



Stock Market Consolidation and US equity Home Bias

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Motivation

- ✦ + In the last three decades, many stock markets around the world have consolidated their trade platforms or signed agreements to facilitate cross-country investments.
- ✦ + Merger and Acquisition (M&A) theory of efficiency theory and synergy gain theory.
- ✦ + Early studies have observed the so-called “home bias puzzle” or the phenomenon where the domestic investors tend to outweigh domestic investment comparing to foreign investment.



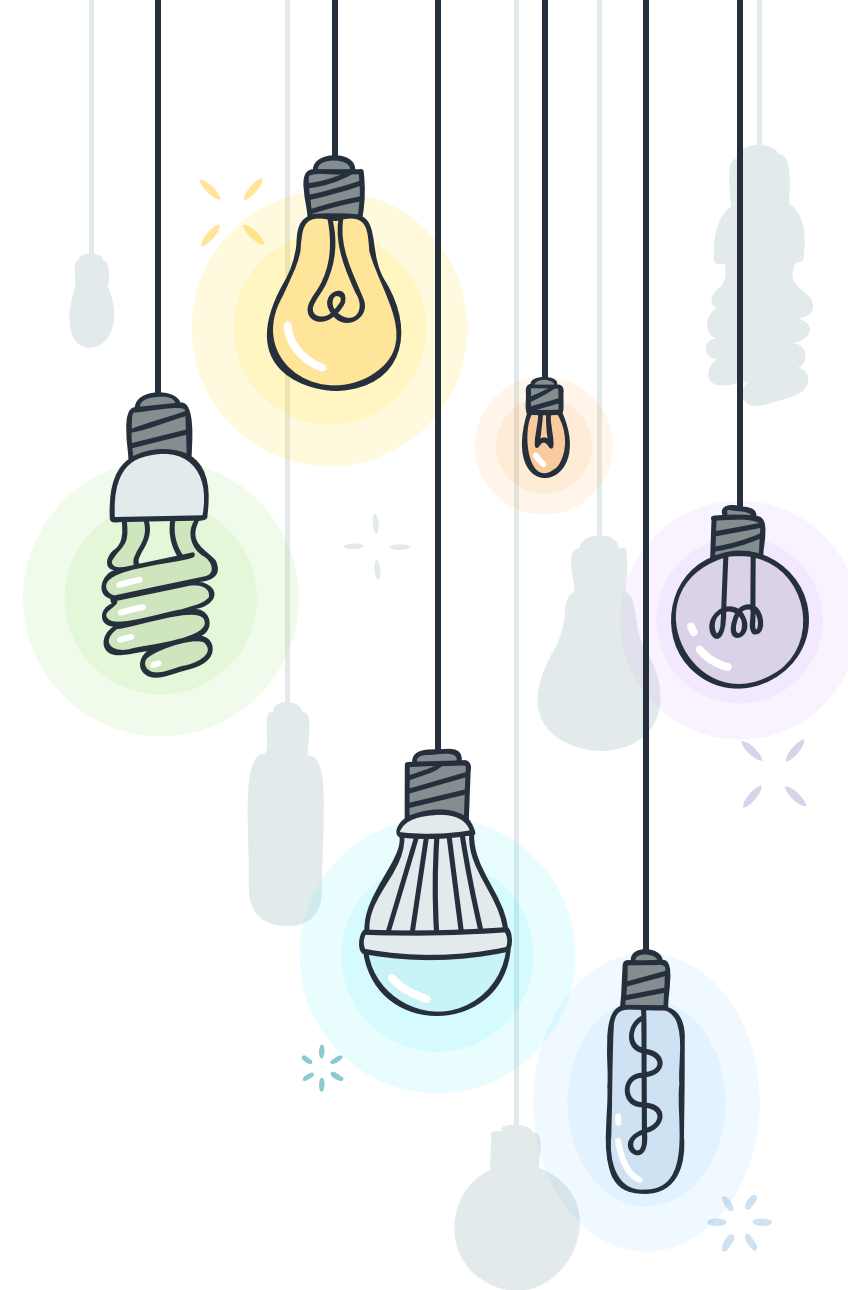
Literature Review

+ Home Bias Measure

- ICAPM HB (Baele et al. 2007; Daly and Vo 2013; Dahlquist et al. 2003; Fidora et al. 2007; Chan et al. 2005; Ahearne et al. 2004)

