Variables for sustained growth 2016 index
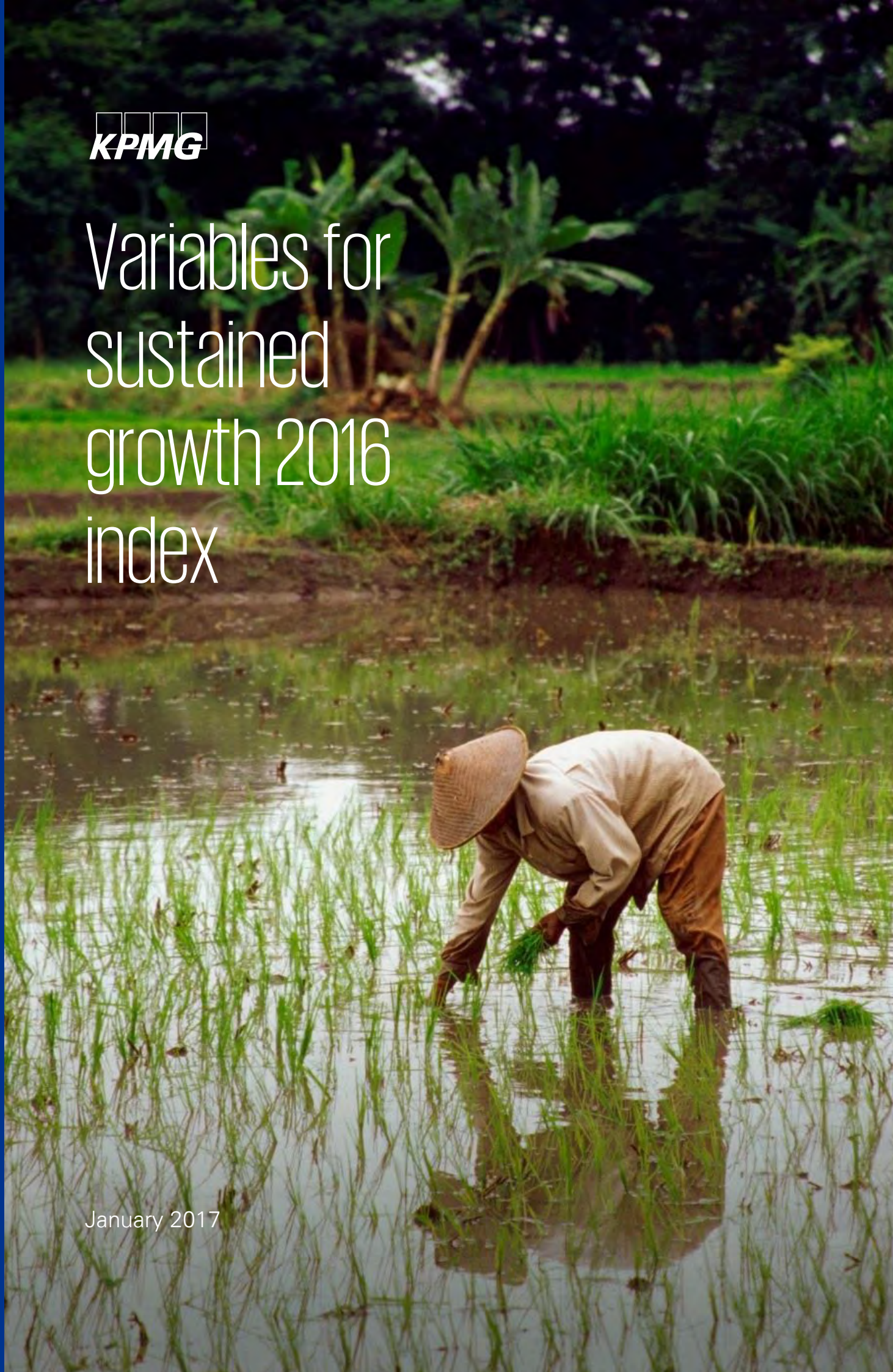
KPMG

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Contents

Executive summary

The Variables for Sustained Growth (VSG) Index aims to compare the productivity potential of different countries across a range of factors. It can be used by governments and investors, alongside other models, to assess a country's growth potential over the long term and to benchmark its performance against peers and top performers.

The VSG Index focuses on factors that policy makers can influence. Some VSG indicators, such as education, technology and strength of institutions, have the potential to greatly affect the future economic growth and wealth of countries.

Western European countries dominate the 2016 VSG Index, with Singapore and Hong Kong the only non-European countries to earn a place in the top 10. Switzerland scored highest, followed by the Netherlands and Luxembourg.

