Decoding global performance indices
The role and merit of “competitiveness” reports in guiding policy in the UAE

A presentation to the UAE Economics Network at the Canadian embassy (Abu Dhabi, UAE)

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CONTENT

- What is a global performance index?
  - UAE government & policy
  - Pros and cons of reports-based policy making
  - How to interpret and use reports to guide policy
  - Appendix
Global performance indices...
Take data inputs (indicators) to produce a rankable output (index)

A global performance index (a.k.a. “competitiveness report” in the UAE) provides a measure of a country’s strength in a given sector/dimension relative to other nation states. They allow the UAE to benchmark its performance against other countries and a deterministic path on how to improve on the measure.

“If you can’t measure it, it doesn’t exist.”
Bill Gates
In recent years a proliferation of such indices

However, a small subset are globally recognised (albeit flawed)

Source: Economist (Nov 8th 2014)
Selection of reports actively monitored by UAE

Both the index and its components are tracked by FCSA/PMO
WEF Global Competitiveness Report (GCR)

Index score is akin to a GPA based on the various “subjects” of the report.

Competitiveness pertains to the ability & performance of a firm, sub-sector or country to sell and supply goods & services in a given market, in relation to the ability & performance of other firms, subsectors or countries in the same mkt.

Institutions
Infrastructure
Macroeconomic environment
Health & primary education
Higher education & training
Goods market efficiency
Labour market efficiency
Financial market development
Technological readiness
Market size
Business sophistication
Innovation

Source: WEF-GCR.
Multi-stage process to generate index score

Clean data; normalize it (unit-free); aggregate it into a rankable output

\[
\begin{align*}
    f(x) &= \begin{cases} 
    \bar{v} : v > \bar{V} \\
    v : V \leq v \leq \bar{V} \\
    v : v < V
    \end{cases} \\
    c(v) &= \begin{cases} 
    \frac{x - \mu}{\sigma} : x \in G \\
    -\frac{x - \mu}{\sigma} : x \in B \\
    \alpha \log(x) + \beta : x \notin N
    \end{cases} \\
    I(s(x)) &= \sum_{i=1}^{N} \alpha_i s_i(x) \\
    I(s(x)) &= \left( \prod_{i=1}^{N} \alpha_i s_i(x) \right)^{1/N}
\end{align*}
\]
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Government policy as a maximisation problem

Maximise social welfare choosing policy variables that achieve KPIs

The UAE government places great priority (and its legitimacy of rule) on delivering a high quality of life to its citizens. The UAE government accomplishes this through three primary means:

1. **Placing key performance indicators on government bodies to ensure transparent policymaking that works to improve the country**
2. Attracting expats to the country to help make the country prosperous
3. Creating conditions favourable to its citizens and offering them employment through the public and semi-public sectors

Mathematically, this can be represented as:

\[
\max_{\{\kappa; \pi\}} W = \sum_{i=1}^{N} \omega_i W_i(\kappa; V)
\]

s.t. \( V = \sum_{j=1}^{M} \vartheta_j V_j \geq \bar{V} \) and \( M = \min\{M\} \)

s.t. \( C(\kappa(\pi)) \leq B \) and \( \kappa_{t|0} \rightarrow \kappa_{t|T} \)

where \( W_i'(\kappa; \cdot) \geq 0 \) and \( W_i'(\cdot; V) \geq 0 \)

and \( g(\kappa; \cdot) \geq 0 \); and \( \kappa \) a set of KPIs

and \( \kappa = \kappa(\pi_1, \pi_2, \pi_3, \ldots, \pi_L) = \kappa(\pi) \)

Policy variables
Government policy is set top down
PMO announces general direction mapped to quantifiable 3rd-party KPIs

The PMO sets policy by mandating government departments to enact policies that will be reflected in international reports (e.g. WEF-GCR)

Dedicated gov’t unit to drive/manage KPI-driven policies
KPIs assigned to all government entities

They incentive entities to enact policies aligned with development goals

The PMO assigns KPIs (indicators, indices, etc.) to every Ministry/Minister based on 3rd-party metrics – encouragement also in place for the private sector. Quantifiable targets give entities clarity on how to set policies and incentivise parties to enact legislation aligned with the UAE’s strategic development goals.
Vision 2021: “National Agenda” goals
The UAE has laid out a clear strategic roadmap for development

Cohesive society & preserved identity
Safe public & fair judiciary
Competitive knowledge economy
First-rate education system
World-class healthcare
Sustainable environment & infrastructure

But how to measure success of these goals?...

