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“A study of potential factor investing strategy from ESG score and intangible capital in Thailand”

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Agenda

• Motivation & Research Questions
• Data
• Methodology & Result
• Key Takeaways
The surge in sustainable investing and the dematerialized world trends has strengthened, drawing increased focus from various stakeholders.

Environment, Social and Governance (ESG) Movement & agenda

Dematerialized world – the rise of Intangible capital

- Increasingly critical in the economy,
  - Economy of knowledge
  - Services-based
  - Innovation-based and digitalized

- Contribution to competitive advantage & differentiating

- Increasing global agenda focus with importance of intangible capital in valuation
  - IMF’s focus: the 10th IMF Statistical: Measuring the Tangible Benefits of Intangible Capital Topic
The rise of sustainable investing & the growing shift to intangible.

**Global perspective: significance PRI Signatory growth in 2006-2021**

- 3,826 PRI signatories in 2021
- New high record of USD 121 trillion collective AUM

**Thailand perspective:**

- NAV of sustainability Fund
- SET retail investor survey on ESG

**SET retail investor survey on ESG**

- 80% traded at least 1 sustainable stock
- 10 Bn
- 52 Bn
- 70,000
- 60,000
- 50,000
- 40,000
- 30,000
- 20,000
- 10,000
- 0

**Example of intangible capital**

- Patents/copyrights
- Brand Value/Goodwill
- R&D
- Customer data
- Innovation/Idea
- Human Capital

Source: PRI report, Morning Star Thailand as of 31 December 2022, SET note vol.8/2022, Franklin Templeton Investment Institute, FactSet. As of May 2021
The study would like to shed light on empirical link between ESG scores and intangible capital relationship.

Conceptual Summary Framework

ESG Scores

Intangible Capital

Stock Performance (Risk & Return)

ESG Investment

Direct Intangible asset creations

Indirect Intangible asset creations

Scalable Value Creation through interconnection

Research gap on ESG & intangible capital -> academic contribution
Research Questions

Is there a relationship between ESG scores and intangible capital ratio?
ESG value creation Framework stated that investments in ESG lead to the creation of intangible value. The aim of this study is to investigate the empirical findings regarding this association.

Can the stock performance be influenced by ESG scores and intangible capital?
Academic research have discovered that both ESG impact and intangible capital linked to stock performance. Does the interaction term have an impact on stock performance?

Can an investment strategy be formulated utilizing ESG scores and intangible capital?
(Potential factor investing)
Is it feasible to develop a rule-based portfolio investment strategy that captures risk-adjusted returns and generates alpha?
Data

1. Data resources for ESG assessment results

   **REFINITIV**
   
   Alternative measurement
   ESG Scores by Third Party
   – Refinitiv

   - Evaluation scores: 0-100 points
   - There were 169 companies
   - Period of Study: 2018 – 2022 through Backfill on the missing data

2. Measurement of intangible capital

   intangible capital from expense capitalization following Peters and Taylor (2017)

   \[ \text{int}_\text{cap}_{it} = EIM_{it} + OC_{it} \]

   - **EIM\(_{it}\)**: Externally purchased intangible capital in balance sheet
   - **OC\(_{it}\)**: Internally generated intangible capital Firm's organizational capital

3. Other financial data: from Refinitiv DataStream, CMDF and SET

   Capitalize expanses as an investment

   - Capitalization
   - Expensing

   **Blanch sheet** vs **SG&A**

   Most of the expenditures generating organization capital could not be capitalized into balance sheet according to accounting treatment.

   Capitalize selling, General & administrative expenses (SG&A) as investment in organization capital (\(OC_{it}\))

   Accounting has lagged behind in valuing these forms of capital - the omission of in-house intangible investments
### Descriptive statistics for ESG score companies

**169 firms in 5 years period (2018-2022)**

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
<th>Min</th>
<th>Std Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICR2</td>
<td>845</td>
<td>0.150</td>
<td>0.120</td>
<td>0.420</td>
<td>0.020</td>
<td>0.110</td>
</tr>
<tr>
<td>ESG score</td>
<td>845</td>
<td>48.920</td>
<td>49.250</td>
<td>78.510</td>
<td>17.470</td>
<td>17.300</td>
</tr>
<tr>
<td>lnTotalAssets</td>
<td>845</td>
<td>17.340</td>
<td>17.320</td>
<td>20.370</td>
<td>14.760</td>
<td>1.600</td>
</tr>
<tr>
<td>DebtRatio</td>
<td>845</td>
<td>0.310</td>
<td>0.330</td>
<td>0.670</td>
<td>0.000</td>
<td>0.200</td>
</tr>
<tr>
<td>ROA</td>
<td>845</td>
<td>6.330</td>
<td>5.860</td>
<td>15.530</td>
<td>-1.020</td>
<td>4.450</td>
</tr>
<tr>
<td>BTM</td>
<td>845</td>
<td>0.660</td>
<td>0.570</td>
<td>1.640</td>
<td>0.100</td>
<td>0.450</td>
</tr>
<tr>
<td>RI</td>
<td>845</td>
<td>5.650</td>
<td>0.000</td>
<td>74.130</td>
<td>-36.270</td>
<td>28.690</td>
</tr>
</tbody>
</table>

