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COMPARING UNITED STATES AND REST OF THE WORLD ECONOMIC IMPACT ON
SELECT EMERGING MARKET ECONOMIES

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ABSTRACT

Emerging market economies heavily indebted in United States dollars are heavily influenced by both the economic health of their trade partners and fluctuations in the United States interest rates. This study examines which of these relationships is more influential by studying how changes in these factors affect investor confidence as well as key economic health indicators. To do so, this study examines how emerging market economies react when the U.S. economy and global economy are correlated (growing or slowing together) and times when they are not correlated (when the U.S. economy outperforms or underperforms the rest of the world). By examining how investor confidence and economic health indicators react through these periods, this study finds which factor is most influential in each scenario. The study focuses on Brazil, Indonesia, Philippines, Korea, and Hungary.

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Chapter 1 Introduction

Economists and investors have heavily scrutinized emerging market (EM) economies throughout the past few decades due to their vast potential and volatility. An EM economy is one that is not fully developed yet but advancing to this stage, often rapidly. These economies offer growth potential and have benefited from globalization and economic liberalization. For this reason, these economies become a focal point for investors seeking yield when traditional economic powerhouses begin to cool off. However, with this growth potential comes volatility. Due to their size and often lack of diversification, EM economies often react extremely to things like commodity prices, interest rates, and general global economic well-being. The United States plays a large role in these economies not just as a trading partner, but also as a financier. Many EM economies are heavily laden with United States dollar (USD) denominated debt, which makes them especially sensitive to the United States economy. However, it is difficult to predict exactly how economies will react to fluctuations in the United States economy versus fluctuations in other factors such as commodity prices or global growth due to the intricacies of the relationships. This study examines one of these relationships: the relationship between the United States economy and global economic well-being.

This study examines how these relationships interact by studying how changes in the United States economy and the global economy affect investor confidence as well as key economic health indicators with the goal of determining how the United States and rest of the world interact economies and which is more influential. To do so, this study examines two sets of scenarios: periods when the U.S. economy moves in step with the global economy and times when the U.S. economy and global economy diverge. The first set of scenarios includes both

periods when the U.S. economy and the global economy are growing and periods when the U.S. economy and the global economy is slowing. The second set of scenarios includes both periods when the U.S. economy is expanding while the global economy is slowing and periods when the U.S. economy is slowing while the global economy is expanding. By examining how investor confidence and economic health indicators react through these periods, this study finds which factor is most influential in each scenario. The study specifically focuses on the EM economies Brazil, Indonesia, Philippines, Korea, and Turkey.

This paper will first review current literature to establish a set of assumptions surrounding the aforementioned relationships. The main areas of focus are the relationship between domestic growth and interest rates, the relationship between interest rates and EM economies, the relationship between United States economic growth and overall global economic health, and the relationship between EM economies and overall global economic health. By examining these key relationships, predictions are able to be made as to how EM economies will react through different global growth scenarios. I will then define my method of analysis and conclude with my results and a summary of findings.

Chapter 2 Review of Findings in Literature

The Yield Curve as an Indicator of Economic Health

Economists have studied the possibility of using the yield curve as an indicator for economic health since the 1980s and this notion has since become widely accepted as an effective tool to do so. The slope of the yield curve, or the term spread, is the difference between

long-term and short-term interest rates on government debt. Research published in a Federal Reserve Bank of New York (FRBNY) article titled *The Yield Curve as a Leading Indicator* shows that peaks in the probability of a U.S. recession predicted by the term spread align with periods of time when the U.S. was experiencing a recession.^[1] The FBNY article shows that the yield curve has predicted every U.S. recession since 1950 and has only generated one false positive in this seventy year period. Similar evidence is available for predictive relationships in other countries such as Germany, Canada, and the United Kingdom.

The article continues to explain some best practices to follow when considering utilizing the yield curve as a leading indicator. The FBNY recommends using the U.S. treasury interest rates as opposed to other rates such as swap or corporate rates. The main reason for this is the accessibility and consistency in data available for the treasury yield curve. As for maturities to use when calculating the term spread, the article argues that the three month and ten year rates are the best indicators. This is due to the liquidity in the market for these two fixed income instruments. The article expands upon this point to claim that it is inconsequential whether changes in the term spread are driven by the short end (three month) or long end (ten year) interest rate. The only statistically significant measure is the change in the term spread itself. The article concludes with a comparison of the yield curve as a leading indicator versus other methods such as stock prices and monetary policy. The FDNY concludes that stock prices have potential predictive power although not as strong as the yield curve as an indicator. In addition, monetary policy often flattens the yield curve as short-term rates increase more than long-term rates. This has the effect of slowing the economy and potentially causing recession. However, it is more direct to examine the yield curve effects of monetary policy when attempting to predict economic health.^[1]

Another relevant piece in the field of the yield curve is a paper written by Estrella, Arturo, and Trubin titled *The Yield Curve as a Leading Indicator: Some Practical Issues*. This paper reaches the same conclusion that the yield curve can be a powerful predictor of economic health. However, the authors believe that the yield curve is only a very powerful indicator if used correctly. It agrees with the FDNY's recommendations of using U.S. treasury rates, focusing on spreads, and using the three month and ten year maturities to measure the spread.^[2] However, it expands upon these recommendations to argue a method of measuring recession periods. The paper argues that the standard monthly method of deriving a recession from peaks and troughs identified by the National Bureau of Economic Research (NBER) should always be used when testing the yield curve as a leading indicator. The methodology for this is recording the month after an NBER peak month until the subsequent trough (including the entirety of the trough). This period of time is used to determine recession length and conclude if the yield curve accurately predicted this length of recession.^[2]

Overall, these two articles overlap thoroughly and do not leave much room for contention. This shows that the yield curve can be accurately used to predict the health of the U.S. and other global economies when doing research. However, certain important considerations must be made in order to ensure that the most accurate results are obtained. The extent of the effect of a growing United States economy on emerging markets is ambiguous. On one hand, a steepening yield curve means a stronger U.S. economy that could demand more products from EM economies. However, this could also mean higher interest rates in these economies that could have potentially negative side effects. This highlights one of the focal points of the study. In order to determine how the relationships interact, a basic understanding of economic growth versus interest rates is necessary.

U.S. Interest Rates' Impact on EM Economies

The first of the key relationships to examine is the relationship between U.S. interest rates and EM economies. As previously stated, this relationship has potential benefits as well as potential consequences. An International Monetary Fund (IMF) journal entry titled *Global Monetary Conditions versus Country-Specific Factors in the Determination of Emerging Market Debt Spreads* studies this relationship in depth. The authors study the EM economies by dividing them into two distinct sets: countries that are in crisis and countries that are not. They also specify the amount of debt each country holds as that is also an important factor in determining the result of interest rate movement. The paper finds that the relationship between U.S. interest rates and EM debt spreads does exist, but is not a simple linear relationship. The main factor that determined how much EM interest rates would react to changes in U.S. interest rates was the amount of debt that the country holds measured by debt to gross national income (GNI) ratios. EM economies that had higher debt to GNI ratios reacted much more significantly to changes in U.S. interest rates than those with lower ratios. Also, this relationship was not linear but shaped like an S-curve.^[3] This relationship is also studied in an article titled *Why Emerging Market Debt Remains Strong Despite Interest Rate Hikes*, published to Seeking Alpha. This article examines how EM debt has fared during the current U.S. tightening cycle. The article concludes that EM debt spreads have not been as affected during this tightening cycle than in the past. The author proposes that the main reason for the inverse relationship is pressure on EM corporations to pay their U.S. denominated debt. However, during this cycle the dollar has depreciated making it easier for corporations to pay down their debt. Because the debt is U.S. dollar denominated, a

weakened U.S. interest rate will make the debt relatively cheaper to pay down and therefore, EM economies will not suffer as much.