Sources: UAE Vision 2021.
10 of the National Agenda goals tied to indices

Many other goals are tied to indicators within global indices

Sources: Earth Institute, GEDI, IMD, INSEAD, Legatum Institute, UNDP, WEF, World Bank
The UAE’s diversification goals are tied to indices
Targeted sectors of economy are mapped to global performance reports
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Negatives of using performance indices

Chasing rank may lead to gaming the index and flaws of the report

Global performance indices are, by nature, designed to look at the international landscape and not to the specifics of a country or region.

- Incentive to massage data & game index
- Overly focused on index score, rather than actual policy improvements
- Proliferation of indices, many of which are poorly constructed (including some with global cache)

- Misleading inputs
- Misleading outputs (e.g. IMD-WCY score)
- Subject to non-robust methodologies
Measurement error and moving targets
Subject to whims of methodologies of indices

Index relies on data inputs, but data are measured with error (especially in the UAE)...

The index inputs and methodology are subject to change from year to year...

So index result is often misleading. Moreover, survey data are not calibrated and of small sample size

So policies that are set based on a given index construction need to be reset frequently
Positives of using performance indices

Simplicity, transparency and third-party recognition

"Be number one!"

"Be number one!"
Using public / high profile indices builds brand

Good performance/recognition of UAE/Dubai helped win right to Expo 2020

TI-CPI

WEF-TTR

WEF-GCR

WB-DBR
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Prioritising indices and indicators

Which reports are relevant? Which indicators are key to improving on index?

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic</td>
<td>National Agenda; PMO KPIs</td>
</tr>
<tr>
<td>UAE coverage</td>
<td>✓</td>
</tr>
<tr>
<td>Frequency</td>
<td>Regular</td>
</tr>
<tr>
<td>Reputation</td>
<td>Global and credible</td>
</tr>
<tr>
<td>Usefulness / Actionable</td>
<td>✓</td>
</tr>
<tr>
<td>Objectivity</td>
<td>✓</td>
</tr>
<tr>
<td>Transparency</td>
<td>✓</td>
</tr>
</tbody>
</table>

Once reports are chosen, priority is placed on working on indicators that will improve most the rank (the sensitivity of the index to a change in an indicator)

\[
\text{severity} = \text{weight} \times \text{loss} = \omega \left( \max_{j} \{s_j\} - s \right)
\]
### Understanding the reports

It is not sufficient to just consider indicator values and/or ranks.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Grouping</th>
<th>Unit</th>
<th>+/−</th>
<th>Data type</th>
<th>Score</th>
<th>Rank</th>
<th>Weight</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property rights</td>
<td>Institutions</td>
<td>[1, 7]-discrete</td>
<td>+</td>
<td>Survey</td>
<td>5.5</td>
<td>23</td>
<td>0.53%</td>
<td>WEF EOS</td>
</tr>
<tr>
<td>Inflation</td>
<td>Macro-economy</td>
<td>%</td>
<td>−</td>
<td>Data</td>
<td>1.1</td>
<td>1</td>
<td>1.06%</td>
<td>IMF WEO</td>
</tr>
<tr>
<td>GDP</td>
<td>Market size</td>
<td>$BN (PPP)</td>
<td>+</td>
<td>Data</td>
<td>272.0</td>
<td>49</td>
<td>6.25%</td>
<td>IMF WEO</td>
</tr>
<tr>
<td>Days to start a business</td>
<td>Goods mkt efficiency</td>
<td>Day</td>
<td>+</td>
<td>Data</td>
<td>8.0</td>
<td>39</td>
<td>0.35%</td>
<td>World Bank</td>
</tr>
<tr>
<td>Malaria cases</td>
<td>Health &amp; education</td>
<td>Per 100,000</td>
<td>−</td>
<td>Data</td>
<td>MF</td>
<td>n/a</td>
<td>0.33%</td>
<td>WHO</td>
</tr>
<tr>
<td>GCI score</td>
<td>Index</td>
<td>[1, 7]-continuous</td>
<td>+</td>
<td>Index</td>
<td>5.33</td>
<td>12</td>
<td>100.0%</td>
<td>WEF</td>
</tr>
</tbody>
</table>

