More Diversification, Less Contagion

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Abstract

This study investigates the relationship between international portfolio diversification and contagion. Previous studies have argued that they are related. However, people cannot reach a consensus on the sign of correlation. I employ a fixed-effect panel data regression to show that those countries with higher home bias, and therefore less portfolio diversification, are associated with a greater contagion during financial crisis in 2008. To understand why this may be the case, I present an international mean-variance portfolio model with home bias constraints on the framework and flexible information frictions. Simulations of the model are consistent with the empirical findings in that financial globalization should lead to reduce contagion.

Keywords: Contagion, Portfolio diversification, Home bias, Crisis.

¹ I am extremely grateful to Professor Nelson Mark for his guidance and support during the past two years. All errors are mine.
1. Introduction

Over last decade, the progress of financial globalization has led to increased diversification of portfolios of international investors. The classical asset pricing model, based on traditional portfolio theory developed by Sharpe (1964) and Lintner (1965), predicts that to maximize risk-adjusted returns investors should hold the world market portfolio of risky assets. Moreover, the diversification process can also be rationalized by the motivation of hedging the domestic risks of stock market.

However, portfolio diversification may be a less effective risk hedging method than previous thought. Investors attempt to diversify their portfolio internationally because they believe that the cross-market co-movement is tolerable. Otherwise, putting eggs in several baskets will be meaningless because they are basically still in the same basket due to the high correlation across markets. In this sense, we worry about the high interdependence of world stock markets.

What is worse, the high interdependence might be exacerbated by the contagion effect. Contagion refers to the idea that a crash in one country’s market causes subsequent but nearly simultaneous crashes in other countries. The process can be captured by a sudden increase in the cross-market correlation coefficient during the shock. In fact, during the 2008 financial crisis and 2000 dot-com crash, returns on virtually all markets were nearly perfectly correlated with the U.S. market in short period.
Many literatures have investigated the cause of contagion, which is a natural enemy of diversification. Soydemir (2000) thinks that the underlying economic fundamentals and trade links to be a determinant of differences in transmission patterns by estimating a four-variable VAR model. Ozcan and Unsal (2011) draw a similar conclusion by stating that the greater is a country’s trade integration with the rest of the world, the greater is the response of its macroeconomic aggregates to a sudden stop of capital flow and therefore the bigger financial spillover from global to the domestic market. Kalemli-Ozcan et al. (2013) suggests that financial crises induce co-movement among more financially integrated countries using a simple general equilibrium model of international business cycles with banks and shocks to banking activity. Calvo and Mendoza (2000) uses a mean-variance model to show that contagion is an outcome of financial globalization because investors are no longer interested in gathering country-specific information, which makes the rumors more influential. Salim et al. (2013) find that investors’ local bias creates market segmentation that could destabilize financial markets by creating excess co-movement and local contagion.

We note that predictions on the relationship between the diversification and contagion Calvo and Mendoza (2000) and Salim et al. (2013) are conflicting with each other. If more portfolio diversification caused increased contagion, we may seriously reconsider whether such diversification is useful since this may partially eliminate the heterogeneous behaviors across markets and create a more uniform world market. In contrast, if portfolio diversification can eliminate the market
interdependence, we can rationalize the globalization process in recent years since the preference of local equity in fact can cause the contagion.

In this paper, I present the empirical evidence that the progress of portfolio diversification has coincided with a world market with less sizable contagion. In other words, we can attain risk hedging by portfolio diversification. A theory is then developed to understand a potential causal mechanism behind the empirical results.

In the empirical part, it is important to identify an indirect approximation for the contagion and level of diversification since the direct measurement is hard to obtain. In this paper, I will use the equity home bias to estimate how heavy the preference of local equity over international stocks for the investors of a specific country. Then I can deduce how diversified their portfolios are. The change of moving cross-market correlation coefficients with the origin of shocks, the U.S. stock market, is used to estimate the dependent variable, contagion. The definition of contagion accepted in this paper is a significant increase in cross-market linkages after a shock to one country. I accordingly employ a difference-in-difference method with fixed effects under the framework of panel data regression. The countries with home bias higher than the world average and the crisis time during the last decade are identified as dummy variables. Therefore the treatment effect of the two dummies is sufficient to show measures if the high home bias countries during the crisis time have a more sizable contagion than lower home bias countries. I find that during the period of the 2008 financial crisis, the level of diversification is significantly negatively correlated to the size of contagion. This implies that diversification is good for avoiding contagion during the global financial shocks.
In the theoretical part, I extend the mean-variance framework of Calvo and Mendoza (2000). The implications of their model are inconsistent with my empirical results. However, I show how a slight and reasonable modification of their model reverses their original predictions and becomes consistent with the data.

Specifically, I allow a flexible information cost and prohibit the short selling behavior on the domestic market. In the model investors are maximizing their expected utilities by choosing the optimal allocation between domestic and international markets. This indeed reflects their home and international preferences, which is in line with my empirical model. The size of contagion is solely determined by whether the investors want to purchase costly information. Once the country-specific information is obtained, the returns of the market are predictable with no variance. Otherwise, an investor has to tolerate a normal variance of returns penalizing the expected utility but saving the information costs. The reason why the diversification can trigger a contagion in the original model is that as more countries are included into the portfolio, the variance of the international markets decreases. Since the market is automatically more predictable while the cost of information is still fixed, investors will refuse to buy the information and therefore generate the contagion.

However, in my model, the information cost becomes less costly as financial globalization increases. In this case, I show that under a framework of flexible information, higher international diversification results in less contagion.

The remainder of the paper is organized as follows. Section 2 introduces the observations on cross-market correlations that motivate this research. Section 3
examines the empirical relationship between contagion and portfolio diversification. Section 4 explore the same correlation theoretically and analyze under which condition the theoretical model can match the empirical results. Section 5 concludes this study.

2. Motivations

The financial crisis in 2008 provides us with an opportunity to study the international transmission of shocks on stock price. The major the stock markets around the world are more or less co-move with the U.S. market. So it is interesting to know how does these correlations country-specific change before, during and after the shock. If the correlations behave differently, is there a common explanation on why they have heterogeneous movements?