An interesting case study that exemplifies the relationship well is explored in an IMF working paper, *The Role of Interest Rates in Business Cycle Fluctuations in Emerging Market Countries: The Case of Thailand*. This paper studies the actual effects of a change in debt spreads on Thailand. The authors use the IMF Global Economy Model in order to determine how macroeconomic variables are affected when U.S. interest rates rise. The article finds that a one percent increase in short-term U.S. interest rates results in a response from several macroeconomic variables. These variables are output, consumption, investment, and capital stock. Capital stock is most affected with a change of -.62%. Investment would experience a -51% change, consumption would experience a -.28% change, and output would experience a -.23% change. The paper continues to suggest how monetary authorities should react to these interest rate changes. It concludes that a floating exchange rate policy is the best way for an EM economy such as Thailand to handle fluctuations in U.S. interest rates as exchange rate depreciation leads to expenditure switching effects.^[5]

Hot Money in EM Economies

The relationship between EM economies and U.S. interest rates also has an impact from an investment standpoint, specifically with the issue of hot money. Hot money flows are the result of investors trying to receive the highest possible short-term interest rates and can therefore change very quickly due to low maturity and ever-fluctuating interest and exchange rates. A paper by S. M. Tarzi titled *Hot Money and the Emerging Markets: Global Political and*

Economic Determinants of Portfolio Capital Flows studies some of the causes and effects of hot money. Hot money is especially prevalent in high yielding EM economies and can have substantial impacts due to the relative size of investment flows to total capital. The authors examine push and pull factors of hot money as well as some ancillary determinants. The main pull factor that they look at is government policy. It has been shown that EM economies taking steps towards privatization and market liberalization receive much greater hot money inflows. Two main push factors also result in hot money flowing into emerging markets: risk diversification and yield fluctuations. In international portfolios, emerging markets can be used to diversify risk, as they are very different from developed economies. In addition, higher, more variable yields attract this short-term hot money as it can be easily moved between countries. Because of this, EM economies are becoming larger parts of international portfolios. The final few determinants of hot money involve the United States. On one hand, U.S. policy encouraging market liberalization in EM economies results in inflows of capital to emerging markets. On the other, rising U.S. interest rates can have the opposite effect as money flows from risky EM economies to less risky U.S. treasuries.^[6]

The Global Economy's Impact on EM Economies

The relationship between the EM economies and overall global economic health is similar to their relationship with the U.S. with some distinct differences. Once again, this relationship can be looked at from two different perspectives: the impact on the business cycle and the impact on investment. The main impact on the business cycle is due to demand fluctuations. EM economies are often very export based and heavily dependent on trade.

Therefore, in times of economic strength throughout the globe, demand will increase and EM economies will thrive. The opposite is true in times of economic fragility. However, during the most recent global recession in 2008, EM economies fared better than they had during previous crises. A paper by Tatiana Didier titled *The Resilience of Emerging Markets during the Global Crisis*, examines some of the reasons this occurred. This article focuses on how EM economies fared directly following the 2008 financial crisis and how this compares to EM responses to previous periods of intense economic downturn. The author concludes that EM economies fared much better during this crisis than previous crises by examining gross domestic product (GDP) performance metrics. Didier offers four main reasons for this resilience. The first is that the crisis was inherently tied to the financial markets, which many EM economies are not as exposed to as developed countries. The second and third reasons for this resilience are intertwined. The author proposes that manufacturing is a smaller part of EM economies than developed nations so the immediate buildup of inventory and collapse of global demand did not have as big of an effect on these countries. Also, overall growth in EM economies is often much faster than developed countries, so they were able to close production gaps more quickly due to faster growth and less of a manufacturing effect. The final reason these economies did not suffer as much relative to previous events in history was better monetary and fiscal policy measures enacted by their countries' governments and central banks. These institutions used more modern economic guidance and therefore were able to persevere better than in the past.^[7] Overall, it can be said that there is a distinct relationship between the global economy and emerging markets and that the magnitude of the effects of global shocks depend on their nature.

EM ETFs and Investor Confidence

It is easy to use hindsight to recount how EM economies fared during different periods and explain the reasons for this. However, in the moment, these reasons may be difficult to see and cause investor confidence to fluctuate much more than the underlying economy. EM exchange traded funds (ETFs) that are representative of the economic health of the underlying economy can track these fluctuations. An exchange traded fund is a security that tracks an index, country, etc., using a basket of underlying assets. Some investors do not believe that EM ETFs are efficient markets and therefore cannot be used to track the actual health of an economy. In a paper titled, *Evaluating the Weak-Form Efficiency of Emerging Markets ETFs*, author G. Rompotis attempts to determine just how efficient EM ETFs are. The paper reports that relevant literature on the topic has concluded that a low volume of trading in these markets can render these ETFs informationally inefficient. Some of the factors that contribute to this inefficiency are lack of market transparency, the low degree of competition, weak regulation, and capital market fragmentation. Rompotis examines forty U.S.-listed EM ETFs using serial correlation testing as well as supplementary variance ratio tests. The findings are diverse. In some cases, he finds evidence to reject weak-form efficiency in EM ETFs; in others, he finds evidence to support this hypothesis. This allows him to conclude that lack of weak-form efficiency is not a significant trend in EM ETFs. Rompotis does provide examples of weak-form efficiency breaking down, but this is on a fund to fund level, not a phenomenon of EM ETFs as a whole.^[8] Therefore, it is safe to conclude that EM ETFs are an adequate measure of investor confidence and can be used as a metric to track it.

In recent years, EM ETFs have been scrutinized in light of the Federal Reserve's tightening cycle. A Barron's article by Dimitra DeFotis titled *Emerging Market ETFs Hit Fresh Highs*, examines recent movements in the EM ETF space. DeFotis claims that rising U.S. interest rates have not had a significant effect on emerging markets and that these ETFs have actually rallied since the Fed's consistent rate increases. She also claims that emerging markets are better prepared to handle U.S. interest rate increases than they were in the past.^[9] However, the article highlights these ETF rallies without reference to the fact that they could potentially be due to a slower future pace of Fed interest rate hikes. A similar article titled *A Catalyst for Emerging Markets ETFs* offers a slightly different view of current EM ETF movements. This article examines the relationship between U.S. interest rates and emerging market EFTs, specifically in a time when U.S. interest rates are rising. The article examines the effect of the Federal Reserve holding off on increasing interest rates and how this has been a positive catalyst for EM ETFs. The article also mentions some other factors that affect EM ETFs such as commodity prices, specifically oil. The article mentions two ETFs specifically, Vanguard Emerging Markets Stock Index and the iShares MSCI Emerging Markets Index, as being two of the main EM ETFs that summarize the market well.^[10] Therefore, it appears that the recent highs of EM ETFs are due to a correction in investor speculation about the speed of the Federal Reserve's tightening.

Chapter 3 Prediction

From this review of literature, I can make assumptions in support of my thesis as to how EM economies will react through different global growth scenarios. The table below defines and explains these predictions.

Table 1: Growth Scenario Predicted Outcome

Correlation	Positive Correlation		Negative Correlation	
Scenario	The United States and ROW experience similar economic growth	The United States and ROW experience similar economic contraction	U.S. Growth, ROW Contraction (relative)	U.S. Contraction, ROW Growth (relative)
Predicted EME Outcome	Simultaneous growth outweighs higher interest rates, positive indicators	Simultaneous contraction outweighs lower interest rates, negative indicators	ROW contraction and higher U.S. interest rates results in negative indicators (U.S. growth alone cannot offset higher interest rates)	ROW expansion and lower U.S. interest rates results in positive indicators (offsets U.S. contraction)

In times of positive correlation, the predicted results are somewhat obvious. When the global economy is expanding, economists assume that emerging markets will move in step and when the global economy is slowing, economists assume that emerging markets will suffer. However, times of negative correlation are more revealing. When the United States diverges from the rest of the world, the direct impact of its economy (through interest rates) can be tested against rest of world economic health to see which is more influential. Next, I will discuss my method of analysis to achieve these results.

Chapter 4 Method of Analysis

Selection of EM Economies

The EM economies selected for this study are Brazil, Indonesia, Korea, Philippines, and Turkey. Three main criteria were used to select specific EM economies. The first of these is that

the United States did not have an average trade share over 20% since 1989 (when trade data began to be published by World Integrated Trade Solutions, the database used for trade flows in this study). The reason for this criteria is that if the United States composed a majority of total trade (such as the case is for Mexico), then the economy would be too correlated with the United States to determine any sort of relationship for the tested variables. The second criteria was that the country did not experience hyperinflation for a prolonged period. Hyperinflation could distort both selection and indicator data and therefore affect results. Because the study used real figures and growth percentages, short periods of hyperinflation or prolonged period of constant, but high inflation would have muted effects on results. The final criteria was that the country borrowed heavily in USD denominated debt. World Integrated Trade Solutions provided trade share data while The World Bank provided data on inflation and debt composition.

As mentioned, the EM economies selected were Brazil, Indonesia, Korea, Philippines, and Turkey. A short summary is provided here, and detailed graphs are listed in the appendix. Brazil has an average trade share with the United States of 18.7%, average USD denominated debt of 74.0%, and average inflation of 316.6%. This high inflation number can be attributed to the hyperinflation Brazil experienced in the early 1990s and will not affect overall results. The graph in the appendix shows how this inflation tapered off quickly. Indonesia has an average trade share with the United States of 10.7%, average USD denominated debt of 41.2%, and average inflation of 9.9%. Korea has an average trade share with the United States of 16.6%, average inflation of 3.8%, and does not provide external debt data on World Bank. Philippines has an average trade share with the United States of 18.2%, average USD denominated debt of 46.8%, and average inflation of 6.0%. Turkey has an average trade share with the United States of 7.0%, average inflation of 39.4%, and does not provide external debt data on World Bank.