+ Determinants of Home Bias

| Category | Variables | Significant | Insignificant |
|-------------------------|-----------|---|--|
| Direct cost | WT | Stulz (1981), Cooper and Kaplanis (1986), Mishra (2014) | Chan et al. (2005) |
| | CO | Ahearne et al. (2004), Daly and Vo (2013) | Chan et al. (2005) |
| Indirect cost | BILAT | Baele et al. (2007), Mishra (2008), Mishra (2014) | Fidora et al. (2007) |
| | INT | Mishra (2008) | - |
| | DIST | Portes and Rey (2005) | - |
| Incentive of investment | EXVOL | Fidora et al. (2007), Mishra (2014), Daly and Vo (2013) | - |
| | DIVER | Fidora et al. (2007), Mishra (2014), Mishra (2008) | Chan et al. (2005) |
| | RAR | - | Daly and Vo (2013), Ahearne et al. (2004), Mishra (2008) |
| | ML | Chan et al. (2005) and Daly and Vo (2013) | - |
| Size | MCAP | Chan et al. (2005), Anderson et al. (2011) and Mishra (2014) | Dahlquist et al. (2003) and Daly and Vo (2013) |
| | GROWTH | Fidora et al. (2007) and Anderson et al. (2011) | Dahlquist et al. (2003) and Chan et al. (2005) |
| Governance | GOV | Chan et al. (2005), Fidora et al. (2007) and Daly and Vo (2013) | Dahlquist et al. (2003) |



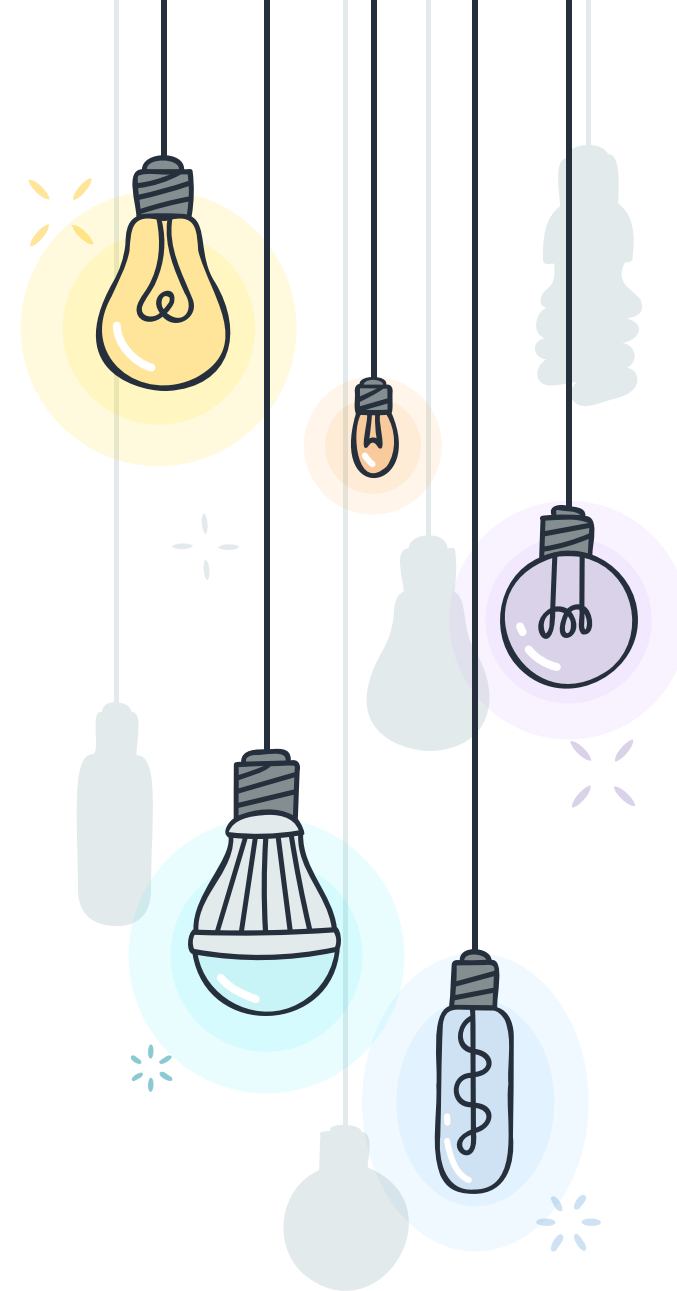
Data

- Sample: 2001-2016, yearly 22 stock markets under six stock market consolidation groups
- US investors' perspective
- The equity holding data is obtained from the IMF's Coordinated Portfolio Investment Survey (CPIS) while the market capitalization data is from the World Bank's World Development Indicator (WDI)
- Control variables are obtained from Datastream and various sources
- 3 subsamples: 2 consolidation groups that include the US stock market (US consolidations) and other consolidation groups that exclude the US stock market (Non-US consolidations).
- Number of Observation
 - NYSE-EURONEXT: 64
 - NASDAQ-OMX: 80
 - Consolidation groups that exclude US Stock markets: 208