Figure 1 plots the moving correlation coefficients of stock market weekly returns for four countries with the U.S. market from 2008 to 2009. Each observation reflects the level of correlation in past eight weeks. The most critical event during the time span is the bankruptcy of Lehman Brothers on September 15th, 2008, which kicked off the collapse of markets across the world. Before the date, we can observe that the markets in UK and Germany run persistently high correlation coefficients with the U.S. while stock market returns in Japan and Hong Kong have somewhat lower correlation with the U.S. However, the two groups converge at the very high level of correlation on the shadow part (From Sept 15th, 2008 to May 15th, 2009). During the nine months of crash, all markets tie closely with the U.S. market until the time when they diverge into two groups again.
This observation is meaningful in studying the interdependence of world markets. It is because those four economies are all well developed and integrated with the world market. However, their domestic markets correlate with the U.S. in two distinct ways. The markets in the first group are highly correlated with the U.S. in both stable and crisis time. Others in the second group are barely correlated with the U.S. in stable time but greatly co-move with the U.S. during the crisis time. In other words, the two groups differ in the size of contagion, or the change of interdependence after shock. I will formally define contagion in the next section.

Calvo and Mendoza (2000) theoretically show that contagion can result from the increase in the level of diversification in investors’ portfolio. That implies that the more biased on home equity, the less sizable in contagion. In the next section, I discuss how I construct my measure of home bias.

In figure 2-A I plot the relationship between home bias and the increase in correlation coefficients for 14 markets during the financial crisis in 2008. The result exhibits a positive correlation between home bias and size of contagion, which contradicts to the theoretical model.
In figure 2-B I plot the relationship between home bias and the persistency of contagion, which is measured as the number of days passed before the correlation coefficients return to the middle value between the highest level and ten-year average after the financial shock. It shows that the high home bias is associated with shorter contagion period. In figure 1 we know that after the shock, two groups of countries finally diverge in the level of interdependence with the U.S. market. This figure tells us the high home bias market is less persistent in high correlation.

In summary, with simple data analysis, I find world markets tie up with the U.S. market in different ways. Moreover, there exists a relationship between the level of diversification and change of interdependence and the sign of correlation is different from a theoretical model. To further understand the case, I need to use econometric model to identify a significant correlation and theoretically explain why the model does not match the data.

3. Empirical evidences
In this section, I provide the evidence of the link between the diversification of portfolio and contagion. I will first show how to construct measures of diversification and contagion. Then I explain the empirical model and analyze the major findings. Last I compare the model estimation and the similar or contradicted results from previous literatures.

3.1 Data

Obviously, it is impossible to find the data that directly measures the country-specific diversification of portfolio and size of contagion. I have to use the readily available dataset as an indirect measurement for regressors.

3.1.1 Measuring the level of diversification

To calculate the level of diversification for a specific country, it is difficult to study the amount of equity that one country holds from other countries’ markets even if the data is available. It is useless to construct a $n \times n$ (n = number of countries) matrix to show the multilateral holding conditions, because the distribution of home fund on international markets cannot reflect how portfolios are diversified. However, if the cross-border holdings statistics is available, I can estimate the amount of domestic equity held by home investors. If the home investors have a strong preference of home equity over international stocks, I can infer that the level of diversification of this country is low. Conversely, if the home investors hold a relatively small fraction of home equity than international stocks, the level of diversification in turn is high. In other words, the level of diversification is negatively correlated with the home preference.
To estimate the home preference, there are two methods of estimations. The first is a simple one, that is

\[ HP_{it} = 1 - \frac{FE_{it}}{CAP_{it}}. \]

Here \( i \) is the country index and \( t \) is the time index. HP denotes the level of home preference, \( FE \) measures the total foreign equity in portfolio and \( CAP \) measures stock market capitalization. The calculation is simple but problematic. On the one hand, considering the denominator, we know that the domestic market contains equity held by foreign investors and the foreign markets also contain equity held by domestic investors. So if I use the stock market capitalization as an approximate of the total value of equity, the result will be erroneous. However, the error should be small because the difference of the domestic and foreign holdings, compared to market capitalization, is negligible in most cases.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full name</th>
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<tbody>
<tr>
<td>HP</td>
<td>Home preference</td>
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<tr>
<td>HB</td>
<td>Home bias</td>
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<tr>
<td>FE</td>
<td>Total foreign equity in portfolio</td>
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<td>(W) CAP</td>
<td>(World) Stock market capitalization</td>
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<td>%FE</td>
<td>Percentage of foreign equity in portfolio</td>
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<tr>
<td>SHARE</td>
<td>Domestic market share</td>
</tr>
<tr>
<td>F2D</td>
<td>Foreign equity held by domestic investors</td>
</tr>
<tr>
<td>D2F</td>
<td>Domestic equity held by foreign investors</td>
</tr>
</tbody>
</table>

There is a second problem with this definition that may be more serious. Considering American and Swedish investors are all holding 30 percent of foreign equity in their portfolio. Their preference is the same. However, the constructed variable does not precisely reflect the true level of diversification due to differential
size effects. For American investors, if they allocate their money proportionally to the international market size, they will invest about 35 percent in the domestic market. However, in the same case, Swedish investors should invest less than 1 percent at home. So given the same level of the foreign holdings, American investors have a weaker home preference than Swedish investors. This motivates me to calculate a second form of home preference in which the total amount of foreign equity is weighted by country-specific market share. That is home bias. The equation of home bias is given by:

\[ HB_{it} = 1 - \frac{\%FE_{it}}{\frac{1}{1 - SHARE_{it}}} \]

where the \( \%FE_{it} \) is estimated as:

\[ \%FE_{it} = \frac{FE_{it}}{CAP_{it} + F2D_{it} - D2F_{it}} \]

Previously, a major hindrance in the research on international diversification has been the poor quality of cross-border holding estimates. This problem will not be solved until International Money Fund releases the Coordinated Investment Portfolio Survey (CIPS), which provides us a high quality dataset to study the cross-border holdings of securities and derived liabilities based on the creditor data. The dataset comprises the individual economy tables of residents' holdings of securities issued by nonresidents (reported data) and the derived data for nonresidents' holdings of securities issued by residents (derived data) in matrix form. With this data, I can select countries of interests and collect the total foreign equity in portfolio (FE), foreign equity held by domestic investors (F2D) and domestic equity held by foreign investors (D2F) respectively.
For computing the market share by country, I need time-series data of market capitalization for major markets. The dataset provided by World Federation of Exchanges record the market capitalization of 65 emerging and developed countries from the end of 1990 to the end of 2010. I compute the domestic market share (SHARE) by:

$$\text{SHARE}_{i,t} = \frac{\text{CAP}_{i,t}}{\text{WCAP}_t},$$

where the world market capitalization ($\text{WCAP}_t$) is given by

$$\text{WCAP}_t = \sum_{i=1}^{65} \text{CAP}_{i,t}.$$

Then I compute the country-specific home bias rate from 2001 to 2010 following the algorithm discussed above.