Turkey's inflation has steadily decreased since the 1990s. As can be seen from the data, each country may not have fulfilled each of the criteria completely, but as a whole fit the criteria better than other potential countries tested. Debt data is from 1980 forward (the time period utilized in the study) while inflation and trade share data is from 1990 forward due to data availability.

Economic Health Indicators

Four main economic health indicators are used in this study to examine the economic impact on the select EM economies. They are GDP growth, export growth, the unemployment rate, and national income growth. GDP growth is used as the classic overarching test of an economies well-being. Export growth is used to see how total international trade is affected by the economic well-being of trading partners. The unemployment rate is used to see if the interest rate impact is strong enough to cause corporate defaults or layoffs. National income growth is also used to determine interest rate impact in the EM economy. To reiterate, these indicators are used to track the economic health of the EMEs through different global growth scenarios. Per the table above, these indicators are expected to outperform the average in times where the United States and global economy expand and when the rest of the world outperforms the United States economy. They are supposed to underperform the average in times when the United States and global economy contract as well as times when the United States economy outperforms the global economy.

Examining Correlation

In order to determine correlation between the United States and rest of the world economies, I created a basket of main trading partners specific to each of the EM economies studied. This basket of trading partners is calculated using trade shares dating back to the 1990s. Trade shares are defined as imports plus exports from the trading partner over total imports plus total exports. Each trading partners' shares are summed from 1989 – 2016 to create a total trade score. If this total trade score is over 100, this trade partner is added to the basket of trade partners. The United States is not included in this basket even if its trade score is over 100. Relative trade score is then used to weight the basket so that each selected trade partner has a fair weight. The weight of each basket country's GDP is their trade score divided by the sum of all of the trade scores for basket countries. Only countries with trade shares are included in the final basket and the United States is not included. The equation is listed below.

$$Basket\ GDP = \sum_i^n GDP_i \times \frac{Trade\ Share_i}{\sum_j^r Trade\ Shares_j}$$

Table 2: Trade Partner Baskets

Brazil Basket Countries				
Argentina	China	Germany	Japan	Netherlands
28.5%	23.7%	20.1%	15.1%	12.6%

Indonesia Basket Countries				
Japan	Singapore	China	Korea	Malaysia
42.1%	21.2%	15.7%	13.1%	7.8%

Korea Basket Countries			
Japan	China	Hong Kong	Germany
42.3%	37.3%	10.5%	10.0%

Philippines Basket Countries				
Japan	China	Singapore	Hong Kong	Korea
38.5%	18.3%	17.5%	13.0%	12.7%

Basket Countries				
Germany	France	U.K.	Italy	Russia
37.7%	14.1%	13.6%	18.3%	16.3%

These values were used to calculate GDP growth for each basket. I then generated 5-year rolling correlation coefficients for each basket versus the United States to determine which global growth scenario the EM economy was undergoing. The results for these correlations are included in the appendix.

Data Compilation

Years where the absolute value of the correlation was greater than .4 were examined in the study. This number was selected in order to ensure that correlation was strong enough (either negative or positive) to have an impact on results. If correlation was negative, there were two possible scenarios. Either the United States economy outperformed the basket, or the basket outperformed the United States. GDP growth numbers were compared to see which economy outperformed. Per prediction, if the basket outperformed, then the EM economy was expected to experience growth and have positive indicators while if the United States outperformed, the EM economy was expected to experience a contraction and negative indicators. If correlation was positive, there are also two scenarios. The global economy (the United States and the basket) either contracted or expanded. The EM economy was then expected to contract or expand in line with the rest of the world. Indicators were deemed positive if they outperformed the average or negative if they did not. A note on data availability: Unemployment numbers for all countries did

not begin until 1990. Also, some countries did not have GDP data in the World Bank database until the early 1990s. Brazil, Indonesia, and Korea's results all data back until 1988 while the Philippines only dates back until 1992 and Turkey's only back until 1995.

These results were tested two ways. First, a simple accuracy test was used. This test measured how accurate the predictor (either positive or negative) was when compared with actual results. Each scenario was measured individually to check accuracy. The second method was statistical. All of the relevant data points for each country were compiled into one dataset. A simple linear regression was then used for each indicator to test whether its affect was statistically significant in the EM basket. The EM ETFs were not included in the regression analysis. Instead, these results are depicted graphically. The results and analysis are listed below.

Chapter 5 Results and Conclusion

Prediction Accuracy

Table 3: Prediction Accuracy

Brazil				
	GDP Growth	Export Growth	Unemployment	National Income
Points	19	19	16	19
Correct	16	15	9	11
Percent	84%	79%	56%	58%

Indonesia				
	GDP Growth	Export Growth	Unemployment	National Income
Points	15	15	13	15
Correct	10	10	6	7
Percent	67%	67%	46%	47%

Korea				
	GDP Growth	Export Growth	Unemployment	National Income
Points	17	17	14	17
Correct	13	17	7	8
Percent	76%	100%	50%	47%

Philippines				
	GDP Growth	Export Growth	Unemployment	National Income
Points	14	14	14	14
Correct	10	7	9	9
Percent	71%	50%	64%	64%

Turkey				
	GDP Growth	Export Growth	Unemployment	National Income
Points	16	16	16	15
Correct	13	10	7	12
Percent	81%	63%	44%	80%

Total				
	GDP Growth	Export Growth	Unemployment	National Income
Points	81	81	73	80
Correct	62	59	38	47
Percent	77%	73%	52%	59%

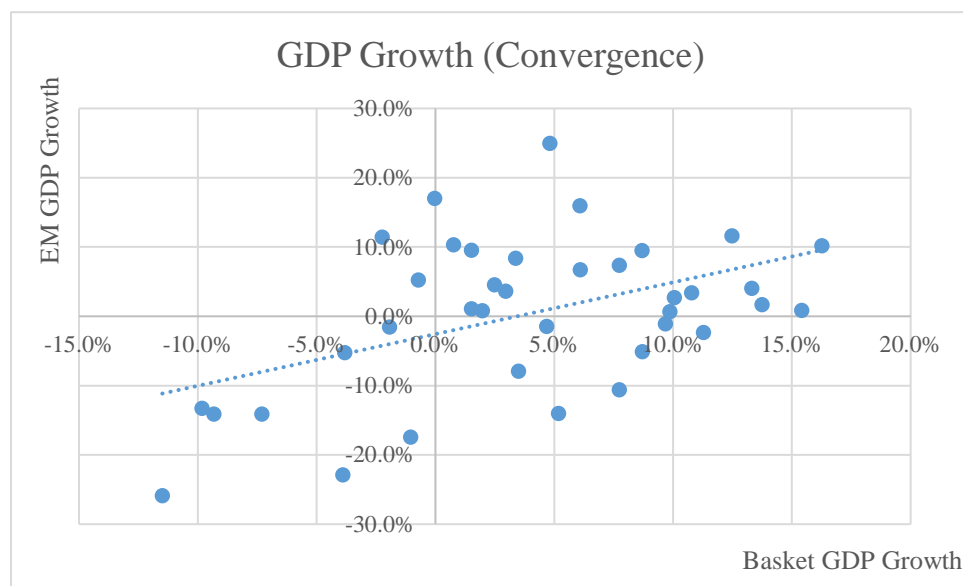
As can be seen from the data, the prediction is more accurate for GDP growth (77%) and export growth (73%). National income growth and unemployment are not as accurate at 59% and 52% respectively. The countries where the prediction is most accurate is Brazil, Korea, and Turkey. Notably in Korea, the predictor is correct for export growth in all seventeen instances of strong correlation. This is a prime example of the model working as predicted.

