# Stock/Bond Dynamics and the Cross-section of Country Stock Returns

Sungjune Pyun

National University of Singapore

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# Cross-section of country stock returns

- ▷ With advancements of ETFs, international equity investment based on the macro environment became more popular. Understanding how local/global risk factors influence the stock market performance is important.
- ▷ What we know about the cross-country stock market performance:
  - The importance of global factor and the exposure to the factor (e.g., International CAPM; Adler and Dumas 1983)
  - *Dividend yields*, *term premium* (Jensen, Mercer, and Johnson 1986) or *momentum* (Hou, Karolyi, and Kho 2011, Cedenese et al.)
  - Liquidity (e.g., Bekaert, Harvey, and Lundblad 2007, Goyenko and Sarkissian 2014)
- ▷ This paper focuses on a new perspective: the hedging aspect of the country stock index and sovereign bond returns

# What drives the variation in the stock & bond prices?

- ▷ One important factor that affects both bonds/stocks is uncertainty.
  - Flight-to-quality implies they move in opposite directions.
    $\rightarrow$ Bonds will hedge uncertainty risk of stock holdings.
- ▷ New aspect: stocks are exposed to global risk more than bonds.
  - One could be due to output/dividends being exposed to global risk more than consumption. (Backus-Keho-Kydland 1992) Why?
  - Strong empirical support: stock correlations across different regions much higher than bonds .
- ▷ Consequence: For countries that have dominant local risk, bonds do not hedge stocks' uncertainty risk well.

# The SB beta and local uncertainty risk

- When local risk is high, global uncertainty risk is difficult to hedge and the SB beta is positive.

- The SB beta:

$$R_{i,s} = \alpha_i + \beta_i(-\Delta y_{i,t}) + \epsilon_{i,t}$$

  - For domestic investors, bonds do not hedge global uncertainty risk well, weakening the negative SB relationship.
  - For global investors, investments in countries with more local risk require a higher risk premium. Difficult to diversify since uncertainty risk also affects currency values.

Higher local uncertainty risk leads to a relatively positive $\beta_i$.

# Data

- ▷ Total of 30: 14 in Europe (Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Norway, Russia, Spain, Sweden, Switzerland, Turkey, UK), 9 in Asia (China, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand), 3 in NA (Canada, Mexico, US), 2 in Oceania (Australia and New Zealand), 1 from SA (Brazil) and Africa (South Africa)
- ▷ Stock returns & Bond yields- from Bloomberg
  - Stocks: MSCI Price Index (1990 – 2021)/ Total Return Index (1999 – 2021)
  - Bonds: Ten-year Treasury yields (1990 – 2021)
- ▷ Intraday variance (Oxford-Man), macro variables (Worldbank, OECD, and IMF), and CDS data (intercontinental exchange)

# Main result - total returns/daily beta

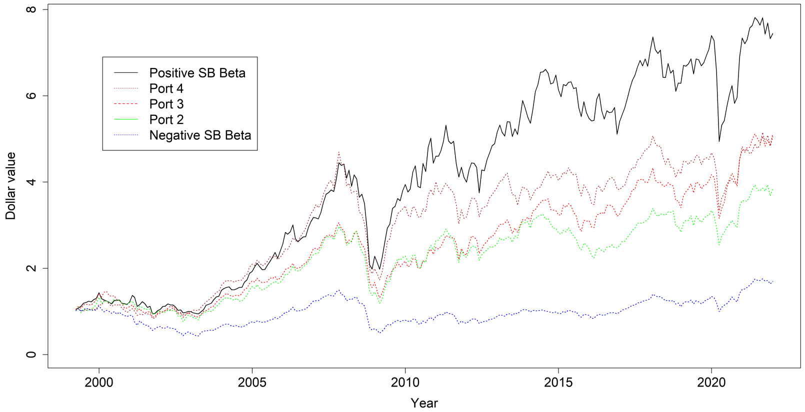
Countries are sorted by their SB beta (estimated using daily data over 180 calendar days), portfolios are formed, and the returns of the following month are evaluated:

| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H–L |
|---|---|---|---|---|---|---|
| Returns in USD | 0.46 | 0.67 | 0.79 | 0.87 | 0.99 | 0.53** |
| | (1.24) | (1.93) | (2.28) | (2.54) | (2.56) | (2.46) |
| ICAPM | −0.12 | 0.10 | 0.46 | 0.63 | 0.69 | 0.81*** |
| | (−1.06) | (0.93) | (2.46) | (2.96) | (4.22) | (4.37) |
| Returns in local $ | 0.37 | 0.56 | 0.81 | 0.86 | 1.05 | 0.68*** |
| | (1.14) | (1.95) | (2.96) | (3.14) | (3.47) | (3.24) |
| Currency returns | 0.07 | 0.09 | −0.05 | −0.02 | −0.12 | −0.19* |
| | (0.51) | (0.66) | (−0.35) | (−0.14) | (−1.03) | (−1.72) |
| SB Beta | −14.50 | −8.14 | −3.96 | 0.68 | 6.06 | 20.56 |

Units: in monthly returns (%)
The results are robust when betas are estimated using weekly, monthly returns.

Results

# Time-series of SB beta-sorted equity portfolios in USD



# Is sovereign default risk in bond yields priced? *Unlikely...*

- Sovereign bond yields move when credit spreads vary.
- If default risk is priced in the stock market, shocks to CDS spread and stock price should be negatively related. → Ceteris paribus, a positive SB relationship is expected.
- Consider a decomposition of first-difference in bond yields:

$$R^i_{S,t+1} = a^i + b^i(-\Delta y^i_{t+1} + \Delta CDS^i_{t+1}) + c^i(-\Delta CDS^i_{t+1}) + \epsilon^i_{t+1}$$

Portfolios formed after sorting by risk-free yield beta

| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H –L |
|---|---|---|---|---|---|---|
| Returns in USD | 0.33<br>(0.89) | 0.70<br>(1.97) | 0.31<br>(0.86) | 0.46<br>(1.22) | 0.79<br>(2.08) | 0.47∗∗<br>(2.34) |

Portfolios formed after sorting by CDS beta

| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H –L |
|---|---|---|---|---|---|---|
| Returns in USD | 0.66<br>(1.57) | 0.56<br>(1.25) | 0.46<br>(1.25) | 0.59<br>(1.31) | 0.41<br>(1.02) | −0.25<br>(−1.45) |

# Cross-sectional regressions

Country-specific characteristic or time-varying risk premium?

| | $\hat{\beta}^i_{d,t}$ | $\bar{\hat{\beta}}^i_d$ | GDP/cap | Total GDP | $\frac{\text{\% Export}}{\text{GDP}}$ | GDP growth | Inf. ($\pi$) | Ave-$R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model 1 | 0.037∗∗∗ | | | | | | | 0.073 |
| | (3.14) | | | | | | | |
| Model 2 | 0.050∗∗∗ | −0.019 | | | | | | 0.140 |
| | (3.31) | (−1.06) | | | | | | |
| Model 3 | 0.030∗∗∗ | | −0.003 | 55.127 | 0.000 | 8.256 | −0.041 | 0.348 |
| | (2.68) | | (−0.45) | (0.73) | (1.27) | (1.02) | (−0.84) | |

Common return predictors

| | $\hat{\beta}^i_{d,t}$ | Div. yield | Term spread | Momentum | Ave-$R^2$ |
|---|---|---|---|---|---|
| Model 4 | 0.025∗∗ | 0.344 | | | 0.116 |
| | (2.34) | (0.05) | | | |
| Model 5 | 0.026∗∗ | | 0.004 | | 0.141 |
| | (2.45) | | (0.11) | | |
| Model 6 | 0.023∗∗ | | | 0.591 | 0.172 |
| | (2.49) | | | (1.06) | |
| Model 7 | 0.027∗∗ | −3.249 | 0.044 | 0.406 | 0.278 |
| | (2.44) | (−0.46) | (0.56) | (0.68) | |