3.1.2 Measuring the contagion

Before discussing the measurement, it is necessary to define contagion. There is widespread disagreement about what this term entails, and in this paper I use the same definition as Forbes and Rigobon (2002).

Hence contagion as a significant increase in cross-market linkages after a shock to one country. In other words, it is only contagion if cross-market co-movement increases significantly after the shock.

Indeed several other definitions are used sometimes in recognizing contagion. Some people use the high correlation as an indicator of contagion. According to definition in this paper, if two markets show a high degree of correlation during periods of stability, even if the markets continue to be highly correlated after a
shock to one market, this cannot be identified as a contagion. For the correlation across the market, I concern about the increment rather than the stock part.

Even though the definition of contagion is similar to the sensitivity of correlation in response to the market shock, I still need to find the correlation across markets and use the econometric approach to estimate the sensitivity.

The data contains the weekly returns of 15 stock markets from 2001 to 2010. During the decade, two worldwide crises take place. One is the so-called dot-com crash from March 2000 to October 2002. The other is the financial crisis from June 2008 to March 2010.

Since both of the crises originated from the U.S. and stock market in New York is the most influential and dynamic market in the world, I calculate the moving correlation coefficients of returns between the U.S. market and other 14 major markets, that is

\[ \text{Correl}_{t} = \frac{\text{Cov}(r_{\text{US},t}, r_{i,t})}{\sigma_{\text{US},t} \sigma_{i,t}} \]

where the weekly returns of the stock market \( r \) is given by:

\[ r_{i,t} = \frac{\text{INDEX}_{i,t}}{\text{INDEX}_{i,t-1}} \times 100\% \]

At this point, I have completed all the data construction needed for the econometric regression. I have the correlation coefficients for estimating contagion, and home bias (preference) for approximating level of diversification of 14 countries over 11-year period. Next section I will discuss panel data regression model that I employ.
### Table 2 Home bias of major markets last decade

<table>
<thead>
<tr>
<th>Country</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
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<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tr>
<td><strong>High</strong></td>
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<tr>
<td>Australia</td>
<td>82.58%</td>
<td>81.00%</td>
<td>83.27%</td>
<td>84.59%</td>
<td>82.33%</td>
<td>82.03%</td>
<td>78.69%</td>
<td>76.59%</td>
<td>79.79%</td>
<td>79.33%</td>
</tr>
<tr>
<td>Belgium</td>
<td>54.79%</td>
<td>46.75%</td>
<td>46.78%</td>
<td>54.34%</td>
<td>49.55%</td>
<td>49.74%</td>
<td>43.23%</td>
<td>33.93%</td>
<td>39.82%</td>
<td>42.43%</td>
</tr>
<tr>
<td>Brazil</td>
<td>98.06%</td>
<td>97.70%</td>
<td>98.60%</td>
<td>99.14%</td>
<td>99.25%</td>
<td>99.31%</td>
<td>99.38%</td>
<td>98.96%</td>
<td>98.99%</td>
<td>98.74%</td>
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<tr>
<td>India</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>99.99%</td>
<td>99.99%</td>
<td>99.96%</td>
<td>99.93%</td>
<td>99.81%</td>
<td>99.85%</td>
<td>99.92%</td>
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<tr>
<td>Japan</td>
<td>88.48%</td>
<td>88.59%</td>
<td>89.22%</td>
<td>88.04%</td>
<td>89.00%</td>
<td>86.43%</td>
<td>84.45%</td>
<td>85.34%</td>
<td>80.39%</td>
<td>81.39%</td>
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<tr>
<td>Korea</td>
<td>99.23%</td>
<td>99.05%</td>
<td>98.55%</td>
<td>97.04%</td>
<td>97.33%</td>
<td>94.26%</td>
<td>88.90%</td>
<td>88.70%</td>
<td>89.30%</td>
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<tr>
<td>Mexico</td>
<td>100.00%</td>
<td>100.00%</td>
<td>99.50%</td>
<td>97.78%</td>
<td>98.13%</td>
<td>97.78%</td>
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<td><strong>Swing</strong></td>
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<tr>
<td>Canada</td>
<td>71.63%</td>
<td>69.49%</td>
<td>71.45%</td>
<td>75.47%</td>
<td>75.70%</td>
<td>71.92%</td>
<td>72.95%</td>
<td>67.18%</td>
<td>71.68%</td>
<td>72.53%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>81.50%</td>
<td>80.44%</td>
<td>74.32%</td>
<td>73.10%</td>
<td>70.74%</td>
<td>66.08%</td>
<td>61.48%</td>
<td>80.23%</td>
<td>56.91%</td>
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<td><strong>Low</strong></td>
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<tr>
<td>Germany</td>
<td>66.43%</td>
<td>58.69%</td>
<td>61.60%</td>
<td>58.16%</td>
<td>56.01%</td>
<td>50.11%</td>
<td>52.35%</td>
<td>47.86%</td>
<td>45.52%</td>
<td>47.32%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>40.93%</td>
<td>42.11%</td>
<td>30.81%</td>
<td>25.69%</td>
<td>31.52%</td>
<td>35.00%</td>
<td>43.90%</td>
<td>29.50%</td>
<td>28.31%</td>
<td>31.77%</td>
</tr>
<tr>
<td>Singapore</td>
<td>70.59%</td>
<td>61.00%</td>
<td>67.70%</td>
<td>67.82%</td>
<td>66.44%</td>
<td>50.06%</td>
<td>46.30%</td>
<td>39.98%</td>
<td>41.06%</td>
<td>36.95%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>62.69%</td>
<td>60.57%</td>
<td>59.34%</td>
<td>58.89%</td>
<td>58.85%</td>
<td>59.95%</td>
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<tr>
<td>Belgium</td>
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<td>43.23%</td>
<td>33.93%</td>
<td>39.82%</td>
<td>42.43%</td>
</tr>
<tr>
<td>UK</td>
<td>69.88%</td>
<td>68.49%</td>
<td>67.66%</td>
<td>64.13%</td>
<td>60.25%</td>
<td>59.27%</td>
<td>56.47%</td>
<td>50.08%</td>
<td>54.83%</td>
<td>55.04%</td>
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<tr>
<td>US</td>
<td>76.93%</td>
<td>77.05%</td>
<td>74.82%</td>
<td>74.15%</td>
<td>70.11%</td>
<td>68.29%</td>
<td>66.83%</td>
<td>66.42%</td>
<td>65.69%</td>
<td>64.27%</td>
</tr>
<tr>
<td>World</td>
<td>80.52%</td>
<td>79.03%</td>
<td>77.72%</td>
<td>76.64%</td>
<td>75.21%</td>
<td>72.91%</td>
<td>73.24%</td>
<td>70.76%</td>
<td>72.32%</td>
<td>72.34%</td>
</tr>
</tbody>
</table>
3.2 Model