Statistical Analysis of Results

In order to run regression analysis, all of the data for each individual EM economy had to be compiled. The data points were separated into two buckets, one of all points with positive

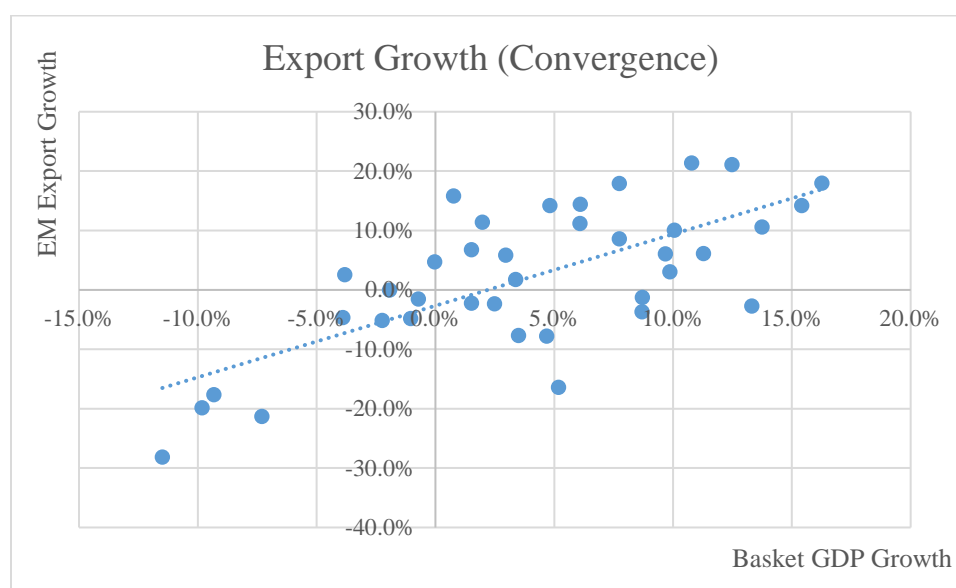
correlation and one for all points with negative correlation. The mean of each indicator was subtracted from the data points in order to more easily determine whether the economy reacted poorly or favorably. For the positive correlation data points, the relationship is direct so the regression equation is predicted to be an upward sloping line for all points except unemployment (as low unemployment is positive). The relationship is direct as it is predicted that as the United States and basket economies grow, or contract, the EM economy will do the same. The x-axis for this regression is the basket GDP growth for each point which is used as a proxy for global growth. In times of negative correlation, the relationship is expected to be inverse so a negatively sloped line is predicted. The x-axis for this regression is U.S. GDP growth minus the basket as relative performance is being evaluated. The prediction here is that when the U.S. outperforms the basket the EM economy will shrink while when the basket outperforms, the economy will falter. Below graphs and regression equations are listed with commentary and in the appendix the data and full regression output are listed.

Figure 1: Convergence GDP Growth



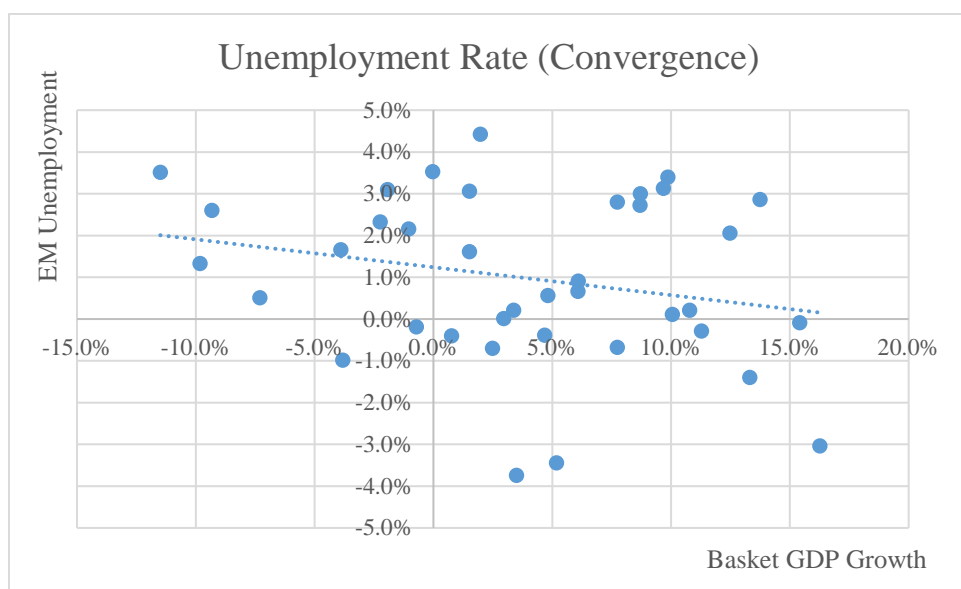
As can be seen from the graph, the positive slope that was predicted does exist. Regression analysis of the data showed a slope of .7464 with a p-value of .0027 (alpha of .05 was used for this study). This means that the predicted direct relationship between basket GDP and the EM economies GDP does exist. This is one of the more obvious predictions made as it makes rational economic sense that a country's GDP would rise/ fall when the GDPs of its main trading partners do the same.

Figure 2: Convergence Export Growth



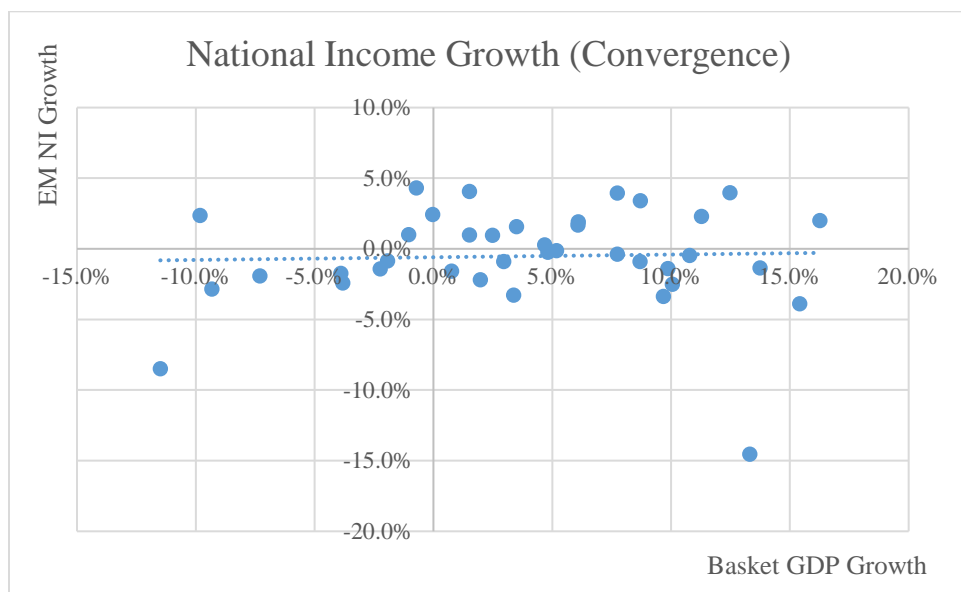
Export growth also had a significant positive slope value as predicted. The slope generated from the regression was 1.21 with a p-value of 8.67E-7. This also makes rational economic sense. As any EME's trading partner's economy grows, they will demand more goods and therefore the EME will export more.

Figure 3: Convergence Unemployment Rate



Although unemployment demonstrates the predicted negative slope, the results were not significant with a p-value of 0.16.

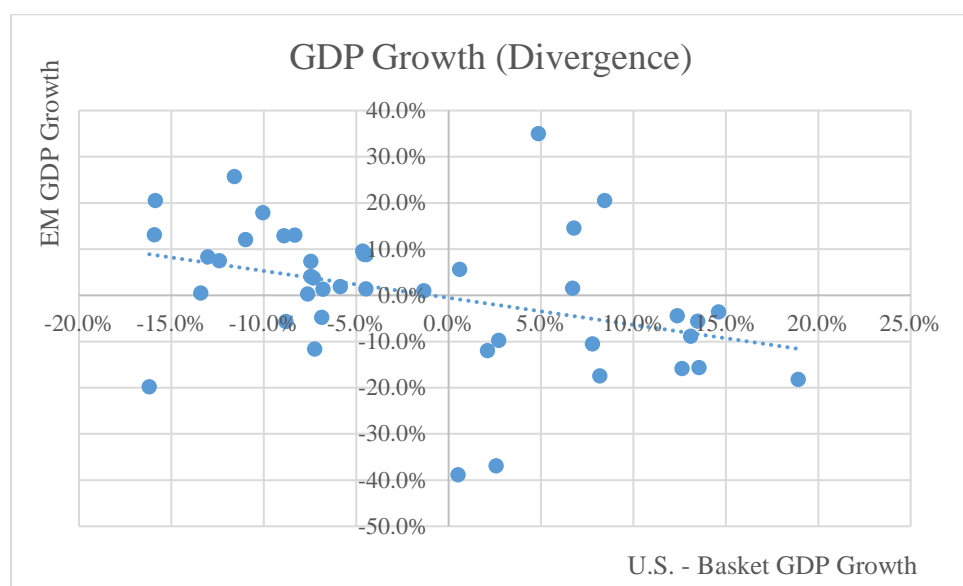
Figure 4: Convergence National Income Growth



National income slightly demonstrates the positive slope predicted. However, the p-value here is also not significant at 0.82.