Hypothesis Development

- + **First hypothesis:** the average degree of the US HB toward the emerging countries should be higher than the developed countries
- + **Second hypothesis:** countries under the same consolidation with the US should have a lower degree of US HB comparing to the countries outside the consolidation group
- + **Third hypothesis:**
 - Test whether the ANNOUNCE and IMPLEMENT are associated with a significant decrease in US HB
 - IMPLEMENT should have a negative impact on US HB (In this stage, there is a physical change to how the consolidated markets operate)
 - It is less clear whether any US HB changes can be observed during ANNOUNCE. (On one hand, it is only declared and not physically implemented. On the other hand, one could argue that the market processes are driven by expectations)



Sample Stock Markets

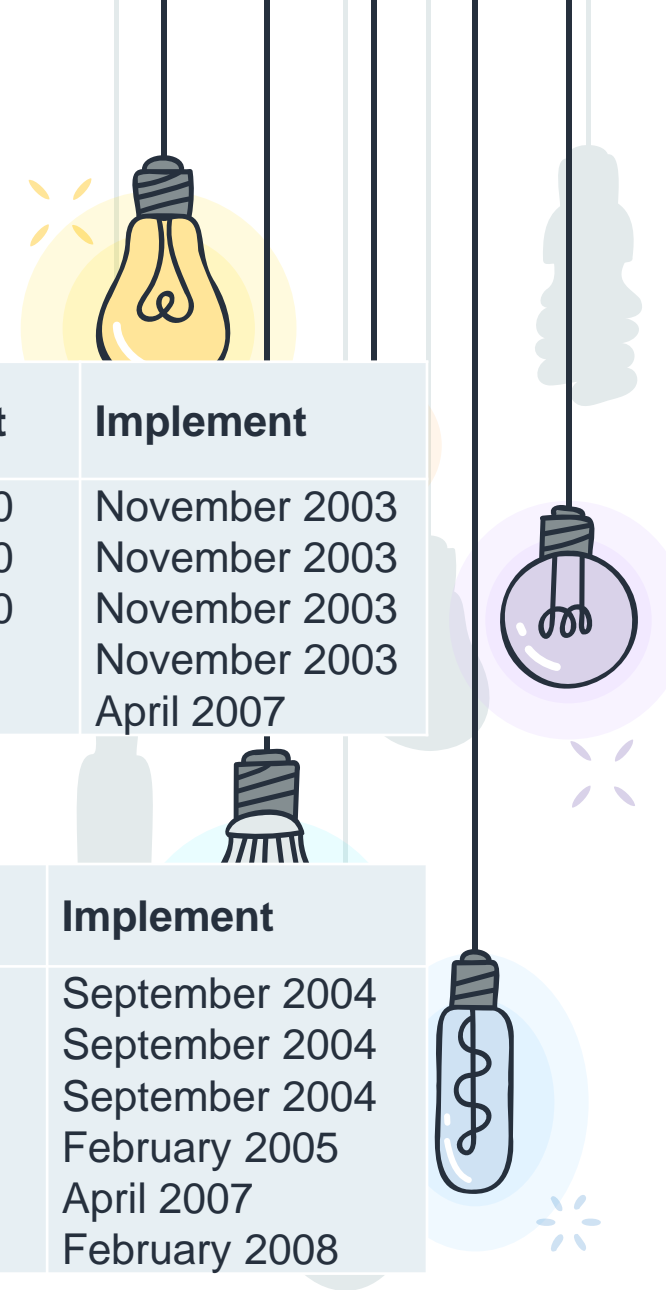
US consolidations

NYSE-EURONEXT

| Consolidation Group | Stock Market Index | Announcement | Implement |
|---------------------|--|--|--|
| NYSE-EURONEXT | Amsterdam Stock Exchange (Netherlands) Brussels Stock Exchange (Belgium) Paris Stock Exchange (France) Lisbon Stock Exchange (Portugal) NYSE (USA) | September 2000 September 2000 September 2000 February 2002 June 2006 | November 2003 November 2003 November 2003 November 2003 April 2007 |

NASDAQ-OMX

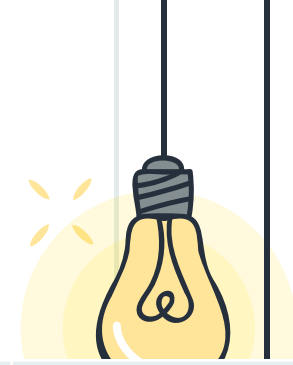
| Consolidation Group | Stock Market Index | Announcement | Implement |
|---------------------|---|---|--|
| NASDAQ-OMX | Stockholm Stock Exchange (Sweden) Helsinki Stock Exchange (Finland) Estonia Stock Exchange (Estonia) Copenhagen Stock Exchange (Denmark) Iceland Stock Exchange (Iceland) NASDAQ (USA) | May 2003 May 2003 May 2003 November 2004 September 2006 May 2007 | September 2004 September 2004 September 2004 February 2005 April 2007 February 2008 |