I use the subscripts \( i \) and \( t \) to index the country and year. The basic regression equation is

\[
\text{Correl}_{i,t} = \beta_0 + \beta_1 \text{Crisis}_{i,t} + \beta_2 \text{HB}_H^H_{i,t} + \beta_3 \text{Crisis}_{i,t} \cdot \text{HB}_H^H_{i,t} + c_i + W_t + \varepsilon_{i,t}
\]

\text{Correl}_{i,t} \text{ is the correlation coefficient of the stock market returns between the country } i \text{ and the U.S. markets. } \varepsilon \text{ is the error term. I also create two dummy variables, Crisis}_i^t \text{ and HB}_H^H_{i,t}. \text{ The dummy Crisis}_i^t \text{ identifies the crisis time, specifically}

\[
\text{Crisis}_{i,t} = \begin{cases} 
1 & \text{when a worldwide market crash taking place} \\
0 & \text{when worldwide markets are in stable period.}
\end{cases}
\]

And the dummy HB}_H^H_{i,t} \text{ identifies the countries with home bias above the world average, specifically}

\[
\text{HB}_H^H_{i,t} = \begin{cases} 
1 & \text{if the home bias of country } i \text{ is above the world average} \\
0 & \text{if the home bias of country } i \text{ is below the world average.}
\end{cases}
\]

The fixed-effect \( c_j \) controls for time-invariant 15 country characteristics, \( W_t \) accounts for worldwide time effects. In expansion form of time and country fixed-effect variable, I in fact take

\[
W_t = \sum_{t=2}^{T} w_t \lambda_t
\]

\[
c_i = \sum_{t=2}^{T} c_t \delta_t
\]

where \( \delta_t \) is the coefficient for the binary time regressors and \( \lambda_t \) is the coefficient for the binary country regressors. \( w_t \) and \( c_t \) is time and country as binary variable.
This model basically is a difference-in-difference estimation under the framework of panel data regression with fixed effects. I select this approach of regression because of my definition of contagion. Again, contagion is the increase in cross-market linkages after a shock to one country. Hence I create a dummy to make distinction between crisis and non-crisis period. I am also interested in the difference of contagion of countries with various level of diversification. So I create a dummy to tell whether a country has a stronger preference of home equity than the world average. In other words, I take the countries with high home bias as a treatment group and countries with lower home bias as a control group. I want to show once there is a policy change (shock) exerting on the world markets, how sensitive the two types of markets will be in terms of the correlation coefficient.

Accordingly, in our econometric framework, the parameter $\beta_1$ measures during the crisis, if there is an increase in correlation (contagion) in all of the world markets. The parameter $\beta_2$ measures during the whole time period, if there exists a difference between the countries with high and low home bias in correlation. The parameter $\beta_3$, which is the most important result, measures if the high home bias countries during the crisis time have a larger contagion than lower home bias countries.

3.3 Findings

The results reported in the table 3 contain three periods. The first one is for the second half of last decade, which is notable because of the financial crisis in 2008. The second period is for the first half of last decade, during which the dot-com crisis crashes the market. The third one includes the full decade from 2001 to 2010.
For all those three periods, each one contains three groups. The first group has no fixed effects in the model. The second group has a time effect and the third one has both time and country effects.

The results first of all confirm there exists a contagion effect after a shock in the U.S. market. For example, during the time span of 2006 to 2010 with time effect, the correlation coefficients in crisis time climbs 25.6% with significant level of 0.05. This sharp increase applies to all countries regardless their diversification level in the portfolio. For the two halves of decades, the contagion persists because the parameter $\beta_1$ rises more than 25% in both specifications.

Furthermore, we can also confirm that the countries with high home bias have a relatively lower correlation with the U.S. during the whole time span. For example, the full period regression with time effect shows that the correlation coefficient for high home bias countries is 15% less than low home bias country with a level of significant of 0.01.

We notice that if I add the country effect dummy into the model, the sign of $\beta_2$ becomes positive. This is because the specification reports the variation within the countries over times. However, we have only two markets that the home bias swings back and forth around the world average during the last decade. It tells us that for those two markets, specifically Hong Kong and Canada, home bias is positively associated with the correlation coefficient with the U.S. market across the time. We must understand that a positive $\beta_2$ obtained by the model with a country effect does not contradict to the previous results. If I fix the time and compare the correlation coefficients by country, those markets with high home bias have a lower
level of co-movement with the U.S. market. However, if I fix the country and compare the correlation coefficient by time, when the particular country's home bias is high, its co-movement with the U.S. market will be high as well.

To further study the two swing markets, I run a very similar regression but dropping the treatment term \((\text{Crisis}_{lt} \cdot \text{HB}^{H}_{lt})\) and using the abridged data of Hong Kong and Canada. The results are reported in Table 4.