**Note:** All data are winsorized at the 5% and 95% level.

- **Panel data** = 845 data observations
- **ICR2:** Mean at 0.15 Median at 0.12, right-skew (positive), low standard deviation
- **ESG score:** mean at 48.92, Median at 49.25, slight left-skew (negative)
- **For control variables** comprised of Ln of Total Assets, DebtRatio, Return on Assets (ROA), Book-to-Market Ratio (BTM)

**Note:** _win = after winsorized data
Hypothesis 1: Analysis relationship between ESG scores and intangible capital ratio result

**Research Objective 1:** Is there a relationship between ESG scores & intangible capital ratio?

\[ \text{int}_c\text{ap\_ratio}_{it} = \beta_0 + \beta_1 \text{ESG}_it + \sum^n_k \gamma_k \text{Control}_{kit} + \epsilon_{it} \]

Hypothesis 1: high ESG score will have high Intangible capital ratio (Positive correlation).

Model: ICR with ESG score (2018-2022)

<table>
<thead>
<tr>
<th></th>
<th>(1) ICR</th>
<th>(2) ICR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.517***</td>
<td>0.725**</td>
</tr>
<tr>
<td></td>
<td>(0.095)</td>
<td>(0.327)</td>
</tr>
<tr>
<td>ESG score</td>
<td>0.001**</td>
<td>0.00004</td>
</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td>(0.0003)</td>
</tr>
<tr>
<td>Ln(Total Assets)</td>
<td>-0.022***</td>
<td>-0.019</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>DebtRatio</td>
<td>-0.003</td>
<td>-0.007</td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>ROA</td>
<td>-0.0004</td>
<td>-0.0004</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>BTM</td>
<td>-0.058***</td>
<td>0.023*</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Fixed-Effects¹</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>845</td>
<td>845</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.1326</td>
<td>0.9500</td>
</tr>
<tr>
<td>( \text{Adjusted R}^2 )</td>
<td>0.1274</td>
<td>0.9367</td>
</tr>
</tbody>
</table>

Clustered standard errors in parentheses. * \( p < 0.10 \), ** \( p < 0.05 \), *** \( p < 0.01 \)

Note: 1). Fixed-Effect in terms of factor (Stock) factor (Year) and factor (Industry)

With Fixed effect: The ESG score was not statistically significant relationship to intangible capital ratio.
Hypothesis 2: Analysis of ESG scores, Intangible capital level and both factors on buy-and-hold returns regression

Research Objective 2: Can the stock performance be influenced by ESG scores and intangible capital?

Methodology

BHR = γ₀ + γ₁ ESG + γ₂ ESG\textsubscript{no score} + γ₃ int\_cap ratio

+γ₄ ESG \times int\_cap ratio + γ₅ ESG\textsubscript{no score} \times int\_cap ratio

+ δ X + ε

Hypothesis 2: interaction term of ESG score & intangible capital ratio will provide high impact on the return

Return with ICR and ESG score

<table>
<thead>
<tr>
<th>(1) RI</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>103.843*</td>
</tr>
<tr>
<td>(40.767)</td>
<td></td>
</tr>
<tr>
<td>ESG score</td>
<td>-61.7966**</td>
</tr>
<tr>
<td>(21.2335)</td>
<td></td>
</tr>
<tr>
<td>ICR</td>
<td>-95.8102***</td>
</tr>
<tr>
<td>(19.4076)</td>
<td></td>
</tr>
<tr>
<td>ICR*ESG</td>
<td>21.455</td>
</tr>
<tr>
<td>(36.699)</td>
<td></td>
</tr>
<tr>
<td>TA</td>
<td>-1.3403</td>
</tr>
<tr>
<td>(2.1720)</td>
<td></td>
</tr>
<tr>
<td>DebtRatio</td>
<td>-9.7190</td>
</tr>
<tr>
<td>(6.7400)</td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>1.8580***</td>
</tr>
<tr>
<td>(0.1454)</td>
<td></td>
</tr>
<tr>
<td>BTM</td>
<td>-45.6095***</td>
</tr>
<tr>
<td>2.0173</td>
<td></td>
</tr>
<tr>
<td>Fixed-Effects¹</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>3,025</td>
</tr>
<tr>
<td>R²</td>
<td>0.5428</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.4263</td>
</tr>
</tbody>
</table>