Among the major developing Asian economies, Malaysia put in a relatively strong performance; Afghanistan ranked weakest, while China advanced steadily over the past 10 years, mostly thanks to improvements in transport quality and technology readiness. Among the larger Latin American countries, Chile, with its high levels of foreign direct investment (FDI) stock and human capital, on par with some European countries, retained first place in the region despite a minor decline in the overall VSG score over the past five years. Despite more than half of African countries experiencing a rise in their VSG scores between 2001 and 2016, the gap between the Africa region average and world average widened over the period.

The top of the 2016 VSG Index is dominated by higher income countries, but income alone does not determine performance in the VSG Index. Policy makers themselves have a role to play in improving their countries' growth potential, as measured by the VSGs.

Take New Zealand, which ranked 11th in the world in the 2016 VSG Index, which is the best performer compared with other economies with similar levels of income, while some of the larger producers and exporters of natural resources performed relatively poorly compared with peers in the same income group.

Equally, a change in policy direction can have a significant impact on a country's VSG performance. Brexit, for instance, could prompt the UK's VSG score to fall as a consequence of lower trade and reduced skill levels due to a decline in EU migration. Meanwhile, in the US, the effects of a new president and new policies could go either way – aiding or damaging its VSG score.

Introduction

Since the Great Recession almost a decade ago many countries have struggled to reach earlier levels of economic performance. Economic growth is primarily a consequence of three factors: a growing labour force, a rise in capital stock, and improvements to productivity. Productivity therefore plays a crucial part in countries' quest for economic growth and prosperity.

Numerous factors are likely to influence productivity in each country, but for public policy makers and investors, it is important to understand how some of the major productivity drivers evolve over time and how each country's performance compares with its peers. Such insights enable better understanding of the economic growth potential of their country and how its future course could be improved.

The Variables for Sustained Growth (VSG) Index was developed in order to compare the productivity potential of different countries across a broad range of factors. The index is part of a set of models that KPMG uses to assess countries' long-term economic growth, and is focused on those areas that policy makers can influence.

The VSG Index comprises 21 series, selected from academic studies and business survey results, to assess countries' productivity potential. The importance of each series within the index, as captured by the weights applied to each series, was determined by econometric analysis, as well as by primary research.[1]

The VSG Index is divided into five pillars:

■ Macroeconomic stability

■ Openness to catch-up with best practice

■ Infrastructure quality

■ Human capital

■ Strength of public institutions

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[1] See Appendix 1 for further discussion of the methodology used to create the VSG Index.

Each pillar represents a number of series and sub-series, which capture key factors associated with productivity performance. These are illustrated in Table 1:

Table 1: Components of the VSG Index

Pillars	Series	Sub-series
Macroeconomic stability	■ Government deficit ■ Government debt	
Openness to catch-up	■ FDI stock ■ Total trade	
Infrastructure	■ Quality of transport ■ Technology readiness ■ Financial institutions – availability of financial services	■ Roads ■ Rail ■ Ports ■ Air ■ 3G network coverage ■ Broadband penetration ■ Secure internet servers
Human capital	■ Education – enrolment rates (weighted by relative return) and test results ■ Life expectancy	
Institutional strength	■ Regulatory quality ■ Judicial independence ■ Transparency of government policymaking ■ Government effectiveness ■ Corruption ■ Business rights	■ Property rights ■ Intellectual property rights

Source: KPMG Macroeconomics

The VSG Index was originally developed in 2013 by members of the KPMG macroeconomics team in collaboration with external advisors. It covers 181 countries and tracks their performance across the productivity drivers since 1997. This year, KPMG has changed the source of data used to measure the quality of mobile and broadband infrastructure, as well as education. We have also revised the relative weightings given for different measures of technology readiness to allow for the introduction of new data. Historic values have been adjusted accordingly, and highlights of historic performance are explored in the regional analysis.

This report outlines the index's overall ranking results for 2016, and we look in more detail at performance across different regions. Additionally, as the trajectory of VSGs can be affected by external events, as well as by shifts in policy direction, we consider how the UK's decision to leave the EU and the new government in the US might impact VSGs in the respective countries. Detailed performance by pillar is provided in Appendix 2.