We notice that Hong Kong's market has no significant contagion under the shock of the U.S. market. Notably, its co-movement with the U.S. market solely depends on the change of home bias over the decade. In the year of 2001, 2002 and 2008, the correlation coefficient between the Hong Kong and the U.S. market is 23.5% higher than the rest of time. For Canada, it has a significant contagion over the period. However, I can only find the positive relationship between home bias and correlation coefficient in the second half of the last decade.

Most importantly and interestingly, the signs of \(\beta_3\) are distinct in the two specifications reported table 3. During the financial crisis period with time effect, we can conclude that high home bias markets during the crisis time have a 10.5% stronger contagion than lower home bias countries, while during the dot-com crisis period, high home bias markets during the crisis time have a 11.7% weaker contagion than lower home bias countries. So we cannot obtain a significant result of \(\beta_3\) in the specification of the full period.

3.4 Discussions

Even though some results are mixed, we are still able to draw some meaningful conclusions. First, it is obvious that during the latest global crisis, a
diversification of portfolio is helpful in avoiding contagion. Those countries with a lower home bias have a 10% less increase of co-movement as compared to higher home bias markets, during the 2008 financial crisis. This result provides a strong support of the diversification of portfolios for the international investors.

Second, it is true that during the dot-com crisis era, the empirical results exhibit that the diversification is associated with a larger contagion. One interpretation is that a lacking of international diversification or risk hedging exacerbates the bilateral or multilateral infections. In other words, it is the improvement of financial globalization that enables the diversification to be a contagion eliminating approach. In the special case study of Hong Kong, we can double-check this implication because we notice that Hong Kong market will be less correlated to the U.S. market if they cut their home preference. In the theoretical model, I will use an idea of information friction to further explain this case.

Last but not least, contagion, as a significant increase in cross-market linkages after a shock to one country, does exist in our markets in whatever the type of the crises. In Forbes and Rigobon (2002), they reject the existence of contagion by arguing that only interdependence is evident in our markets. My results show that the international market in general is more sensitive to the volatility of the origin of crises during the shock times, compared to the stable period.
Table 3 Treatment effect estimate of relationship between contagion and level of diversification

<table>
<thead>
<tr>
<th>Home Bias</th>
<th>2006-2010</th>
<th>2001-2005</th>
<th>Full period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>0.095***</td>
<td>0.256**</td>
<td>0.227**</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.099)</td>
<td>(0.085)</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>-0.182***</td>
<td>-0.190***</td>
<td>0.045*</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.010)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>0.102***</td>
<td>0.105***</td>
<td>0.128***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.018)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.675***</td>
<td>0.675***</td>
<td>0.800***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.070)</td>
<td>(0.060)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time/Country effect</th>
<th>No</th>
<th>Time</th>
<th>All</th>
<th>No</th>
<th>Time</th>
<th>All</th>
<th>No</th>
<th>Time</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R^2$</td>
<td>0.10</td>
<td>0.35</td>
<td>0.54</td>
<td>0.09</td>
<td>0.24</td>
<td>0.40</td>
<td>0.08</td>
<td>0.17</td>
<td>0.33</td>
</tr>
<tr>
<td>N</td>
<td>3654</td>
<td>3654</td>
<td>3654</td>
<td>3613</td>
<td>3613</td>
<td>3613</td>
<td>7267</td>
<td>7267</td>
<td>7267</td>
</tr>
</tbody>
</table>
Table 4 The swing market without the treatment effect

<table>
<thead>
<tr>
<th>Home Bias</th>
<th>2006-2010</th>
<th>2001-2005</th>
<th>Full period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HK</td>
<td>Canada</td>
<td>Both</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>-0.053</td>
<td>0.225***</td>
<td>0.165***</td>
</tr>
<tr>
<td></td>
<td>(0.064)</td>
<td>(0.031)</td>
<td>(0.031)</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>0.407***</td>
<td>0.099***</td>
<td>0.156***</td>
</tr>
<tr>
<td></td>
<td>(0.074)</td>
<td>(0.037)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.431***</td>
<td>0.601***</td>
<td>0.509***</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.020)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.16</td>
<td>0.18</td>
<td>0.12</td>
</tr>
<tr>
<td>N</td>
<td>261</td>
<td>261</td>
<td>522</td>
</tr>
</tbody>
</table>
4. Theoretical model

I divide the world securities market consisting of $J$ countries ($2 \leq J \leq \infty$) into two parts. One is the domestic market, which has an expected return $r^*$ with variance $\sigma_f^2$. The other is the international market, containing $J-1$ identical countries whose returns follow i.i.d. processes with mean $\mu$ and variance $\sigma_f^2$. The share of the portfolio invested in the international market is $\theta$.

Without loss of generality, I also assume that the correlation coefficient of the returns of portfolio among countries are zero. This implies that in this model, we only focus on the contagion generated by influential bad news triggered by investors’ decreasing incentives to acquire the country-specific information. This is in accordance with the definition of contagion I propose above. It is because the pairwise correlations of returns among countries are heterogenous. I only study the incremental rather than stock in response to the bad news. In other words, by assuming that the correlation coefficients of returns are zero, we can better examine the sensitivity of correlation by looking at variation in the degree of portfolio diversification.

The theoretical model of two markets (international and domestic) is used in this paper because this is in line with the empirical model I propose in the next section. By deciding how to allocate their portfolio, domestic investors in fact are choosing the level of home bias, which indicates their degree of integration to the global markets. Therefore, we can further investigate the correlation between financial integration and the capacity of avoiding contagion.
Next I am going to show the relationship between the globalization process and investors’ incentives to gather the country-specific information when they allocate optimally between domestic and international markets to maximize their utilities.

4.1 Contagion and international diversification

Assuming that an investor has one unit of wealth. Initially, all countries are identical in asset returns and variance (i.e. $r^* = \rho$ and $\sigma_i = \sigma_j = \sigma$). In this case, the share of the portfolio in each country is $1/J$ and the expected return and variance are $\rho$ and $\sigma^2/J$, respectively.