Sample Stock Markets

Non-US consolidations

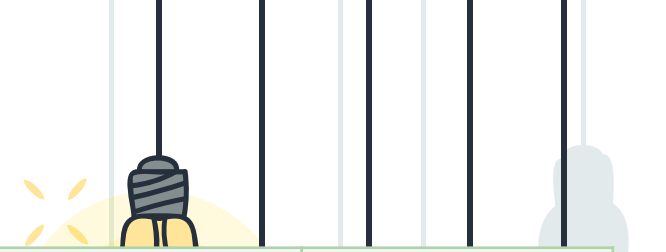
| Consolidation Group | Stock Market Index | Announcement | Implement |
|---------------------|--|----------------|----------------|
| LSE-BI | London Stock Exchange (UK) | June 2007 | October 2007 |
| | Italian Stock Exchange (Italy) | June 2007 | October 2007 |
| CEESEG | Budapest Stock Exchange (Hungary) | November 2008 | January 2010 |
| | Ljubljana Stock Exchange (Slovenia) | November 2008 | January 2010 |
| | Prague Stock Exchange (Czech Republic) | November 2008 | January 2010 |
| | Vienna Stock Exchange (Austria) | November 2008 | January 2010 |
| MILA | Lima Stock Exchange (Peru) | September 2009 | May 2011 |
| | Colombia Stock Exchange (Colombia) | September 2009 | May 2011 |
| | Chile Stock Exchange (Chile) | September 2009 | May 2011 |
| | Mexican Stock Exchange (Mexico) | July 2014 | December 2014 |
| ATL | Bursa Malaysia (Malaysia) | April 2011 | September 2012 |
| | Singapore Exchange (Singapore) | April 2011 | September 2012 |
| | Stock Exchange of Thailand (Thailand) | April 2011 | October 2012 |



Variables

| Category | Independent Variables | Details | Expected Sign |
|------------------------------------|-----------------------|--|---------------|
| Dependent Variable | HB | HB= US HB toward 22 destination countries | |
| Dummy Consolidations | ANNOUNCE | Stock market consolidation announcement period (= 1 from the announcement date to the implement date and 0 otherwise) | - |
| | IMPLEMENT | Stock market consolidation implement period (= 1 from the implement date onward and 0 otherwise) | - |
| Financial Crises | CRISISUS | US global financial crisis (= 1 during the period 2007 to 2009 and 0 otherwise) | - |
| | CRISISEU | European debt crisis (= 1 during the period 2009 to 2011 and 0 otherwise) | + |
| Direct Cost of investment | WT | Withholding tax of dividend in destination countries | + |
| | CO | Chinn-Ito capital account openness index | - |
| Indirect Cost of investment | BILAT | Bilateral import and export between US and each destination country over US total import and export with all partner country | - |
| | INT | Share of internet user in destination country's population | - |
| | DIST | Distance from capital to capital | + |

Variables



| Category | Independent Variables | Details | Expected Sign |
|--------------------------------|-----------------------|--|---------------|
| Incentive of Investment | EXVOL | Standard Deviation of monthly exchange rate. Exchange rate is expressed in terms of local currency per USD | + |
| | DIVER | 1-correlation between US and destination country monthly MSCI return | - |
| | RAR | average monthly returns over the standard deviation of returns in the previous year of destination country | - |
| | ML | stock traded per GDP of destination country | - |
| Size | MCAP | Market capitalization/ World market capitalization | - |
| | GROWTH | Growth in the GDP per capita of the destination country | - |
| Governance | GOV | World governance indicators (WGI) index normalize 0-1 | - |