The VSG Index 2016 ranking

Rank	Country	Overall score	Rank	Country	Overall score	Rank	Country	Overall score	Rank	Country	Overall score
1	Switzerland	8.3	23	France	6.7	45	Croatia	5.1	67	Botswana	4.7
2	Netherlands	8.2	24	United States	6.7	46	Georgia	5.1	68	Thailand	4.7
3	Luxembourg	8.1	25	Israel	6.3	47	Costa Rica	5.0	69	Mexico	4.6
4	Hong Kong	7.9	26	United Arab Emirates	6.3	48	Oman	5.0	70	Vietnam	4.5
5	Norway	7.7	27	Qatar	6.0	49	Panama	5.0	71	Jamaica	4.5
6	Finland	7.7	28	Czech Republic	6.0	50	Italy	5.0	72	Belarus	4.5
7	Denmark	7.7	29	Cyprus	6.0	51	Seychelles	5.0	73	Kazakhstan	4.5
8	Sweden	7.6	30	Slovenia	5.9	52	Bulgaria	5.0	74	Saint Vincent and the Grenadines	4.5
9	Iceland	7.5	31	Lithuania	5.9	53	Hungary	5.0	75	Russia	4.5
10	Singapore	7.5	32	Portugal	5.9	54	Jordan	4.9	76	Serbia	4.5
11	New Zealand	7.4	33	Spain	5.9	55	China	4.9	77	Azerbaijan	4.4
12	Germany	7.3	34	Chile	5.9	56	Greece	4.9	78	Morocco	4.4
13	United Kingdom	7.2	35	Latvia	5.8	57	Brunei	4.9	79	Sri Lanka	4.4
14	Canada	7.2	36	Malaysia	5.7	58	Turkey	4.9	80	Kuwait	4.4
15	Ireland	7.2	37	Barbados	5.6	59	South Africa	4.8	81	Bhutan	4.4
16	Belgium	7.1	38	Poland	5.5	60	Namibia	4.8	82	Tunisia	4.3
17	Australia	7.0	39	Uruguay	5.5	61	Romania	4.8	83	Colombia	4.3
18	Estonia	6.9	40	Mauritius	5.4	62	Montenegro	4.8	84	Albania	4.3
19	Austria	6.9	41	Bahamas	5.3	63	Trinidad and Tobago	4.8	85	Cabo Verde	4.3
20	Japan	6.8	42	Bahrain	5.3	64	Antigua and Barbuda	4.8	86	Indonesia	4.3
21	Korea, South	6.8	43	Saudi Arabia	5.2	65	Macedonia FYR	4.7	87	Grenada	4.3
22	Malta	6.7	44	Slovakia	5.1	66	Rwanda	4.7	88	Saint Lucia	4.3

Source: KPMG Macroeconomics

Rank	Country	Overall score	Rank	Country	Overall score	Rank	Country	Overall score	Rank	Country	Overall score
89	Samoa	4.2	112	Maldives	3.8	135	Gambia	3.3	158	Venezuela	2.8
90	Lebanon	4.2	113	Belize	3.7	136	Pakistan	3.3	159	Central African Republic	2.7
91	Peru	4.2	114	Suriname	3.7	137	Bolivia	3.3	160	Myanmar	2.6
92	Armenia	4.2	115	Ukraine	3.7	138	Vanuatu	3.2	161	Togo	2.6
93	Dominican Republic	4.2	116	Mongolia	3.7	139	Cameroon	3.2	162	Niger	2.6
94	Brazil	4.1	117	Egypt	3.7	140	Gabon	3.2	163	Timor-Leste	2.6
95	Philippines	4.1	118	Guyana	3.7	141	Congo	3.1	164	Guinea	2.5
96	Honduras	4.1	119	Algeria	3.7	142	Mali	3.1	165	Turkmenistan	2.5
97	Ecuador	4.1	120	Tonga	3.7	143	Sao Tome and Principe	3.1	166	Afghanistan	2.5
98	Fiji	4.0	121	Cote d'Ivoire	3.7	144	Lesotho	3.1	167	Congo, Dem. Rep	2.4
99	Ghana	4.0	122	Nicaragua	3.6	145	Solomon Islands	3.0	168	Chad	2.4
100	El Salvador	4.0	123	Laos	3.6	146	Uzbekistan	3.0	169	Angola	2.4
101	India	4.0	124	Paraguay	3.6	147	Nigeria	2.9	170	Burundi	2.4
102	Argentina	4.0	125	Nepal	3.5	148	Mozambique	2.9	171	Yemen	2.3
103	Moldova	4.0	126	Kyrgyzstan	3.5	149	Djibouti	2.9	172	Haiti	2.3
104	Guatemala	3.9	127	Micronesia	3.5	150	Sierra Leone	2.9	173	Equatorial Guinea	2.2
105	Kenya	3.9	128	Tanzania	3.4	151	Malawi	2.9	174	Libya	2.1
106	Tajikistan	3.9	129	Kiribati	3.4	152	Mauritania	2.9	175	Comoros	2.1
107	Cambodia	3.8	130	Liberia	3.3	153	Zimbabwe	2.9	176	Iraq	2.0
108	Iran	3.8	131	Bangladesh	3.3	154	Papua New Guinea	2.8	177	Eritrea	2.0
109	Senegal	3.8	132	Ethiopia	3.3	155	Swaziland	2.8	178	Sudan	2.0
110	Bosnia and Herzegovina	3.8	133	Uganda	3.3	156	Madagascar	2.8	179	Syria	2.0
111	Zambia	3.8	134	Benin	3.3	157	Burkina Faso	2.8	180	South Sudan	1.9
									181	Guinea-Bissau	1.8