Then consider an environment in which a credible bad news indicating that the domestic expected return is $r$ with $r \leq r^*$, $\sigma^2$ is same, is heard by an investor. The investor can choose whether to pay an information cost, $k$, to acquire and process country-specific information or not. By purchasing the information, the investor will verify the bad news and update the mean and variance of the domestic country. Specifically, the updated mean will be $r'$ and variance will be zero. Before paying $k$, the potential update of the return $r'$ is a random variable draw from a known probability distribution function. If the investor refuses to pay for the information, the expected return will be $r$ since the rumor is credible and the variance will be same. In either case, the moments of international countries are unchanged.

The investor will pay for the costly information only when the gain from the purchase $S = EU^I - EU^U$ is positive. If $EU^I$ does not exceed $EU^U$, due to the lacking of verification, the bad news will be influential, which in turn, drives the contagion. To understand the relationship between globalization and contagion, we only need
to know how the size of market is associated with the difference of the expected utility with and without gaining the costly information.

Consider a mean-variance framework where $\theta^U$, the share of international portfolio without the information, is chosen to maximize:

$$\mathbb{E} U^U = \theta^U \rho + (1 - \theta^U) r - \frac{\gamma}{2} \frac{(\theta^U \sigma^2)}{J - 1} + (1 - \theta^U)^2 \sigma^2.$$ 

Case 1: corner solutions, uninformed

Due to the short-selling constraints, I restrain the range of $\theta^U$ in a particular interval. $-a \leq \theta^U \leq b$, where for given constants $a, b$, $0 \leq a < \infty$ and $1 \leq b < \infty$.

**Proposition 1:** Short-selling constraints implies that for $r \leq r^U_{\min}$, where

$$r^U_{\min} = \rho - \gamma \sigma^2 [J (b - 1) + 1] / (J - 1), \theta^U = b$$

and for $r \geq r^U_{\max}$, where $r^U_{\max} = \rho + \gamma \sigma^2 [J (a + 1) - 1] / (J - 1), \theta^U = -a$. As $J$ goes to $\infty$, the range of interval solutions for $\theta^U$ converges to $\gamma \sigma^2 [b + a]$.

Proof:

Since $r \leq r^U_{\min}$, the portfolio hits the short-selling constraints. Thus there is a limit to which the domestic market can be shorted. Taking the first order condition with respect to $\theta^U$ implies:

$$\theta^U = \left( \frac{J - 1}{J} \right) \left[ 1 + \frac{\rho - r^U_{\min}}{\gamma \sigma^2} \right].$$

By setting $\theta^U = b$ in the expected utility function, we got:

$$b = \left( \frac{J - 1}{J} \right) \left[ 1 + \frac{\rho - r^U_{\min}}{\gamma \sigma^2} \right]$$

Solve the $r^U_{\min}$ as a function of b and J, we got:

$$r^U_{\min} = \rho - \frac{\gamma \sigma^2 [J (b - 1) + 1]}{(J - 1)}.$$
Similary, we can show that when the portfolio hits the other bound $\theta^U = -a$, $r^U_{max}$ will be:

$$r^U_{max} = \rho + \frac{\gamma \sigma^2 [J(a + 1) - 1]}{(J - 1)}$$

As $J$ goes to infinity,

$$\lim_{J \to \infty} (r^U_{max} - r^U_{min}) = \gamma \sigma^2 (b + a).$$

Case 2: internal solutions, uninformed

For $r^U_{min} \leq r \leq r^U_{max}$, plugging in the value of $\theta^U$, the maximum of $EU^U$ is:

$$EU^U = r - \frac{\gamma \sigma^2}{2J} + \frac{(\rho - r)J - 1}{2J} [2 + \frac{(\rho - r)}{\gamma \sigma^2}]$$

Next we examine the mean-variance problem under the assumption that the investor pays for the information. In exchange for the payment $k$, the investor learns the new return $r^I$ with zero variance. The utility $U^I(r^I)$ is:

$$U^I(r^I) = \theta^I \rho + (1 - \theta^I)r^I - \frac{\gamma}{2} \frac{(\theta^I)^2}{J - 1} \sigma^2 - \frac{k}{J}.$$  

Case 3: corner solutions, informed

Consider $\theta^I$, the share of international portfolio with the information is chosen to maximize the expected utility function. Let $-a \leq \theta^I \leq b$, and for given constant $a$, $b$ such that $0 \leq a < \infty$ and $1 \leq b < \infty$. So the expected utility is given by

$$EU^I = \begin{cases} 
    \left[ b \rho - \frac{\gamma \sigma^2}{2} \left( \frac{b^2}{J - 1} \right) \right] F(r^I_{min}) + \int_{-\infty}^{r^I_{min}} (1 - b)r^I dF(r^I) - \frac{k}{J}, \\
    \left[ -a \rho + \frac{\gamma \sigma^2}{2} \left( \frac{a^2}{J - 1} \right) \right] \left( 1 - F(r^I_{min}) \right) + \int_{r^I_{min}}^{\infty} (1 + a)r^I dF(r^I) - \frac{k}{J},
\end{cases}$$

if $r^I \leq r^I_{min}$ and

if $r \geq \rho$.  

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**Proposition 2:** Short-selling constraints implies that for \( r^l \leq r^l_{\min} \), where

\[
r^l_{\min} = \rho - b \gamma \sigma^2 /(J - 1), \quad \theta^l = b \] and for \( r \geq r^l_{\max} \), where \( r^l_{\max} = \rho + a \gamma \sigma^2 /(J - 1), \quad \theta^l = -a \). As \( J \) goes to \( \infty \), the range of interval solutions for \( \theta^U \) converges to zero.