What improves the index score (and rank) more:

1. An increase in property rights by 0.5? or
2. An increase in GDP of 14? or
3. Reducing days to start a business by 1?

Cannot answer this question by looking at ranks or scores!
Fallacy of looking at values and ranks
Indices are constructed to compare indicator values against other countries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Country #1</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #2</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #3</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #4</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #5</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #99</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>UAE</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #101</td>
<td>99.0</td>
<td>101</td>
</tr>
</tbody>
</table>

"Enrolment ratio rank dropped from 1 to 100 leading to a sharp fall in our rank."

<table>
<thead>
<tr>
<th>GDP growth (%)</th>
<th>Score (2014)</th>
<th>Rank (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country #1</td>
<td>10.0</td>
<td>1</td>
</tr>
<tr>
<td>Country #2</td>
<td>9.9</td>
<td>2</td>
</tr>
<tr>
<td>Country #3</td>
<td>9.8</td>
<td>3</td>
</tr>
<tr>
<td>Country #4</td>
<td>9.7</td>
<td>4</td>
</tr>
<tr>
<td>Country #5</td>
<td>9.6</td>
<td>5</td>
</tr>
<tr>
<td>Country #99</td>
<td>0.2</td>
<td>99</td>
</tr>
<tr>
<td>UAE</td>
<td>-4.9</td>
<td>100</td>
</tr>
<tr>
<td>Country #101</td>
<td>-5.0</td>
<td>101</td>
</tr>
</tbody>
</table>

"GDP growth fell by half so it lowered our score and rank."
## Indicator score rather than value is important

Score is the unit-free normalised value indicator value

### Z-score example (e.g. IMD-WCY)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Property rights</td>
<td>Survey</td>
<td>5.5</td>
<td>5.0</td>
<td>+0.5</td>
<td>5.5</td>
<td>1.2</td>
<td>5.0</td>
<td>1.1</td>
<td>0</td>
<td>0</td>
<td>N/C</td>
</tr>
<tr>
<td>GDP growth rate</td>
<td>%</td>
<td>3.2</td>
<td>4.1</td>
<td>-0.9</td>
<td>2.5</td>
<td>2.9</td>
<td>3.9</td>
<td>3.0</td>
<td>0.241</td>
<td>0.067</td>
<td>+0.175</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>Years</td>
<td>9.9</td>
<td>9.9</td>
<td>N/C</td>
<td>10.1</td>
<td>4.0</td>
<td>9.8</td>
<td>4.0</td>
<td>-0.050</td>
<td>0.025</td>
<td>-0.075</td>
</tr>
<tr>
<td>Days to start bus.</td>
<td>Days</td>
<td>8</td>
<td>9</td>
<td>+1</td>
<td>9</td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>-0.200</td>
<td>0.333</td>
<td>-0.133</td>
</tr>
<tr>
<td>PISA score</td>
<td>[200, 800]</td>
<td>450</td>
<td>460</td>
<td>-10</td>
<td>490</td>
<td>105</td>
<td>510</td>
<td>110</td>
<td>-0.381</td>
<td>-0.455</td>
<td>+0.074</td>
</tr>
<tr>
<td>INDEX (RANK)</td>
<td>ℝ</td>
<td>15</td>
<td>10</td>
<td>-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7-score example (e.g. WEF-GCR)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Property rights</td>
<td>Survey</td>
<td>5.0</td>
<td>5.5</td>
<td>-0.5</td>
<td>3.5</td>
<td>6.8</td>
<td>3.3</td>
<td>6.9</td>
<td>5.0</td>
<td>5.5</td>
<td>-0.5</td>
</tr>
<tr>
<td>GDP growth rate</td>
<td>%</td>
<td>4.1</td>
<td>3.2</td>
<td>-0.9</td>
<td>2.0</td>
<td>16.0</td>
<td>-4.0</td>
<td>10.0</td>
<td>1.90</td>
<td>4.09</td>
<td>-2.19</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>Years</td>
<td>9.9</td>
<td>9.9</td>
<td>N/C</td>
<td>5.0</td>
<td>18.0</td>
<td>6.0</td>
<td>16.0</td>
<td>3.26</td>
<td>3.34</td>
<td>-0.08</td>
</tr>
<tr>
<td>Days to start bus.</td>
<td>Days</td>
<td>9</td>
<td>8</td>
<td>+1</td>
<td>4</td>
<td>22</td>
<td>4</td>
<td>16</td>
<td>5.33</td>
<td>5.00</td>
<td>+0.33</td>
</tr>
<tr>
<td>PISA score</td>
<td>[200, 800]</td>
<td>460</td>
<td>450</td>
<td>-10</td>
<td>410</td>
<td>600</td>
<td>320</td>
<td>560</td>
<td>2.58</td>
<td>4.25</td>
<td>-1.67</td>
</tr>
<tr>
<td>INDEX (RANK)</td>
<td>ℝ</td>
<td>10</td>
<td>15</td>
<td>-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
No such thing as missing indicators