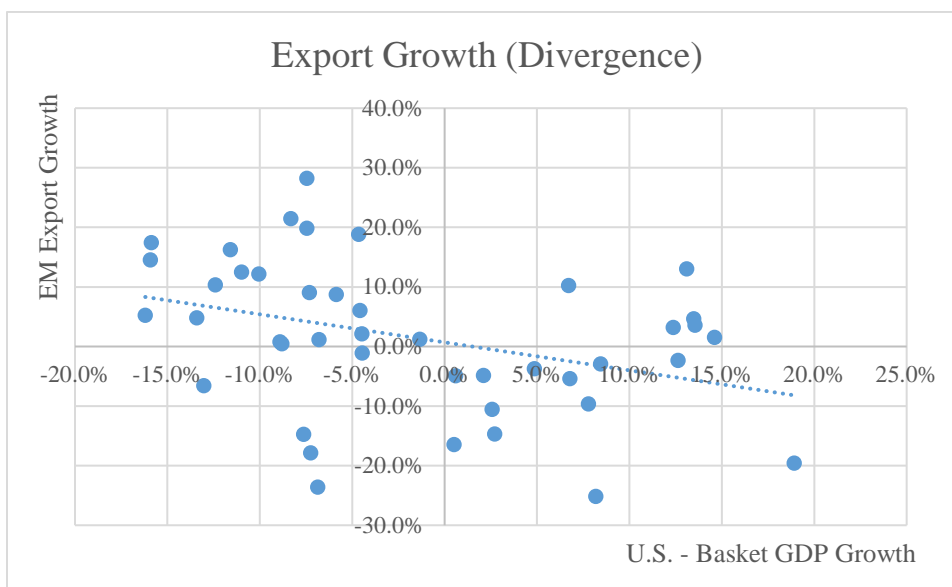
Next are the graphs for times of divergence. This is the focal point of the study as it shows how EM economies react in a global growth scenario where the United States is diverging from the basket of other countries. It is predicted that all slopes will be negative and unemployment will be positive due to the inverse relationship.

Figure 5: Divergence GDP Growth



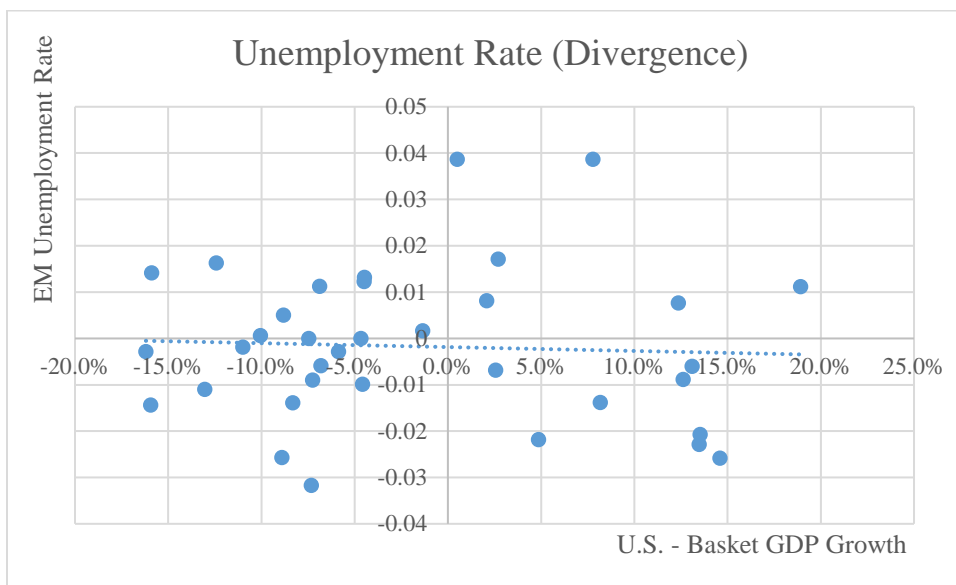
As predicted, the slope for GDP growth in times of divergence is negative. The slope from the regression output is -0.58 with a p-value of $.013$ which makes it significant. This result reinforces my thesis that in times where the United States outperforms the basket of countries, the EM economies suffer under the weight of lessened trade and higher interest rates. The opposite is true, when the basket outperforms the United States economy, the EM economies benefit from higher trade and lower United States interest rates.

Figure 6: Divergence Export Growth



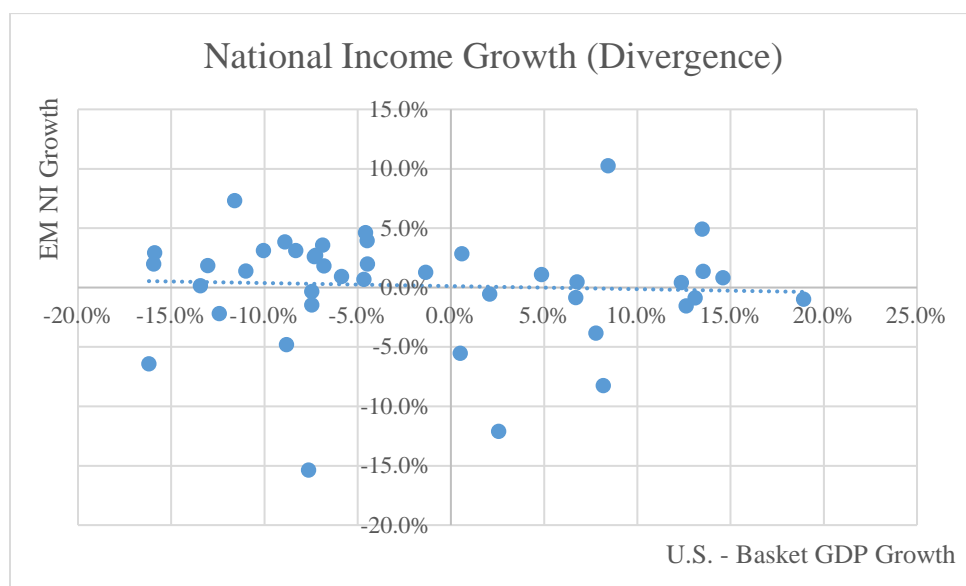
Export growth is also significant and negative as predicted with a slope of -0.47 and a p-value of $.016$. This shows that EM economies' trade is more sensitive to the basket countries as a whole than it is to the United States. This makes rational economic sense as these basket countries represent a larger overall share of trading than the United States.

Figure 7: Divergence Unemployment Rate



Unemployment does not show the predicted positive relationship. Its slope coefficient is also not significant at .77.

Figure 8: Divergence National Income Growth



National income shows a slight negative slope which is as predicted. However, this coefficient is not significant at .73.

ETF Performance

Along with economic health indicators, this study examines ETF data to determine whether or not the predictors are able to predict ETF performance along with economic health. Below are the monthly returns on Blackrock's EM ETFs for Brazil, Korea, Philippines, and Turkey. The Indonesia ETF is too young to measure. Because these ETFs are relatively new, this study does not do extensive statistical analysis, it simply presents the data graphically. The shaded gray area is the prediction, if it is above the axis, the prediction is positive and if it is below the prediction is negative.

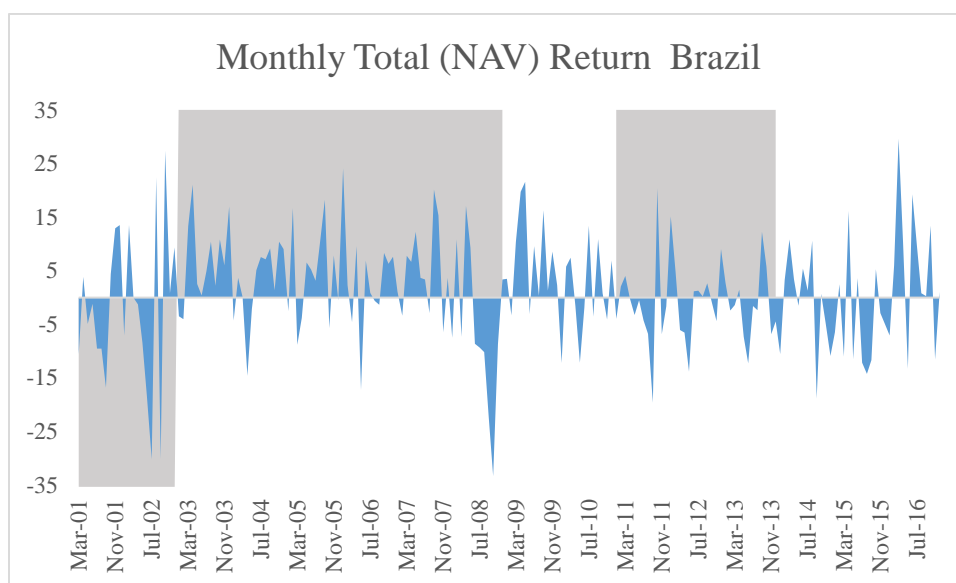
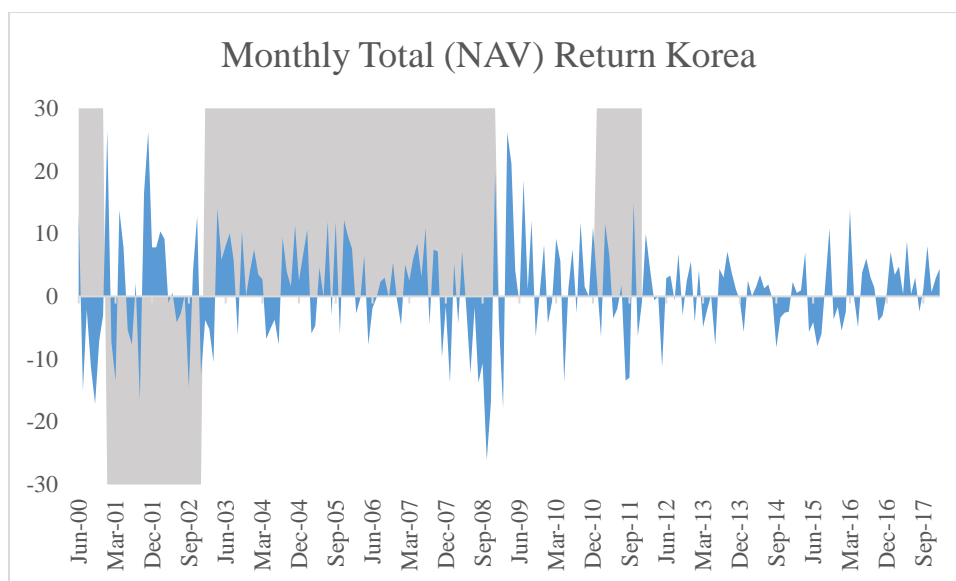
Figure 9: Brazil ETF Performance**Figure 10: Korea ETF Performance**