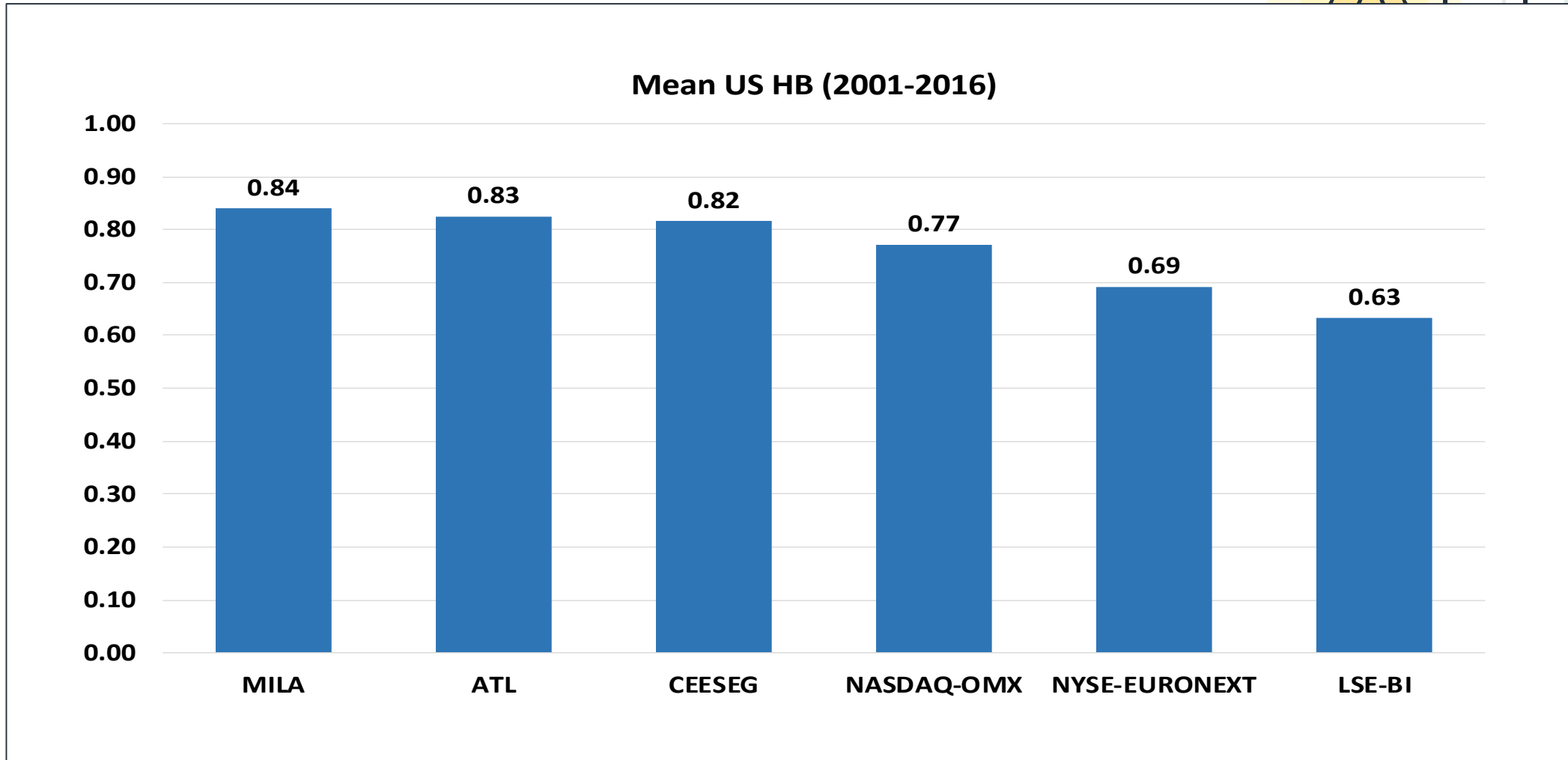
Methodology

- Bilateral home bias can be calculated from $\mathbf{HB}_{ij} = 1 - \frac{\mathbf{ACT}_{ij}}{\mathbf{OPT}_{ij}}$
- $\mathbf{Actual} = \frac{\mathbf{Foreign\ equity\ asset}}{\mathbf{Foreign\ equity\ asset} + \mathbf{Domestic\ market\ capitalization} - \mathbf{Foreign\ equity\ liability}}$
- $\mathbf{ICAPM\ Optimal\ Weight} = \frac{\mathbf{Market\ Capitalization\ of\ destination\ countries}}{\mathbf{World\ Market\ Capitalization}}$
- HB equals to 0 = domestic investors diversify their investment in each destination country according to the optimal portfolio weight and there is no home bias toward that destination country
- HB equals to 1 = domestic investors do not diversify their investment in that destination country
- Random Effect Panel Regression

$$\begin{aligned} \mathbf{HB}_{i,t} = & \alpha_{i,t} + \beta_1 \mathbf{ANNOUNCE}_{i,t} + \beta_2 \mathbf{IMPLEMENT}_{i,t} + \beta_3 \mathbf{CRISISUS}_{i,t} + \\ & \beta_4 \mathbf{CRISISEU}_{i,t} + \beta_5 \mathbf{WT}_{i,t-1} + \beta_6 \mathbf{CO}_{i,t-1} + \beta_7 \mathbf{BILAT}_{i,t-1} + \beta_8 \mathbf{INT}_{i,t-1} + \beta_9 \mathbf{DIST}_{i,t-1} + \\ & \beta_{10} \mathbf{EXVOL}_{i,t-1} + \beta_{11} \mathbf{DIVER}_{i,t-1} + \beta_{12} \mathbf{RAR}_{i,t-1} + \beta_{13} \mathbf{ML}_{i,t-1} + \\ & \beta_{14} \mathbf{MCAP}_{i,t-1} + \beta_{15} \mathbf{GROWTH}_{i,t-1} + \beta_{16} \mathbf{GOV}_{i,t-1} + \varepsilon_{i,t} \end{aligned}$$