# Cross-sectional regressions - Other controls

Nominal-real covariance (à la Campbell, Pflueger, Viceira 2020)

| | $\hat{\beta}^i_{d,t}$ | $\pi$ | $\Delta GDP$ | $\Delta GDP \times \pi$ | $\Delta c$ | $\Delta c \times \pi$ | $\rho_{\pi,\text{GDP}}$ | $\rho_{\pi,\Delta c}$ | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| Model 8 | 0.021** | 0.018 | 6.838 | −1.814 | | | | | 0.266 |
| | (2.02) | (0.16) | (1.32) | (−1.02) | | | | | |
| Model 9 | 0.023** | −0.023 | 2.524 | | | | −0.290* | | 0.312 |
| | (2.13) | (−0.34) | (0.84) | | | | (−1.92) | | |
| Model 10 | 0.034*** | −0.033 | | | −1.821 | −0.121 | | | 0.332 |
| | (2.69) | (−0.71) | | | (−0.32) | (−0.89) | | | |
| Model 11 | 0.032*** | −0.017 | | | 1.005 | | | 1.005 | 0.304 |
| | (2.64) | (−0.37) | | | (0.59) | | | (0.59) | |

Exposure to global illiquidity (Bakaert, Harvey, Lundblad 2007)/Treasury illiquidity (Goyenko, Sarkissian 2014)

| | $\hat{\beta}^i_{d,t}$ | Treas. Illiq. | Amihud | Zero ret. | Zero volume | $R^2$ |
|---|---|---|---|---|---|---|
| Model 12 | 0.018** | 0.000 | | | | 0.131 |
| | (2.01) | (−0.62) | | | | |
| Model 13 | 0.016* | | 30.112 | | | 0.131 |
| | (1.82) | | (0.70) | | | |
| Model 14 | 0.021** | | | 0.031 | | 0.127 |
| | (2.43) | | | (0.62) | | |
| Model 15 | 0.015* | | | | 0.030 | 0.123 |
| | (1.65) | | | | (0.65) | |

# Are stocks correlated more across regions than bonds?

Stock correlations across continents

| | Asia | Africa | Europe | Lat Am | Aus & NZ | US & Can |
|---|---|---|---|---|---|---|
| Asia | 0.493 | 0.450 | 0.437 | 0.485 | 0.385 | 0.457 |
| Europe | 0.437 | 0.521 | 0.627 | 0.538 | 0.428 | 0.608 |
| Lat Am | 0.485 | 0.590 | 0.538 | 0.623 | 0.414 | 0.630 |
| Aus & NZ | 0.385 | 0.428 | 0.428 | 0.414 | 0.463 | 0.461 |
| US & Can | 0.457 | 0.576 | 0.608 | 0.630 | 0.461 | 0.747 |

Bond correlations across continents

| | Asia | Africa | Europe | Lat Am | Aus & NZ | US & Can |
|---|---|---|---|---|---|---|
| Asia | 0.127 | 0.121 | 0.139 | 0.117 | 0.186 | 0.179 |
| Europe | 0.139 | 0.127 | 0.482 | 0.138 | 0.360 | 0.469 |
| Lat Am | 0.117 | 0.248 | 0.138 | 0.336 | 0.086 | 0.119 |
| Aus & NZ | 0.186 | 0.143 | 0.360 | 0.086 | 0.625 | 0.492 |
| US & Can | 0.179 | 0.102 | 0.469 | 0.119 | 0.492 | 0.752 |

| | Same Continent | Different Continent | Paired t-test |
|---|---|---|---|
| S/B Difference | 0.292 | 0.126 | −0.151 |
| T-statistics | (11.54) | (1.93) | (−2.12) |
| P-value | 0.000 | 0.063 | 0.051 |