Figure 11: Philippines ETF Performance

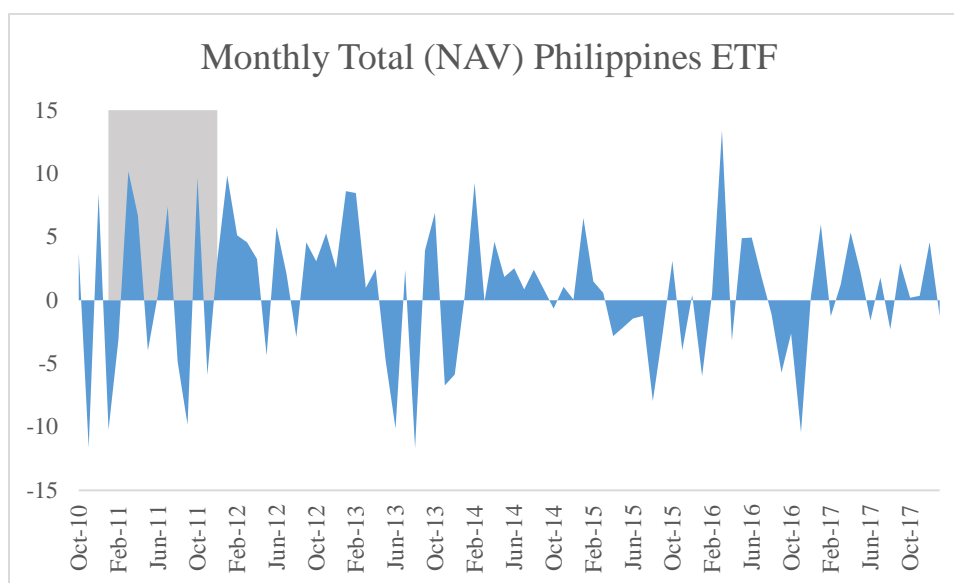
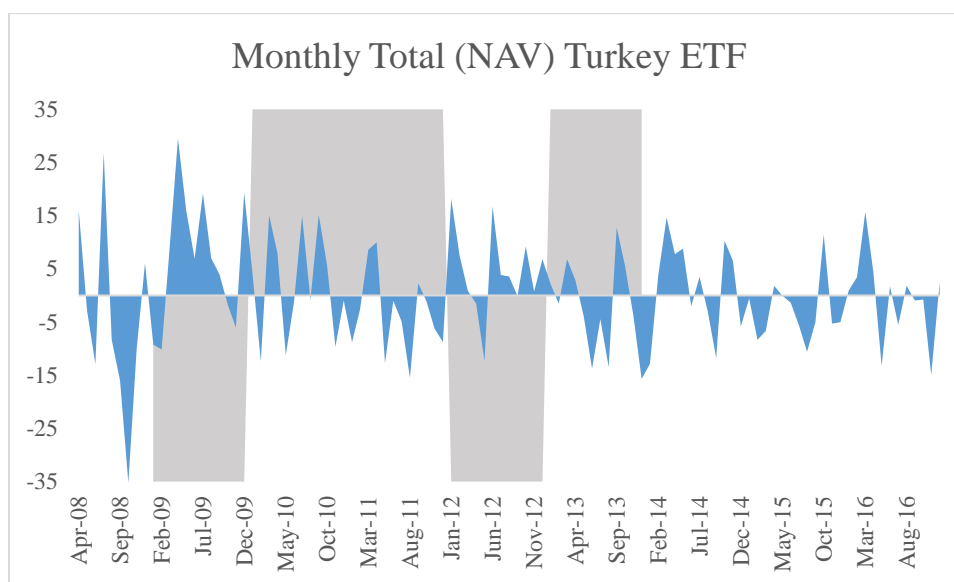


Figure 12: Turkey ETF Performance



As can be seen by viewing the data, the predictor is not adequate when it comes to predicting EM ETF performance. These funds are much volatile to be predicted in this way. Broad economic health indicators are more easily predicted as they do not have the immense level of volatility that these ETFs do.

Conclusion

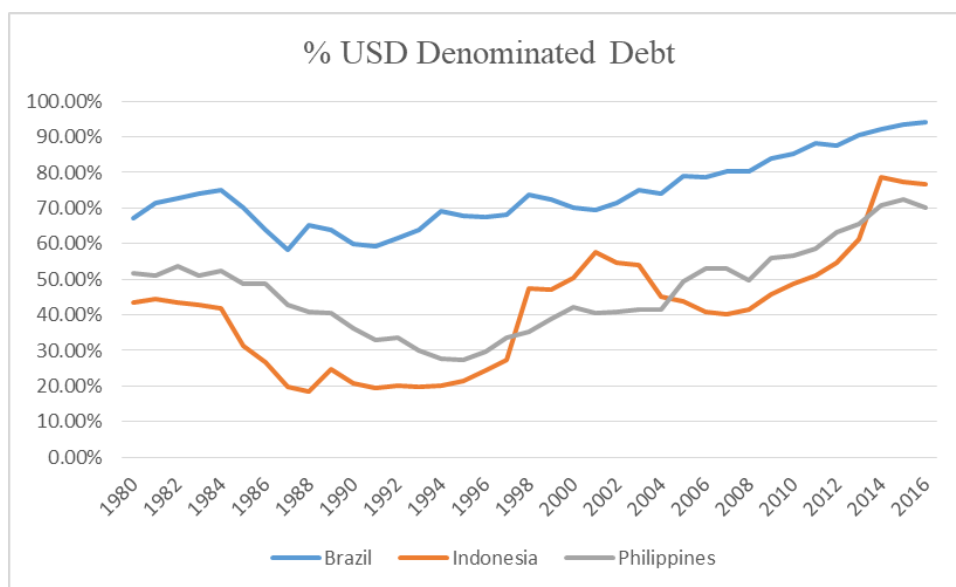
This study examined how emerging market economies reacted to different scenarios of global growth. The prediction was that when the United States and world economies moved together, EM economies would react directly to fluctuations in these economies. If the United States and rest of world were expanding, the EM economies would benefit while if they were contracting, the EM economies would suffer. However, in times of divergence, the relationship would be inverse. The theory is that an expanding United States economy and stagnant rest of the world would have very negative impacts on EM economies, as they would experience higher interest rates on their USD denominated debt with muted demand from the rest of the world for exports. The opposite of this was also proposed. When the United States is contracting while the rest of the world is expanding, EM economies should benefit from lower interest rates and higher global demand. The countries selected in this study were Brazil, Indonesia, Philippines, Turkey, and Korea due to their high levels of USD denominated debt, relatively low or controlled inflation, and their trade relationship with the United States. Economic health indicators studied were GDP growth, export growth, unemployment, and national income growth. Country specific exchange traded funds were also studied to see if this prediction could present a viable trading strategy.

The study found that this prediction was accurate for GDP growth and export growth, but did not find significant results for unemployment or national income growth. Also, it was apparently from viewing the EM data that there was no relationship between the prediction and outcome for EM ETFs.

