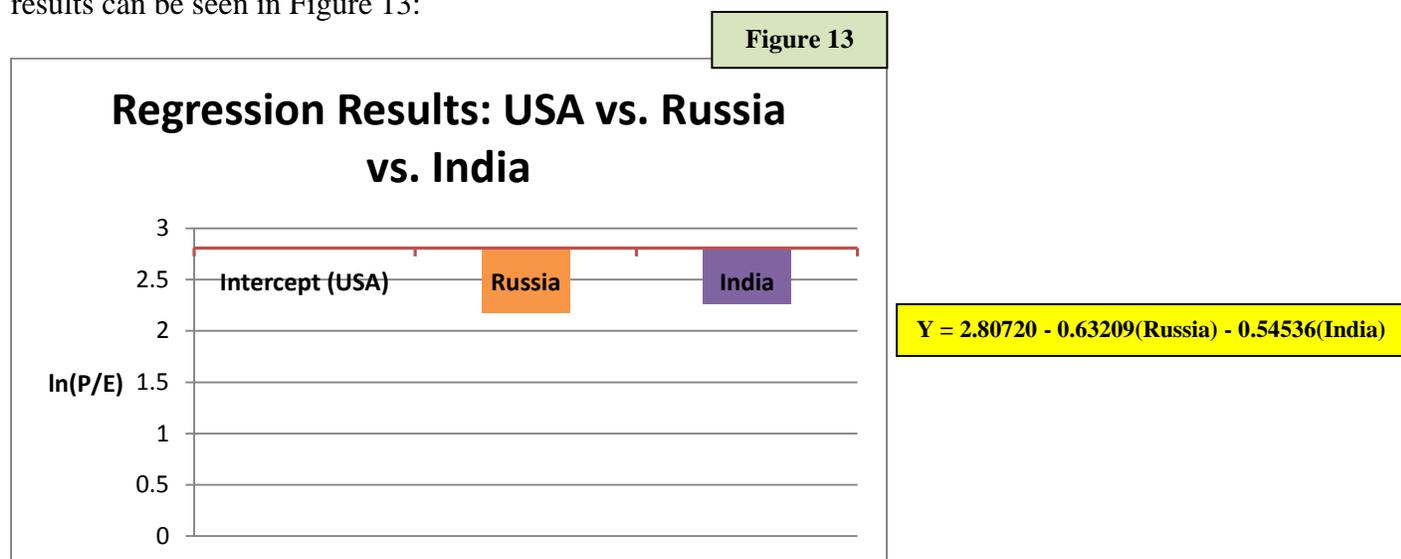
Remember, each of these values is equal to ln(P/E). So, in theory, we should be able to

derive the expected P/E multiple for each country by exponentiating each Y value. For example,

the value of ln(P/E) for the United States is approximately 2.80720 (as given in the above

equation). If we exponentiate, i.e., raise e to the power of 2.80720, the resulting value should be

approximately equal to the regression's projected P/E value for a firm based in the United States.

The exponentiated value is 16.56, meaning that the expected P/E ratio for a U.S.-based firm is

16.56. Performing the same operation for Russia and India results in expected P/E multiples of

8.80 and 9.60, respectively.

For the sake of comparison, let us compare the regression's projected P/E multiples for

these three countries with the actual median values that were calculated using a database of 148

U.S.-based firms, 53 Russian-based firms, and 77 Indian-based firms (in addition to projections

and actual figures for the 42 Brazil-based firms and 77 China-based firms) (see Figure 14):

Country	Median P/E Ratio (from database)	Projected P/E Ratio (Regression)
United States	16.23	16.56
Russia	8.60	8.80
India	9.10	9.60
Brazil	14.10	15.04
China	14.80	14.02

Figure 14

Amazingly, the expected P/E multiples projected by the regression equation are nearly identical to actual median P/E ratio calculated for each country. Addtionally, we can see that Brazil and China's values are extremely close to those of the United States, which indicates that country risk does not have a significant effect on the P/E ratios of firms located in these two emerging markets.

Conclusions

It is clear that equity valuations vary significantly not only between emerging markets and developing markets, but also across individual countries. Differences in price/earnings ratios between the United States and two of the BRIC countries are statistically significant, as we saw firsthand. On the other hand, while country-specific risk (particularly socioeconomic risk and internal conflict risk) may be strongly associated with a country's P/E multiple, this relationship is not necessarily statistically significant. Specifically regarding the BRIC countries, we have learned that differences in equity valuations between firms based in the United States and those based in either Russia or India are statistically significant (and can therefore be at least partially attributed to country risk with a strong level of confidence). On the other hand, the same cannot be said for differences in P/E multiples between U.S.-based firms and companies based in either Brazil or China.

However, the low R^2 values (0.0406 and 0.0797) discussed previously indicate that while country risk can certainly have a significant effect on the P/E ratios of firms based in BRIC

countries (particularly Russia and India), there is still a tremendous amount of P/E ratio variation that remains unexplained. Explaining such variation could be the basis for further research.

Additionally, why does country risk only have a statistically significant effect on equity valuations for firms based in Russia and India? Based on research and prior knowledge, it seems as though China and Russia are generally viewed as being "risky," while Brazil and India are typically viewed as "less risky." As a result, before reviewing the data, I expected the effect of country risk to be insignificant for both Brazil and India, but significant for China and Russia as it relates to "investment" risk. However, my research clearly indicates that this is not the case. The explanatory factors behind this stark discrepancy between general perception and investment reality could also be the basis for future research.

Overall, it is clear that emerging markets, particularly Brazil, Russia, India, and China, are playing an increasingly important role in the global economy. These markets are quickly growing both financially and in terms of population and are expected to become leading economic players over the coming decades. As this transition occurs and each BRIC country's risk profile changes accordingly, we can expect to see these equity valuation trends adjust accordingly.

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