Clustered standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01

Note: 1). Fixed-Effect in terms of factor (Stock) factor (Year) and factor (Industry)

With Fixed effect: The interaction term between ICR and ESG also wasn't significant relationship to the return
Research Objective 3: Can an investment strategy be formulated utilizing ESG scores and intangible capital? (Rule-based investing strategy to captures risk-adjusted returns and generates alpha)

1. Categorize the data (3x2 matrix)

<table>
<thead>
<tr>
<th>ESG Score</th>
<th>Intangible Capital Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>High ESG score</td>
<td>High int_cap ratio</td>
</tr>
<tr>
<td>Low ESG score</td>
<td>Low int_cap ratio</td>
</tr>
<tr>
<td>No ESG score</td>
<td>Low int_cap ratio</td>
</tr>
</tbody>
</table>

- Gather data (SET)
- Categorize companies with ESG scores & intangible capital ratio into 6 groups (3x2 matrix)
  - No, Low, High ESG scores
  - Low & High intangible capital ratio
  (For Refinitiv ESG Score)

2. Run Buy & Hold Strategy for each port

3. Factor Loading analysis with
   (Daily basis frequency)

\[ r_{lt} - r_{f,t} = \alpha_i + \sum \beta_i \text{Factor}_t + \epsilon_{lt} \]

Factor data is obtained from Thailand’s Factor Library, supported by Capital Market Development Fund (CMDF) and SETSMART Enterprise, SET

4. To analyze risk & return portfolio performance, compared with SETTRI
   - Alpha
   - Cumulative Return
   - Sharpe/ Treynor Ratio

Hypothesis 3: Companies with High ESG score & high intangible capital ratio will provide greater abnormal return than companies with Low ESG score or Low intangible capital ratio.
Companies that participated in ESG disclosure & score assessment, higher ICR levels provide better returns. However, all factor portfolios outperformed SETTRI benchmark.

Results from each portfolio with the three-factor, four-factor & five-factor model.

Factor Loading analysis on alpha

<table>
<thead>
<tr>
<th>Low ESG Score &amp; High ICR (LH)</th>
<th>COEF</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ESG scores &amp; Low ICR</td>
<td>0.1225**</td>
<td>(0.0002)</td>
</tr>
</tbody>
</table>

Alpha

<table>
<thead>
<tr>
<th>Low ESG Score &amp; High ICR (LH)</th>
<th>COEF</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ESG scores &amp; Low ICR</td>
<td>0.1225**</td>
<td>(0.0002)</td>
</tr>
</tbody>
</table>
Considering Intangible capital provided higher risk & return than ESG factor.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Port Return</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H,H)</td>
<td>34.37%</td>
<td>18.07%</td>
</tr>
<tr>
<td></td>
<td>73.02%</td>
<td>19.15%</td>
</tr>
<tr>
<td>(L,L)</td>
<td>35.45%</td>
<td>16.29%</td>
</tr>
<tr>
<td></td>
<td>84.74%</td>
<td>22.67%</td>
</tr>
<tr>
<td>(L,H)</td>
<td>56.73%</td>
<td>23.22%</td>
</tr>
<tr>
<td>(H,L)</td>
<td>38.97%</td>
<td>6.93%</td>
</tr>
</tbody>
</table>

Note:
- Portfolio (H,H): High ESG score and High Intangible capital ratio
- Portfolio (H,L): High ESG score and Low Intangible capital ratio
- Portfolio (L,H): Low ESG score and High Intangible capital ratio
- Portfolio (L,L): Low ESG score and Low Intangible capital ratio
Key Takeaways

For Investor

• Voice over for better understanding on undisclosed information
• Expand new investment opportunity & analysis in ESG & Intangible capital aspects & relationship
• Improve risk/return, compared with SETTRI

For Business/Company

• Intangible capital plays a significant role in firms’ competitive advantage but is often missing from balance sheets & business accounts.
• Improve information disclosure for investors to grasp growth & strategy drivers.
• Emphasize understanding on ESG investment should relate along business value chain & is considered as a long-term value
• Develop ESG strategy to create competitive advantages & protect downside risks

For policymakers & Regulators

• Improve measurement of intangible capital for enhanced support in investment, taxation, and macroeconomic analysis.
• Accurate intangible capital measurement is crucial for understanding the drivers of company growth.
• Advocate for increased disclosure and database development for ESG and intangible capital.

For Economy & Thailand

• To Support The National Economic and Social Development Plan no.13: Create economic value along with sustainable social development
• Innovation Policy for Sustainable Development: Digital/Creative Economy link to care and sustainability economy