**Proof:**

Since \( r \leq r^U_{\min} \), the portfolio hits the short-selling contraints. Taking the first order condition with respect to \( \theta^l \) implies:

\[
\theta^l(r^l) = (J - 1)\left[ \frac{\rho - r^l_{\min}}{\gamma \sigma^2} \right].
\]

By setting \( \theta^l(r^l) = b \) in the expected utility function, we got:

\[
b = (J - 1)\left[ \frac{\rho - r^l_{\min}}{\gamma \sigma^2} \right]
\]

Solve the \( r^U_{\min} \) as a function of \( b \) and \( J \), we got:

\[
r^l_{\min} = \rho - \frac{b \gamma \sigma^2}{(J - 1)}
\]

Similary, we can show that when the portfolio hits another bound \( \theta^U = -a \), \( r^U_{\max} \) will be:

\[
r^l_{\max} = \rho + \frac{b \gamma \sigma^2}{(J - 1)}
\]

As \( J \) goes to infinity,

\[
\lim_{J \to \infty} (r^U_{\max} - r^U_{\min}) = 0
\]

**Case 4:** internal solutions, informed

Plugging \( \theta^l(r^l) \) into the original utility function, we know

\[
U^l(r^l) = r^l + \frac{1}{2} (\rho - r^l)^2 (J - 1) - \frac{k}{J}
\]
Before paying \( k \), the \( r^I \) is a random variable drawn from a known probability distribution function. Let \( F(r^I) \) and \( f(r^I) \) denotes the c.d.f. and p.d.f. of \( r^I \) respectively. So the expectation of utility \( U^I(r^I) \) is given by:

\[
E U^I = \int_{-\infty}^{\infty} [\theta^I(r^I) \rho + (1 - \theta^I(r^I)) r^I - \frac{\gamma}{2 \left[ \frac{(\theta^I(r^I))^2}{j-1} \sigma^2 \right]} f(r^I) dr^I - \frac{k}{j}.
\]

Note that the major difference between Calvo and Mendoza (2000) and my model is that the information costs is flexible with respect to \( J \). In other words, I claim that the information costs will decrease as the number of countries in the portfolio rises. In Ahearne et al. (2004), they show some empirical evidences that the information costs can be significantly reduced by firms’ cross-listing in different markets. For an individual investor, the more equity markets to which he/she can invest in the portfolio, the more likely he/she can get access to the free or less expensive information. Therefore, the information cost is subject to change as the diversification of portfolio. This is crucial for the subsequent analytical results because the information cost is fixed in the previous studies of a similar model. Thus as the number of countries increases, the value of information is underestimated. I show below that, under fairly general conditions, \( S \) rises as \( J \) rises. Therefore, the globalization is an incentive to gather country-specific information.

**Proposition 3**: For a bad news such that (i) short-selling constraints are not binding for the portfolio of an uninformed investor \( (r^U_{\min} \leq r \leq r^U_{\max}) \) and (ii) the rumor sets the country \( I \) returned to be less or equal than the return of the world fund \( (r \leq r^* \leq \rho) \), and assuming that \( F \) and \( f \) are continuously differentiable, \( S \) is decreasing in \( J \), for \( J < \infty \), if the number of countries in the global market is at least \( 1/\{1 - \gamma \sigma^2 [ (b^2 - a^2)F(\rho) + a^2] / (\gamma \sigma^2 - 2k) \}^{0.5} \).
Proof:

For any bad news in the interval \( r_{min} \leq r \leq r_{max} \), \( S \) is given by:

\[
S = \left[ b \rho - \frac{\gamma \sigma^2}{2} \left( \frac{b^2}{J-1} \right) \right] F(r_{min}) \int_{r_{min}}^{r_{max}} (1 - b) r^l dF(r^l) - \left[ a \rho + \frac{\gamma \sigma^2}{2} \left( \frac{a^2}{J-1} \right) \right] (1 - F(r_{max}))
\]

\[
+ \int_{r_{max}}^{\infty} (1 + a) r^l dF(r^l) + \int_{r_{min}}^{r_{max}} \left[ r^l + \frac{1}{2} \frac{(\rho - r^l)^2}{\gamma \sigma^2} (J - 1) \right] dF(r^l)
\]

\[- \frac{k}{J} \left( r - \frac{\gamma \sigma^2}{2} \right) + \frac{(\rho - r) J - 1}{2} \left[ 2 + \frac{(\rho - r)}{\gamma \sigma^2} \right].
\]

Since \( F(r^l) \) is continuously differentiable, taking the partial derivative with respect to \( J \) gives:

\[
\frac{\partial S}{\partial J} = \frac{\gamma \sigma^2}{2(J-1)^2} \left[ b^2 F(r_{min}) + a^2 (1 - F(r_{max})) \right] + \int_{r_{min}}^{r_{max}} \left[ \frac{1}{2} \frac{(\rho - r^l)^2}{\gamma \sigma^2} \right] dF(r^l)
\]

\[- \frac{\gamma \sigma^2}{2J^2} - \frac{(\rho - r)}{2J^2} \left[ 2 + \frac{(\rho - r)}{\gamma \sigma^2} \right] + \frac{k}{J^2}.
\]

We need to find the condition under which \( S \) is negatively correlated with \( J \).

To achieve that, we need to prove that a larger value is less than zero. Replacing \( r_{min} \) and \( r_{max} \) by \( \rho \) and setting \( r^l = r_{min} \). Since \( F(r_{min}) \leq F(\rho) \leq F(r_{max}) \), it follows that:

\[
\frac{\partial S}{\partial J} \leq \frac{\gamma \sigma^2}{2(J-1)^2} \left[ b^2 F(\rho) + a^2 (1 - F(\rho)) \right] - \frac{\gamma \sigma^2}{2J^2} - \frac{(\rho - r)}{2J^2} \left[ 2 + \frac{(\rho - r)}{\gamma \sigma^2} \right] \frac{k}{J^2} < 0
\]

This implies:

\[
\frac{\gamma \sigma^2}{2(J-1)^2} [(b^2 - a^2) F(\rho) + a^2] + \frac{k}{J^2} \leq \frac{\gamma \sigma^2}{2J^2} + \frac{(\rho - r)}{2J^2} \left[ 2 + \frac{(\rho - r)}{\gamma \sigma^2} \right]
\]

Multiply both sides by \( \frac{2J^2}{\gamma \sigma^2} \) gives:
Since $r \leq \rho$, we can drop the last two terms to form a sufficient (not necessary) condition. This gives:

$$\frac{J^2}{(J - 1)^2} \left[(b^2 - a^2)F(\rho) + a^2\right] + \frac{2k}{\gamma \sigma^2} \leq 1 + \frac{\rho - r}{\gamma \sigma^2} \left[2 + \frac{\rho - r}{\gamma \sigma^2}\right]$$

We single $J$ out and it follows that:

$$J > \frac{1}{1 - \left\{ \frac{\gamma \sigma^2 [(b^2 - a^2)F(\rho) + a^2]}{\gamma \sigma^2 - 2k} \right\}^{\frac{1}{2}}}$$

### 4.2 Comparison of fixed and flexible information costs

The above partial derivative condition shows that $S$ and $J$ are negatively associated only when the number of countries in the portfolio is big. Otherwise, since the condition is not necessary, the relationship is ambiguous. However, if the difference between $\rho$ and $r$ is small enough and the $\sigma^2$ is sufficiently big, we can loosely say that $S$ and $J$ are positively correlated if $J$ is smaller than the threshold.