Source: KPMG Macroeconomics

Regional performance

Western Europe

Western European countries displayed strong performance in the Variables for Sustained Growth Index, with Singapore and Hong Kong the only non-European countries among the top 10 in 2016.

Generally, the Western European region experienced fast improvement in its technology readiness between 2006 and 2016. France performed strongly on infrastructure quality, having the eighth-highest score for quality of transport, yet was some way behind United Arab Emirates, which came out on top in this category. Notable transport quality was not enough to boost France's overall VSG Index rating. It fell outside the top 20, mostly due to weak macroeconomic stability. Germany's performance, meanwhile, ranked above the average for Western European countries in trade, government debt and institutional quality, but saw lower FDI stocks. For both countries, the lion's share in VGS progress was made between 1997 and 2011, with limited improvement over the past five years.

Switzerland's performance was among the most improved in the past decade. It ranked highest among all economies in 2016, thanks to a strong share of FDI stock and trade relative to the size of its economy (see Chart 1).

Although Italy showed improvements between 2006 and 2016, as a consequence of better quality of transport and education, the past five years saw a general stagnation. This is due mostly to a decrease in macroeconomic stability and no improvements in public institutions.

The UK, Ireland, Portugal, and Spain all witnessed substantial drops in macroeconomic stability in the past 10 years. Spain, despite having one of the most extensive 3G networks, has experienced a minor decrease in its VSG rating over the past five years. It ranked well behind the average for G7 countries on institutional strength.

Chart 1: VSG performance in selected European countries, 2006 vs. 2016
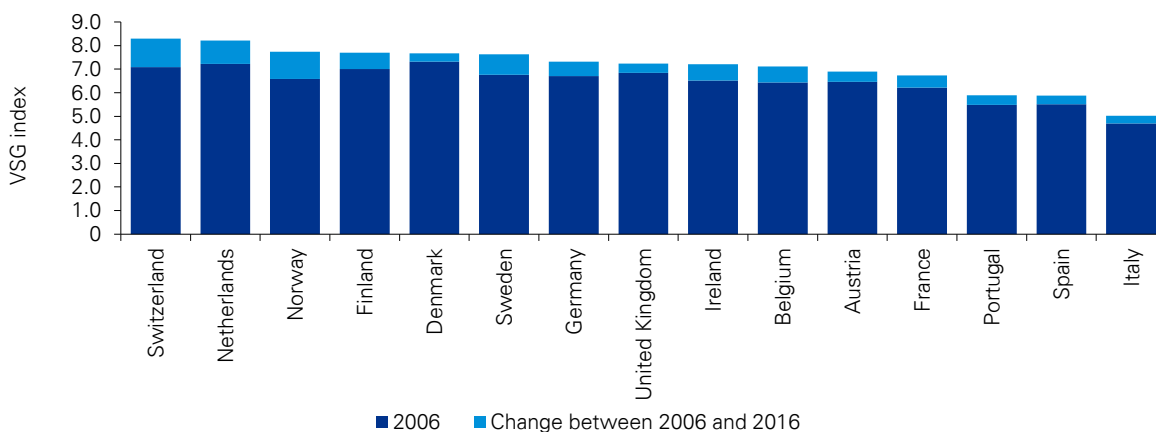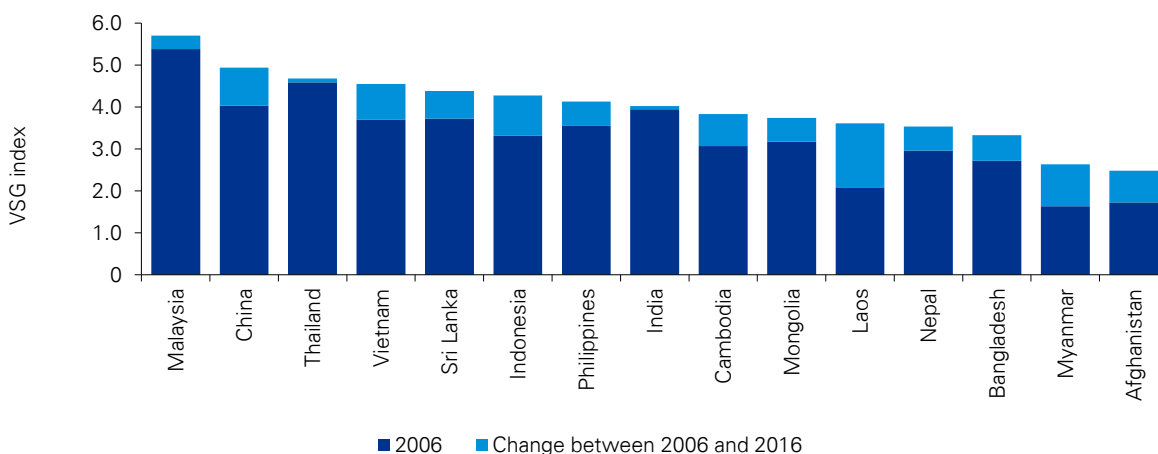