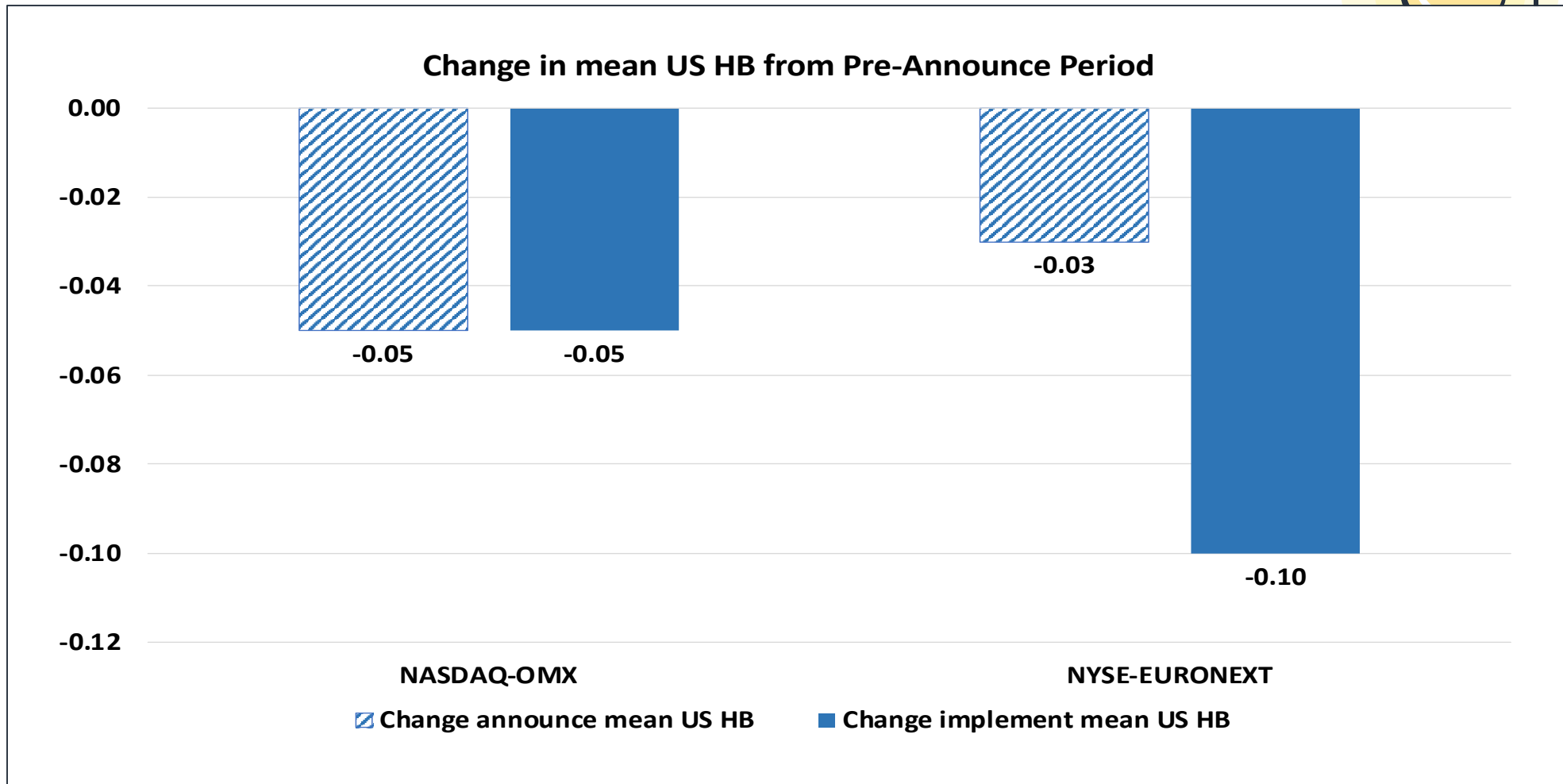


Result: Comparison of US HB



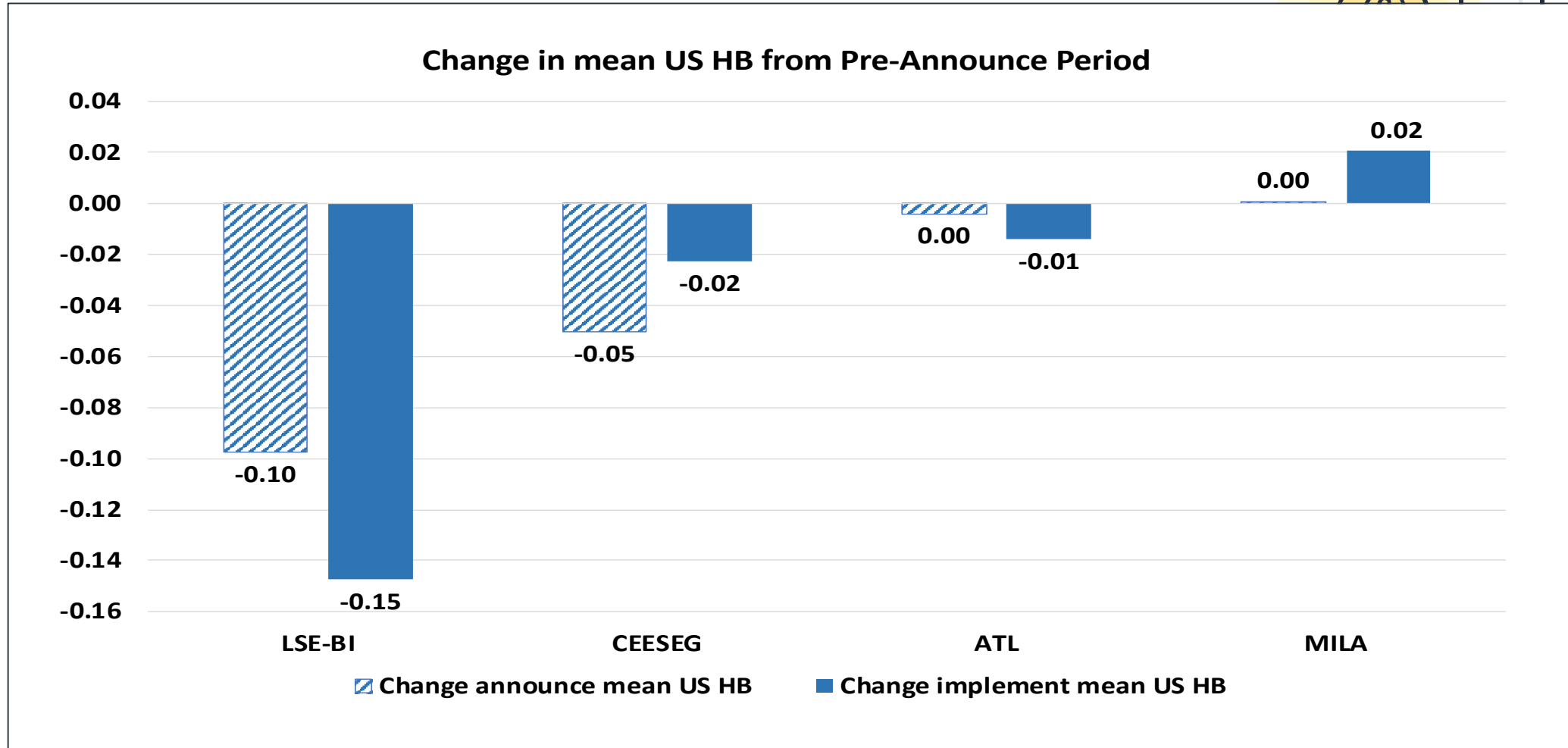
Result: Mean US HB in different stages

US Consolidations



Result: Mean US HB in different stages

Non-US Consolidations



Result: Random Effect Panel Regression

US Consolidations

NYSE-EURONEXT

| Dependent Variable = | HB ICAPM |
|----------------------|----------------------|
| ANNOUNCE | 0.008 (-0.02) |
| IMPLEMENT | -0.042 (-0.03) |
| CRISISUS | 0.044 (-0.03) |
| CRISISEU | 0.043 (-0.04) |
| CO | 0.133 (-0.13) |
| BILAT | -4.294 (-3.13) |
| INT | -0.312** (-0.11) |
| DIST | -0.600*** (-0.08) |
| EXVOL | 0.995** (-0.38) |
| DIVER | 0.073 (-0.08) |
| RAR | 0.011 (-0.02) |
| ML | -0.037 (-0.02) |
| MCAP | -1.783 (-1.26) |
| GROWTH | 0.105** (-0.04) |
| GOV | -1.192*** (-0.12) |
| CONSTANT | 7.125*** (-0.80) |
| Obs | 64 |
| R-Square | 0.91 |
| Cluster Country | Yes |

NASDAQ-OMX

| Dependent Variable = | HB ICAPM |
|----------------------|----------------------|
| ANNOUNCE | -0.091 (-0.09) |
| IMPLEMENT | -0.067 (-0.13) |
| CRISISUS | 0.027 (-0.10) |
| CRISISEU | -0.018 (-0.03) |
| CO | 0.443** (-0.17) |
| BILAT | 33.021 (-27.87) |
| INT | 0.162 (-0.11) |
| DIST | -1.178*** (-0.24) |
| EXVOL | 0.006*** (0.00) |
| DIVER | -0.049 (-0.05) |
| RAR | -0.013 (-0.04) |
| ML | -0.018 (-0.03) |
| MCAP | -12.031 (-20.43) |
| GROWTH | -0.017 (-0.10) |
| GOV | -1.103*** (-0.18) |
| CONSTANT | 11.596*** (-1.97) |
| Obs | 80 |
| R-Square | 0.78 |
| Cluster Country | Yes |