Mistaken belief about the impact of “missing data”

When an indicator is missing, the weight of that variable is reassigned to the other indicators within the indicator group. However, if a country is missing too many values its inclusion in the index/report may be dropped.

“The missing data are hurting the UAE.”

“The lack of data is holding back the UAE’s performance on the index.”

“We will improve on the report if we can find all the data.”
Example of how missing data are treated

Missing values do not (ex ante) hurt a country’s performance

The vast majority of reports “do not consider/ignore” missing data and shift weight of indicator to remaining indicators within the group...

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Data type</th>
<th>Weight</th>
<th>Value</th>
<th>UAE weight</th>
<th>Score</th>
<th>Implicit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator #1.1</td>
<td>Survey</td>
<td>1.0%</td>
<td>5.0</td>
<td>1.67%</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Indicator #1.2</td>
<td>Survey</td>
<td>1.0%</td>
<td>5.5</td>
<td>1.67%</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Indicator #1.3</td>
<td>Survey</td>
<td>1.0%</td>
<td>6.0</td>
<td>1.67%</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Indicator #1.4</td>
<td>Data</td>
<td>2.0%</td>
<td>N/A</td>
<td>0.00%</td>
<td>Avg 5.5</td>
<td></td>
</tr>
<tr>
<td>Indicator #2.1</td>
<td>Data</td>
<td>2.0%</td>
<td>42,000</td>
<td>2.40%</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
<td>Indicator #2.2</td>
<td>Data</td>
<td>2.0%</td>
<td>6.2</td>
<td>2.40%</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>Indicator #2.3</td>
<td>Survey</td>
<td>1.0%</td>
<td>76.7</td>
<td>1.20%</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>Indicator #2.4</td>
<td>Data</td>
<td>1.0%</td>
<td>N/A</td>
<td>0.00%</td>
<td>W-Avg f^−1(6.18)</td>
<td></td>
</tr>
<tr>
<td>Indicator #3.1</td>
<td>Data</td>
<td>1.0%</td>
<td>6.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

... But this is misleading/wrong! Any treatment of missing data assigns it a value!
Targeting indices is an indirect growth strategy

But it is akin to central banks targeting inflation rate

Creating policies (or massaging data/index) for the purpose of achieving a KPI is a second-best way of achieving development goals, but its transparency and ability to rally support amongst the population make it an effective means of policy making in the UAE.
Do not need to rely always on third parties
Use public data and apply index methodologies to create custom indices

Pick and choose the knowledge and intellectual capital of the reports and use it to create tailored index that will be more applicable to the UAE (or desired target)
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Appendix
APPENDIX: Historical performance of the UAE
WEF-GCR, WB-DBR, UNDP-HDR, LI-LPI

Sources: Legatum Institute, UNDP-HDR, WEF-GCR, World Bank DBR.