Appendix

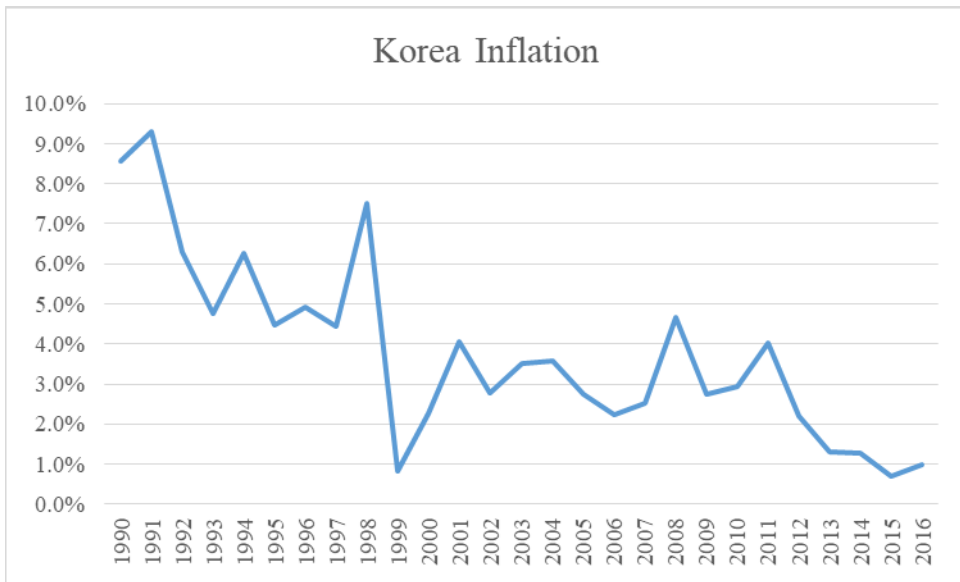
Selection Data

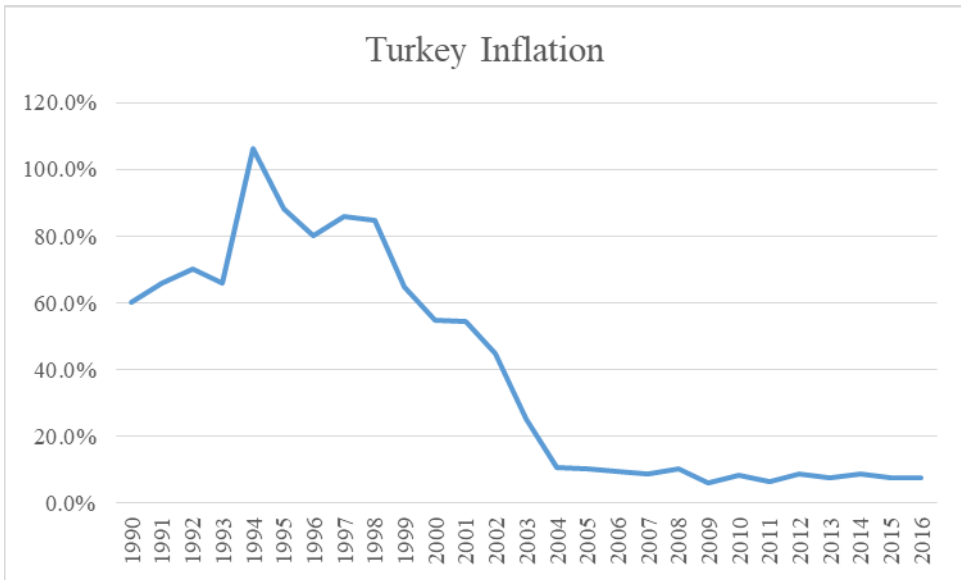
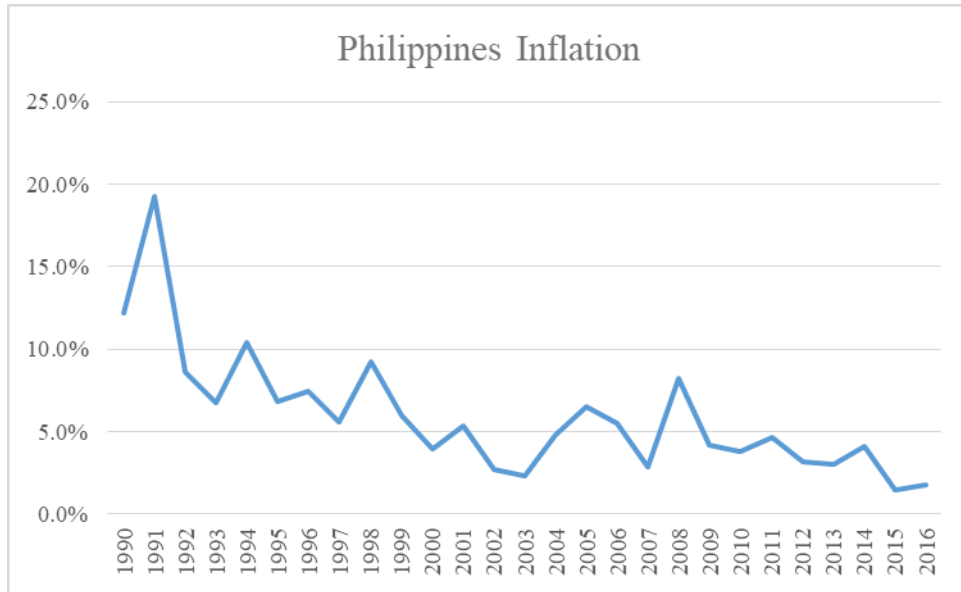
USD Denominated Debt



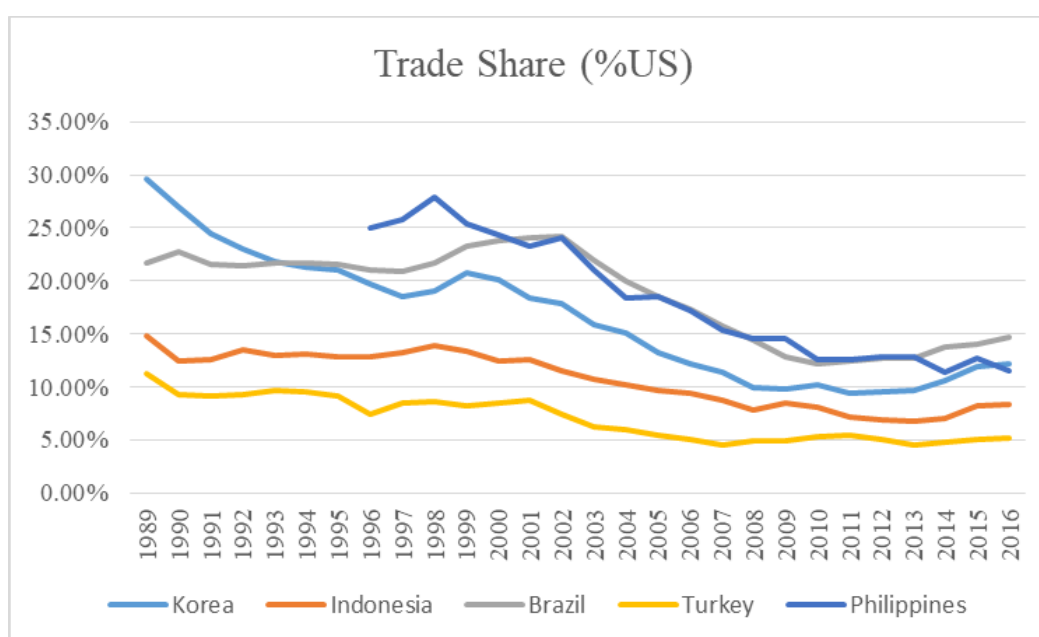
Inflation Data







Trade Shares



Note: Philippines trade share data begins in 1996 due to data availability.