# Country-level analysis: "Stock minus bond correlations"

| | Region | | | | Region | | |
|---|---|---|---|---|---|---|---|
| | Different | Same | S-D | | Diff Continent | Same | S-D |
| Australia | 0.263 | -0.161 | -0.424 | Mexico | 0.417 | 0.287 | -0.130 |
| Austria | 0.218 | -0.025 | -0.244 | Netherlands | 0.223 | 0.065 | -0.158 |
| Belgium | 0.220 | 0.043 | -0.177 | Norway | 0.230 | 0.118 | -0.112 |
| Brazil | 0.363 | 0.287 | -0.076 | NZ | 0.077 | -0.161 | -0.238 |
| Canada | 0.284 | -0.004 | -0.288 | Philippines | 0.364 | 0.391 | 0.027 |
| China | 0.413 | 0.474 | 0.061 | Russia | 0.360 | 0.459 | 0.099 |
| Finland | 0.155 | -0.071 | -0.225 | Singapore | 0.201 | 0.367 | 0.166 |
| France | 0.271 | 0.091 | -0.180 | S. Africa | 0.365 | . | . |
| Germany | 0.247 | 0.096 | -0.151 | Spain | 0.331 | 0.243 | -0.088 |
| India | 0.345 | 0.389 | 0.044 | Sweden | 0.277 | 0.134 | -0.143 |
| Indonesia | 0.318 | 0.410 | 0.092 | Switzerland | 0.226 | 0.163 | -0.063 |
| Italy | 0.332 | 0.262 | -0.070 | Thailand | 0.223 | 0.282 | 0.058 |
| Japan | 0.292 | 0.341 | 0.049 | Turkey | 0.254 | 0.290 | 0.036 |
| Korea | 0.297 | 0.346 | 0.050 | UK | 0.290 | 0.157 | -0.133 |
| Malaysia | 0.200 | 0.293 | 0.094 | USA | 0.265 | -0.004 | -0.270 |
| | | | | Mean | 0.277 | 0.192 | -0.083 |
| | | | | T-stat | (22.07) | (5.71) | (-3.10) |

# Hedging global uncertainty risk using bonds

- Stocks are heavily exposed to global (uncertainty risk)
- Bonds better hedge global uncertainty risk when SB beta/correlation is negative?
- Need an estimate of local global uncertainty. A stochastic volatility (SV) model on global returns:

$$R^*_{m,t} = \beta^*_0 + \exp(h^*_t/2)\epsilon^*_t$$
$$h^*_{t+1} = \mu^*_h + \varphi^*_h(h^*_t - \mu^*_h) + \sigma^*_h\eta^*_t,$$

# Hedging global variance risk using bonds

$$\Delta y^i_{t+1} = \alpha_0 + \alpha_1 \Delta \exp(h^*_{t+1}/2) + \alpha_2 \Delta \exp(h^*_{t+1}/2) \times \text{SB Beta}^i_t + \alpha_3 \text{SB Beta}^i_t + e^i_{t+1}$$

| | Quarterly changes in yields | | | |
|---|---|---|---|---|
| $\Delta \exp(h^*_t/2)$ | 3.253 | 3.258 | 2.556 | 2.540 |
| | (1.06) | (1.09) | (1.03) | (0.81) |
| $\Delta \exp(h^*_t/2) \times$ SB Beta | 0.506 | 0.512 | | |
| | (4.75) | (5.11) | | |
| SB Beta | 0.004 | 0.006 | | |
| | (2.85) | (3.21) | | |
| $\Delta \exp(h^*_t/2) \times$ SB Cor | | | 26.770 | 26.910 |
| | | | (7.27) | (7.55) |
| SB Cor | | | 0.104 | 0.134 |
| | | | (2.57) | (1.70) |
| Country Fixed Effect | N | Y | N | Y |
| $R^2$ | 0.017 | 0.029 | 0.026 | 0.036 |
| Number of Obs. | 3,131 | 3,131 | 3,131 | 3,131 |

# SB relationship and the amount of local uncertainty risk

1) SV estimate of country-specific returns:

$$R^i_{m,t} = \beta^i_0 + \beta^i_m R^*_{m,t} + \beta^i_q \Delta q^i_t + \exp(h^i_t/2)\epsilon^i_t$$
$$h^i_{t+1} = \mu^i_h + \varphi^i_h(h^i_t - \mu^i_h) + \sigma^i_h \eta^i_t,$$

Note: From Ito's lemma, vol of the variance = variance ($\exp(h^i_t)$).

2) Use intraday data to find the forecast error of 5-day RV:

$$RV^i_{t+1,t+5} = b_0 + b_1 RV^i_{t-5,t} + b_2 RV_{t-22,t} + e^i_{t+1,t+5}$$

Estimate the standard deviation of the residual ($SD(\omega^i_t)$) in the regression:

$$\hat{e}^i_t = c_0 + c_1 \sum_{j \in \text{countries}} \hat{e}^j_t + \omega^i_t,$$

$\rightarrow$ Expect the SB beta to me more positive when volatility of variance of the country-specific component is higher!

