



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Divya Siddarth	Project Number J1611
Project Title Global Shock: A Mathematical Model to Ascertain Correlation in Worldwide Stock Markets	
Abstract Objectives/Goals The purpose of my project is to determine the mathematical relationships between the stock market indices of several countries in 2000 and 2008 and to examine the change in these relationships with time. This analysis will show whether a global risk diversification strategy can be equally effective in 2000 and 2008. Methods/Materials I downloaded weekly closing prices of the stock market indices for ten countries, namely the U.S., China, India, Japan, Germany, England, France, Canada, Mexico, and Brazil for the years 2000 and 2008. Because the range of values of each stock market index is different, I standardized each country's weekly price by subtracting the mean and dividing by the standard deviation. In order to limit the number of comparisons for each country, c, I created a Global Index by averaging the standardized stock market indices of countries other than c for the same week. The relationship can be represented by the equation $SMI_{cw} = a_c + b_c * GI_{cw}$, where SMI_{cw} is the standardized value of the Stock Market Index of country c for week w and GI_{cw} is the Global Index created as above for the same week. I estimated the regression coefficients a_c and b_c for each country by the method of least squares. To examine the effect of the 2008 stock market meltdown, I also compared the estimation results from the first and second halves of 2008 for the U.S.-based Dow Jones Industrial Average. Results The stock market indices of all these countries were highly correlated with the global index in 2008. I obtained r-squared values between 0.88 and 0.98. In contrast, the correlations were lower in 2000, with r-squared values between 0.04 and 0.68. I also found that the correlation between the Dow Jones Industrial Average and the global index was noticeably higher in the second half of 2008 compared to the first half of 2008. Conclusions/Discussion These findings show an increase in the interdependence of global economies with time. One implication of these results is that a global risk diversification strategy would have been much less effective in 2008 compared to 2000. In addition, my analysis suggests that even the stock markets of the world's largest economies are not insulated from the markets of other, smaller, countries. Therefore, it is likely that countering the effects of a global recession would be more successful if the efforts to stimulate individual economies were globally coordinated.	
Summary Statement My project determines the mathematical relationships between stock market indices of several different countries and analyzes how these relationships have changed over time.	
Help Received My mother showed me where to download stock market data from the Web and showed me how to run a linear regression.	