Rolling Correlation

Rolling Correlation, US versus EMEs' Basket					
Year	Korea	Brazil	Turkey	Phi	Indo
1988	-0.74	-0.83			-0.72
1989	-0.78	-0.83			-0.77
1990	-0.41	-0.65			-0.37
1991	-0.05	-0.21			-0.04
1992	-0.06	-0.24		-0.04	-0.04
1993	-0.85	-0.62		-0.81	-0.81
1994	-0.47	0.12		-0.50	-0.51
1995	-0.67	-0.09	0.05	-0.70	-0.71
1996	-0.24	-0.18	-0.08	-0.24	-0.24
1997	-0.52	-0.55	-0.43	-0.51	-0.51
1998	-0.35	-0.47	-0.76	-0.29	-0.29
1999	-0.34	-0.61	-0.94	-0.22	-0.21
2000	0.68	0.44	-0.86	0.73	0.73

2001	0.58	0.41	-0.67	0.60	0.60
2002	0.70	0.71	-0.78	0.69	0.70
2003	0.80	0.44	-0.42	0.88	0.88
2004	0.81	0.60	-0.02	0.86	0.86
2005	0.72	0.68	0.29	0.73	0.72
2006	0.48	0.49	-0.12	0.48	0.44
2007	-0.44	-0.65	-0.63	-0.23	-0.19
2008	-0.81	-0.78	-0.04	-0.71	-0.68
2009	-0.33	0.07	0.68	-0.45	-0.47
2010	-0.08	0.34	0.77	-0.20	-0.22
2011	0.52	0.76	0.86	0.42	0.38
2012	0.34	0.45	0.59	0.37	0.36
2013	0.25	0.52	0.73	0.14	0.11
2014	0.10	-0.13	-0.53	0.21	0.23
2015	-0.06	-0.32	-0.62	0.09	0.12
2016	-0.04	-0.07	-0.48	-0.17	-0.23

Note: Missing values are due to lack of data.

Convergence Data Points

Convergence				
Basket	GDP Growth	Export Growth	Unemployment	National Income
1.5%	1.1%	6.8%	3.1%	1.0%
-3.9%	-22.9%	-4.7%	1.7%	-1.8%
-1.0%	-17.5%	-4.8%	2.2%	1.0%
13.7%	1.6%	10.6%	2.9%	-1.4%
12.5%	11.6%	21.1%	2.1%	4.0%
4.8%	24.9%	14.2%	0.6%	-0.3%
6.1%	16.0%	11.2%	0.7%	1.7%
16.3%	10.2%	18.0%	-3.0%	2.0%
5.2%	-14.0%	-16.4%	-3.4%	-0.1%
3.5%	-8.0%	-7.7%	-3.7%	1.6%
7.7%	7.4%	17.9%	-0.7%	-0.4%
-9.8%	-13.3%	-19.9%	1.3%	2.3%
-2.2%	11.4%	-5.1%	2.3%	-1.4%
8.7%	9.5%	-3.7%	2.7%	-0.9%
9.7%	-1.1%	6.1%	3.1%	-3.4%
2.0%	0.8%	11.4%	4.4%	-2.2%
0.0%	17.0%	4.7%	3.5%	2.4%

6.1%	6.7%	14.4%	0.9%	1.9%
-7.3%	-14.1%	-21.3%	0.5%	-1.9%
-0.7%	5.2%	-1.5%	-0.2%	4.3%
10.0%	2.7%	10.1%	0.1%	-2.5%
10.8%	3.4%	21.4%	0.2%	-0.5%
3.4%	8.4%	1.8%	0.2%	-3.3%
3.0%	3.6%	5.9%	0.0%	-0.9%
15.4%	0.8%	14.2%	-0.1%	-3.9%
7.7%	-10.6%	8.6%	2.8%	4.0%
-9.3%	-14.2%	-17.7%	2.6%	-2.9%
-1.9%	-1.6%	0.0%	3.1%	-0.9%
8.7%	-5.1%	-1.3%	3.0%	3.4%
9.9%	0.6%	3.0%	3.4%	-1.4%
2.5%	4.5%	-2.4%	-0.7%	0.9%
0.8%	10.3%	15.8%	-0.4%	-1.6%
13.3%	4.0%	-2.7%	-1.4%	-14.5%
-				
11.5%	-25.9%	-28.1%	3.5%	-8.5%
1.5%	9.5%	-2.2%	1.6%	4.1%
11.3%	-2.4%	6.1%	-0.3%	2.3%
-3.8%	-5.3%	2.6%	-1.0%	-2.4%
4.7%	-1.5%	-7.8%	-0.4%	0.3%

Divergence Data Points

Divergence				
U.S. - Basket	GDP Growth	Export Growth	Unemployment	National Income
-7.5%	4.1%	19.9%		-1.5%
8.4%	20.5%	-2.9%		10.3%
-7.6%	0.3%	-14.7%		-15.4%
-1.3%	1.0%	1.2%	0.2%	1.3%
12.4%	-4.4%	3.2%	0.8%	0.4%
7.8%	-10.5%	-9.6%	3.9%	-3.8%
0.5%	-38.9%	-16.5%	3.9%	-5.5%
-10.0%	17.9%	12.2%	0.1%	3.1%
-15.9%	13.1%	14.5%	-1.4%	2.0%
-13.4%	0.5%	4.8%		0.2%
6.7%	1.5%	10.3%		-0.9%
-8.9%	12.9%	0.8%	-2.6%	3.9%

-4.5%	1.4%	2.1%	1.2%	3.9%
-7.3%	3.7%	9.1%	-3.2%	2.6%
13.5%	-15.6%	3.6%	-2.1%	1.4%
-12.4%	7.5%	10.4%	1.6%	-2.2%
-6.9%	-4.8%	-23.6%	1.1%	3.6%
-11.6%	25.7%	16.2%		7.3%
6.8%	14.6%	-5.4%		0.5%
0.6%	5.7%	-4.9%		2.8%
-6.8%	1.3%	1.2%	-0.6%	1.8%
-4.6%	8.9%	6.1%	-1.0%	4.6%
-8.3%	13.0%	21.5%	-1.4%	3.1%
12.6%	-15.8%	-2.3%	-0.9%	-1.5%
-5.9%	1.9%	8.7%	-0.3%	0.9%
-16.2%	-19.8%	5.3%	-0.3%	-6.4%
-8.8%	-5.6%	0.5%	0.5%	-4.8%
-4.7%	9.6%	18.9%	0.0%	0.7%
-7.5%	7.4%	28.2%	0.0%	-0.3%
13.1%	-8.9%	13.0%	-0.6%	-0.9%
-13.0%	8.4%	-6.6%	-1.1%	1.9%
-7.3%	-11.6%	-17.8%	-0.9%	2.7%
13.5%	-5.6%	4.7%	-2.3%	4.9%
4.9%	35.0%	-3.7%	-2.2%	1.1%
8.2%	-17.4%	-25.1%	-1.4%	-8.3%
14.6%	-3.5%	1.5%	-2.6%	0.8%
2.6%	-36.9%	-10.6%	-0.7%	-12.1%
-4.5%	8.8%	-1.1%	1.3%	2.0%
-15.9%	20.6%	17.4%	1.4%	2.9%
-11.0%	12.1%	12.5%	-0.2%	1.4%
2.1%	-12.0%	-4.8%	0.8%	-0.5%
18.9%	-18.2%	-19.6%	1.1%	-1.0%
2.7%	-9.8%	-14.7%	1.7%	

Regression Output (Convergence)

GDP Growth Statistics

R Square	0.2237
SE	0.0996
Observations	38

Unemployment Rate Statistics

R Square	0.0548
SE	0.0199
Observations	38

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
--	--------------	-----------	---------------	----------------

Intercept	-0.0257	0.0185	-1.3838	0.1750
Basket Growth	0.7464	0.2317	3.2213	0.0027

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
--	--------------	-----------	---------------	----------------

Intercept	0.0124	0.0037	3.3531	0.0019
Basket Growth	-0.0668	0.0462	-1.4446	0.1572

Export Growth Statistics

R Square	0.4940
Standard Error	0.0874
Observations	38

National Income Growth Statistics

R Square	0.0014
Standard Error	0.0359
Observations	38

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
--	--------------	-----------	---------------	----------------

Intercept	-0.0266	0.0163	-1.6352	0.1107
Basket Growth	1.2051	0.2033	5.9282	8.67E-07

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
--	--------------	-----------	---------------	----------------

Intercept	-0.0060	0.0067	-0.8949	0.3768
Basket Growth	0.0190	0.0835	0.2280	0.8210

Regression Output (Divergence)

<i>GDP Growth Statistics</i>	
R Square	0.1423
SE	0.1409
Observations	43

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.0055	0.0218	-0.2526	0.8018
US - Basket	-0.5829	0.2235	-2.6081	0.0126

<i>Export Growth Statistics</i>	
R Square	0.1325
Standard Error	0.1184
Observations	43

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.0070	0.0183	0.3825	0.7041
US - Basket	-0.4701	0.1878	-2.5028	0.0164

<i>Unemployment Rate Statistics</i>	
R Square	0.0026
SE	0.0167
Observations	35

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.0019	0.0029	-0.6499	0.5202
US - Basket	-0.0084	0.0286	-0.2928	0.7715

<i>National Income Growth Statistics</i>	
R Square	0.0029
Standard Error	0.0472
Observations	42

	<i>Coeff</i>	<i>SE</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.0012	0.0074	0.1643	0.8703
US - Basket	-0.0258	0.0750	-0.3438	0.7328

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17. BlackRock. "iShares MSCI Brazil ETF." iShares by BlackRock

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