# Size of Uncertainty risk estimated from stock returns

| | Dep . Variable: $\hat{\beta}^i$ | | | |
|---|---|---|---|---|
| $\exp(h_t^i)$ | 12.450 | 88.925 | | |
| | (3.21) | (2.24) | | |
| $\exp(h_t^*)$ | −65.370 | −16.884 | | |
| | (−0.61) | (−2.26) | | |
| Idiosyncratic vol. of RV | | | 51.537 | 34.413 |
| | | | (4.27) | (3.01) |
| Volatility of RV | | | −33.543 | −20.957 |
| | | | (−3.10) | (−2.05) |
| FE Country | N | Y | N | Y |
| FE Time | Y | Y | Y | Y |
| $R^2$ | 0.302 | 0.532 | 0.242 | 0.525 |
| # of Obs. | 2,824 | 2,824 | 1,568 | 1,568 |

→ These results so far suggest that when there is more local uncertainty risk, both the SB beta and the SB correlations will be more positive.

# SB Correlation and Stock or Bond Variance

Controlling for stock return volatility, bond yield volatility should measure the amount of local uncertainty.

$$\text{Dep}_{i,t} = \underbrace{b}_{>0} \sigma_t(\Delta y^i) + \underbrace{c}_{<0} \sigma_t(R_s^i) + \text{FE}_{i,t} + e_{i,t}$$

| | $\hat{\beta}^i$ | | | $\hat{\rho}^i$ | | |
|---|---|---|---|---|---|---|
| SD($\Delta y^i$) | 14.952 | 4.953 | 4.224 | 0.494 | 0.204 | 0.154 |
| | (4.10) | (3.10) | (2.80) | (3.86) | (2.35) | (2.41) |
| SD($R_m^i$) | −0.777 | −1.345 | −0.976 | 0.023 | −0.018 | 0.010 |
| | (−2.37) | (−5.98) | (−3.11) | (3.69) | (−2.98) | (1.97) |
| FE Country | N | Y | Y | N | Y | Y |
| FE Time | Y | N | Y | Y | N | Y |
| $R^2$ | 0.206 | 0.382 | 0.382 | 0.255 | 0.274 | 0.468 |
| # of Obs. | 8,130 | 8,130 | 8,130 | 8,130 | 8,130 | 8,130 |

# Does country-specific volatility of variance predict returns?

Result of the cross-sectional regression:

| | Dep. var.: Leading month returns | | | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Country-specific VOV | 0.052** | 0.047** | | |
| | (2.22) | (2.04) | | |
| Local RV | | | 0.003 | 0.002 |
| | | | (1.27) | (1.13) |
| ICAPM Beta | −0.006 | | −0.006 | |
| | (−1.50) | | (−1.34) | |

# Consumption dynamics

Epstein-Zin (1991) preference for country $i$ and world $(^*)$:

$$m_{t+1}^{i/*} = \theta \log \beta - \frac{\theta}{\psi} \Delta c_{t+1}^{i/*} + (\theta - 1) R_{TW,t+1}^{i/*},$$

**Country i:**

$$\begin{aligned}
\Delta c_{t+1}^{i} &= \mu + x_t^* + x_t^i + \sqrt{v_t^i}\epsilon_{c,t+1}^{i} + \sqrt{v_t^*}\epsilon_{c,t+1}^{*} \\
x_{t+1}^{i} &= \xi_l x_t^i + \lambda_x \varphi_x \sqrt{v_t^i}\epsilon_{x,t+1}^{i} \\
v_{t+1}^{i} &= v_{l0} + v_{l1} v_t^i + \sigma_l \sqrt{v_t^i}\epsilon_{v,t+1}^{i} \\
\pi_{t+1}^{i} &= p_0 + p_1 \pi_t^i + \sigma_{pl} \sqrt{v_t^i}\epsilon_{\pi,t+1}^{i} + \sigma_{pg} \sqrt{v_t^*}\epsilon_{\pi,t+1}^{*},
\end{aligned} \tag{1}$$