Non-US Consolidations

| Dependent Variable = | HB ICAPM |
|----------------------|----------------------|
| ANNOUNCE | 0.040** (-0.01) |
| IMPLEMENT | 0.027* (-0.01) |
| CRISISUS | 0.006 (-0.02) |
| CRISISEU | 0.021** (-0.01) |
| WT | 0.502*** (-0.13) |
| CO | -0.056 (-0.07) |
| BILAT | -1.314*** (-0.40) |
| INT | -0.144 (-0.12) |
| DIST | 0.046 (-0.03) |
| EXVOL | 0.000 (0.00) |
| DIVER | 0.124*** (-0.03) |
| RAR | -0.014 (-0.01) |
| ML | -0.031 (-0.02) |
| MCAP | -1.716 (-0.94) |
| GROWTH | 0.069 (-0.08) |
| GOV | 0.032 (-0.04) |
| CONSTANT | 0.438 (-0.26) |
| Obs | 208 |
| R-square | 0.71 |
| Cluster Group | Yes |

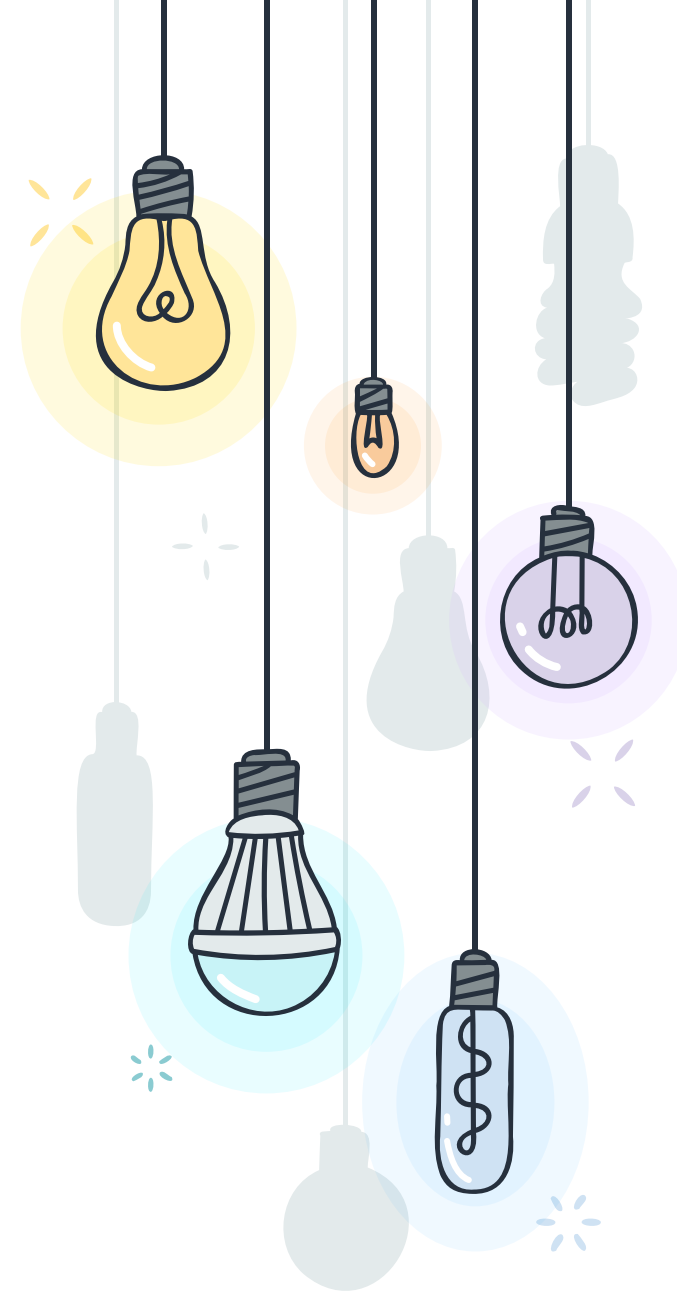
The stock market consolidation does not significantly affect the US equity home bias

- The results are not significant for both NYSE-EURONEXT and NASDAQ-OMX despite US taking parts in both consolidation groups.
- US investors invest even less in the non-US consolidation groups following stock market consolidations.
- Direct and indirect cost of investment, exchange rate volatility and governance play important roles in determining US investors equity home bias.



Limitation and suggestion for further studies

- The holding data is reported on an annual basis.
- Reported on semi-annual basis since 2013.
- Thailand equity and bond investment home bias following the new FX ecosystem.





Thank you for your attention