Next I will compare the model with flexible and fixed information costs. In the model of Calvo and Mendoza (2000), the threshold of the number of countries in the global market is $1/(1 - \{(b^2 - a^2)F(\rho) + a^2\}^{0.5})$. The only difference is that my model contains a multiplier $\gamma \sigma^2/(\gamma \sigma^2 - 2k)$ inside the curly bracket and this term is obviously bigger than one. This entails a more strict requirement under which $S$ and $J$ can be negative correlated. I will show that when varying the parameter in the model, how big the difference of country requirement will be with and without the multiplier.

#### 4.2.1 Parameter identification
To understand the how a flexible information costs impact on the country threshold, I estimate some reasonable intervals of parameters in the model.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanations</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>Short-selling constraint</td>
<td>0</td>
<td>0.81</td>
<td>CPIS from IMF</td>
</tr>
<tr>
<td>k</td>
<td>Information costs</td>
<td>0.55%</td>
<td>1.7%</td>
<td>Management fees estimates</td>
</tr>
<tr>
<td>σ</td>
<td>Variance of returns</td>
<td>3.2%</td>
<td>6.4%</td>
<td>Yahoo Finance</td>
</tr>
<tr>
<td>F(ρ)</td>
<td>Probability of bad news</td>
<td>0.3</td>
<td>0.7</td>
<td>My estimation</td>
</tr>
</tbody>
</table>

Many stock markets set some kinds of short-selling constraint to reduce speculative trading and thereby have the potential to stabilize volatile financial markets. The effectiveness of the constraint is controversial. Though Boehmer, Jones, Zhang (2008) shows that in 2008 stock market turmoil, those stocks accepting a shorting ban suffer a significantly less short sales, Beber, Pagono (2013) argues that a short-selling constraint slows down price discovery, especially in bear markets and failed to support prices, except possibly for U.S. financial stocks. The table 2 shows that the home bias of most countries lies within the interval of 25% to 100%. Note that I slightly loosen the upper bound. However, without the loss of generality, no investor is allowed to short the home equity while they can short the international equity freely. This is simply for examining the effectiveness of constraint under home bias assumption.

The informational cost is hard to estimate directly. I will use the mutual fund management fees as an approximate of the information cost because people
purchase mutual fund mainly because the fund managers are more accessible to the 
information in the market. So the value of information is equivalent to opportunity 
cost in hiring somebody to manage the portfolio. I estimate that the management 
fees consisting of several parts for marketing and maintenance should be between 
0.55% and 1.7%.

<table>
<thead>
<tr>
<th>Fees</th>
<th>Explanation</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>12B-1 fee</td>
<td>An annual marketing or distribution fee on a mutual fund.</td>
<td>0.25-1%</td>
</tr>
<tr>
<td>Shareholder servicing fee</td>
<td>A mutual fund can pay a broker up to 0.25 percent of your assets for &quot;servicing&quot; your account</td>
<td>0.25%</td>
</tr>
<tr>
<td>Account maintenance fee</td>
<td>A broker charges an average of $20 to &quot;maintain&quot; each mutual fund in your account</td>
<td>0.05%</td>
</tr>
<tr>
<td>Revenue-sharing fee</td>
<td>A typical profit a mutual fund may preserve</td>
<td>0.1-0.4%</td>
</tr>
</tbody>
</table>

| Total                     |                                                                             | 0.55-1.7%  |

To estimate the variance of return in several countries, I calculate a weekly 
variance of returns from 2001 to 2010 for 16 major markets. The data shows that 
the variance should be within the interval of 3.2% and 6.4%.

4.2.2 Sensitivity analysis

I vary a parameter each time within the boundary while controlling other variables. 
Then I plot the comparison of country threshold above which the S and J are 
negatively correlated under the framework of fixed and flexible
Figure 3

The graph on the upper-left shows the relationship between short-selling constraint on home equity and country threshold. We can observe that once we keep loosening the lowest requirement of home equity in the portfolio, the country threshold sharply increases under the flexible information assumption. This implies that once the investors in high home bias country make efforts to diversify their portfolio, they are more likely to purchase the country-specific information and therefore eliminate the influence of the contagion. The numerical and empirical results are matching in this case.
The down-right graph exhibits the relationship between the probability of bad news and the country threshold. We can observe that during the crisis time when the markets are dominated by bad news, both of the country thresholds for the fixed and flexible information decrease and they converge when the probability is as high as 70%. This shows that during the crisis time, diversification of portfolio is actually bad for risk-hedging. That is why in the table 2 we can observe that most countries during the financial crisis in 2008 stopped the process of portfolio diversification. On the contrary, the probability of bad news is low (stable time), the progress of financial globalization is evident.

5. Conclusions

Financial markets are becoming increasingly integrated internationally. This trend can be captured by the reduction of portfolio home bias during the last decade. Meanwhile the cross-market contagion during the crisis may discourage the motives of the diversification.

This study investigates the relationship between international portfolio diversification and Contagion. Under both empirical and theoretical framework, we can conclude that the international diversification of portfolio is helpful in diminishing the contagion. My results suggest that one need not fear that diversification may generate a contagion, which makes the risk hedging useless.

In addition, this paper also confirms that there exists a contagion effect during the crisis. The more integrated a country is to the world market, the better ability to avoid the contagion. Therefore, the results shown in this paper also have some
policy implications. That is, for mitigating big financial crash in response to the financial shock in major markets, a country should allow its domestic investors to access to foreign equity market. Closing the market cannot stop the contagion while the openness is constructive to the market stability because it enables countries to share and digest the shock together.

References