**World:**

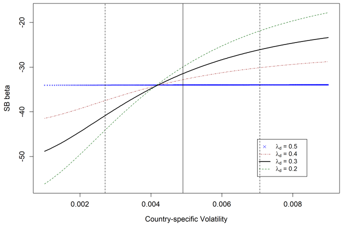
$$\begin{aligned}
\Delta c_{t+1}^{*} &= \mu + x_t^* + \sqrt{v_t^*}\epsilon_{c,t+1}^{*} \\
x_{t+1}^{*} &= \xi_g x_t^* + \sqrt{1-\lambda_x}\varphi_x \sqrt{v_t^*}\epsilon_{x,t+1}^{*} \\
v_{t+1}^{*} &= v_{g0} + v_{g1} v_t^* + \sigma_g \sqrt{v_t^*}\epsilon_{v,t+1}^{*}, \\
\pi_{t+1}^{*} &= p_0 + p_1 \pi_t^* + \sigma_{pg} \sqrt{v_t^*}\epsilon_{\pi,t+1}^{*}
\end{aligned} \tag{2}$$

# Dividend dynamics

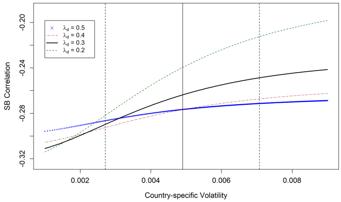
$$\Delta d_{t+1}^{i} = \mu_d + \phi\lambda_d(x_t^i + \varphi_d\sqrt{v_t^i}\epsilon_{d,t+1}^i) + \phi(1-\lambda_d)(x_t^* + \varphi_d\sqrt{v_t^*}\epsilon_{d,t+1}^*),$$

- Key assumption: $\lambda_d < 0.5$
- Preference: $\gamma = 15$, $\psi$=2, $\beta$=0.9985
- Consumption: $\mu$=0.0015, $\xi_g = \xi_l$=0.979, $\lambda_x$=0.25, $\varphi_x$ 0.044
- Variance: $v_{g1}$=0.912, $\sqrt{\bar{v}_t{}^*} = 0.0036$, $v_{l1}$=0.972, $\sqrt{\bar{v}_t{}^i}$=0.0049
- Dividends: $\mu_d$=0.0025, $\phi$=5.0, $\lambda_d$=0.3, $\varphi_d$=4.0, $\sigma_g = 1.94 \times 10^{-4}$, $\sigma_l = 5.10 \times 10^{-4}$
- Correlations: $\rho_{cv}$ = -0.30, $\rho_{cd}$ = 0.45, $\rho_{xv}$=-0.45, $\rho_{cx} = 0$, $\rho_{nr} = 0$

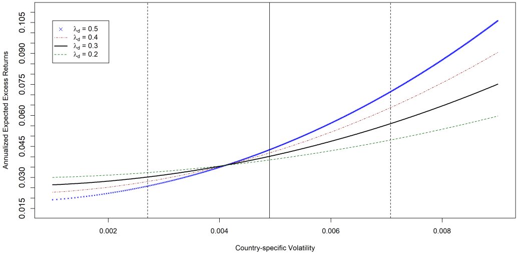
# Model Implications: SB Beta/Correlations




(a) Nominal 10Y SB beta

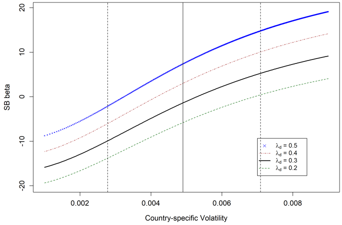



(b) Nominal 10Y SB correlation

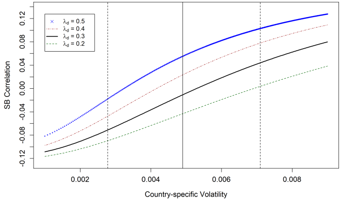



(c) Expected excess stock returns

# Model Implications: SB Correlation




(a) Nominal 10Y SB beta




(b) Nominal 10Y SB correlation

$$\rho_{cx} = \text{-}0.4,\ \rho_{nr} = \text{-}0.3$$

# Conclusion

- ▷ Countries with a positive relationship between returns on stocks and bonds have higher future stock returns.
- ▷ Stock and bond returns are relatively positively related if
  - there is more uncertainty shock within the country or region.
  - sovereign bond yield is volatile.
- ▷ Evidence of local risk priced in the international equity market

# Main result - price returns/daily beta

Countries are sorted by their SB beta, portfolios are formed, and the returns of the next month are evaluated:

| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H–L |
|---|---|---|---|---|---|---|
| Returns | 0.18 | 0.63 | 0.64 | 0.85 | 0.86 | 0.68*** |
| in USD | (0.59) | (2.26) | (2.27) | (2.91) | (2.45) | (2.86) |
| ICAPM | −0.40 | 0.15 | 0.18 | 0.43 | 0.46 | 0.86*** |
| | (−3.55) | (1.56) | (1.44) | (3.13) | (2.80) | (4.62) |
| Returns | 0.12 | 0.53 | 0.63 | 0.82 | 0.92 | 0.81*** |
| in local $ | (0.44) | (2.25) | (2.70) | (3.39) | (3.05) | (3.56) |
| Currency | 0.05 | 0.08 | −0.02 | 0.01 | −0.11 | −0.16 |
| returns | (0.42) | (0.80) | (−0.16) | (0.07) | (−0.94) | (−1.27) |

# Main Result - Alternative Specifications

**A. Weekly Estimation**

| | Total returns | | | | | | Price returns | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H–L | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H–L |
| Returns | 0.28 | 0.32 | 0.53 | 0.52 | 0.93 | 0.65*** | 0.02 | 0.23 | 0.50 | 0.67 | 0.66 | 0.66** |
| in USD | (0.74) | (0.86) | (1.45) | (1.38) | (2.27) | (2.73) | (0.05) | (0.77) | (1.71) | (2.08) | (1.76) | (2.57) |
| ICAPM | −0.18 | 0.10 | 0.32 | 0.30 | 0.92 | 1.11*** | −0.35 | −0.02 | 0.22 | 0.28 | 0.44 | 0.81*** |
| | (−1.77) | (0.60) | (2.47) | (2.03) | (4.32) | (5.16) | (−2.45) | (−0.15) | (1.60) | (1.60) | (2.01) | (3.83) |
| Returns | 0.22 | 0.26 | 0.35 | 0.62 | 1.05 | 0.83*** | 0.00 | 0.25 | 0.49 | 0.67 | 0.81 | −0.81*** |
| in local \$ | (0.68) | (0.85) | (2.11) | (2.06) | (3.14) | (3.60) | (0.01) | (1.05) | (2.04) | (2.51) | (2.45) | (3.40) |
| Currency | 0.06 | 0.06 | −0.07 | −0.09 | −0.11 | −0.17 | 0.01 | −0.03 | 0.02 | 0.00 | −0.14 | −0.15 |
| returns | (0.40) | (0.41) | (−0.47) | (−0.68) | (−0.97) | (−1.59) | (0.09) | (−0.24) | (0.16) | (0.01) | (−1.06) | (−1.09) |

**B. Monthly Estimation**

| | Total returns | | | | | | Price returns | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H–L | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | H–L |
| Returns | 0.15 | 0.26 | 0.32 | 0.72 | 0.71 | 0.57** | 0.55 | 0.52 | 0.46 | 0.87 | 0.96 | 0.42** |
| in USD | (0.47) | (0.87) | (1.13) | (2.27) | (1.95) | (2.34) | (1.72) | (1.81) | (1.57) | (2.67) | (2.68) | (2.06) |
| ICAPM | −0.18 | −0.01 | −0.07 | 0.42 | 0.46 | 0.66*** | −0.11 | 0.08 | 0.28 | 0.41 | 0.85 | 0.96*** |
| | (−1.17) | (−0.11) | (−0.43) | (2.80) | (2.31) | (3.27) | (−0.85) | (0.71) | (2.07) | (2.79) | (4.64) | (4.77) |
| Returns | 0.13 | 0.30 | 0.31 | 0.71 | 0.80 | 0.68*** | 0.60 | 0.44 | 0.57 | 0.88 | 1.07 | 0.50*** |
| in local \$ | (0.44) | (1.26) | (1.27) | (2.79) | (2.61) | (3.04) | (2.28) | (1.82) | (2.31) | (3.39) | (3.61) | (2.72) |
| Currency | 0.02 | −0.05 | 0.01 | 0.01 | −0.09 | −0.10 | −0.05 | 0.07 | −0.10 | −0.01 | −0.11 | −0.07 |
| returns | (0.20) | (−0.40) | (0.10) | (0.05) | (−0.80) | (−0.90) | (−0.40) | (0.69) | (−0.85) | (−0.07) | (−0.93) | (−0.64) |

Go Back