Source: KPMG Macroeconomics

Asia

In the larger developing Asian economies, VSG performance has been more diverse over the past decade than in Europe. The highest-ranking country, Malaysia, experienced comparatively less progress, while Myanmar, Laos and Afghanistan, at the bottom end of the rankings, benefited from significant catch-up in openness and better quality of public institutions in the last five years. There has been a general improvement, in all countries, in technology readiness (see Chart 2).

China's steady improvement over the past 10 years is mostly thanks to improvements in transport quality and technology readiness, where it outperformed all other major developing economies in Asia. When compared to the whole Asian region, however, it had a strong macroeconomic environment, but was still behind the average for Asia in infrastructure, with countries like Japan and South Korea ahead in both transport infrastructure and technology readiness.

Indonesia's performance in education and technology readiness compared with other large Asian countries, dragged down its overall index score. Nonetheless, it displayed better macroeconomic stability against other major developing Asian economies.

Improvements in the quality of roads and port infrastructure over the past decade have been insufficient to escalate India up in the rankings. Its lack of openness and weakening of public institutions have not helped. India's quality of education score is also relatively low due to poor tertiary enrolment rates and low science test scores.

Chart 2: VSG performance in selected developing Asian countries, 2006 vs. 2016

Source: KPMG Macroeconomics

Oceania

While Australia is the largest economy within the Oceania region, the country with the highest VSG rating is New Zealand. It outperformed Australia in all pillars, with notably better results in macroeconomic stability and openness to catch up. Specifically, New Zealand returned to budget operating surplus in 2015 and is expected to remain positive, out to the medium term. Its net debt levels are significantly lower than Australia's, sitting at about 6% of GDP compared to 17% for Australia.

As small open economies both New Zealand and Australia rely on trade to help grow their economies beyond what they could achieve domestically. While Australia has recorded relatively larger growth in exports of goods and services than New Zealand over the past 10 years, the gap in the trade balance has also widened more so for Australia than New Zealand, as imports have grown at a relatively faster rate as well.

Similar to other parts of the developing world, the island nations that make up the rest of Oceania have recorded VSG results outside of the top 100 countries; with the notable exception of Fiji which has snuck in at 98. High levels of tourism, and the attraction of relatively stronger levels of FDI to support tourism and manufacturing activities has pushed Fiji ahead of other, smaller Oceania countries.


Latin America

Progress on VSGs was more muted among Latin American countries than in some of the Asian countries over the past five years. However, with the exception of Venezuela, they have demonstrated consistent improvement over the past decade (see Chart 3).

Despite improvements in education, life expectancy and quality of technological infrastructure in the past 10 years, Chile saw a minor decline in its VSG Index score between 2011 and 2016. This is due to a significant decrease in total trade, relative to the size of its economy, and in transport quality. Nevertheless, Chile remains the top performer among the larger Latin American economies, thanks to strong institutions and high scores for human capital, which resembles developed European countries.

Progress in Mexico and Brazil stalled in the past five years, both experiencing weaker macroeconomic stability. On top of this, Brazil's institutional framework deteriorated over the same period.

Venezuela's rise in government deficit over the past five years, coupled with a decrease in FDI stock compared with the size of its economy, drove its VSG rating down by 6% from 2011. Relatively weak judicial independence and little openness to catch-up are the main reasons for the fall in Bolivia's 2016 VSG Index rating over the past five years. Nonetheless, it, saw an overall positive trend, between 2006 and 2016, on improvements to infrastructure and human development.

Chart 3: VSG performance in selected Latin American countries, 2006 vs. 2016

■ 2006   ■ Change between 2006 and 2016
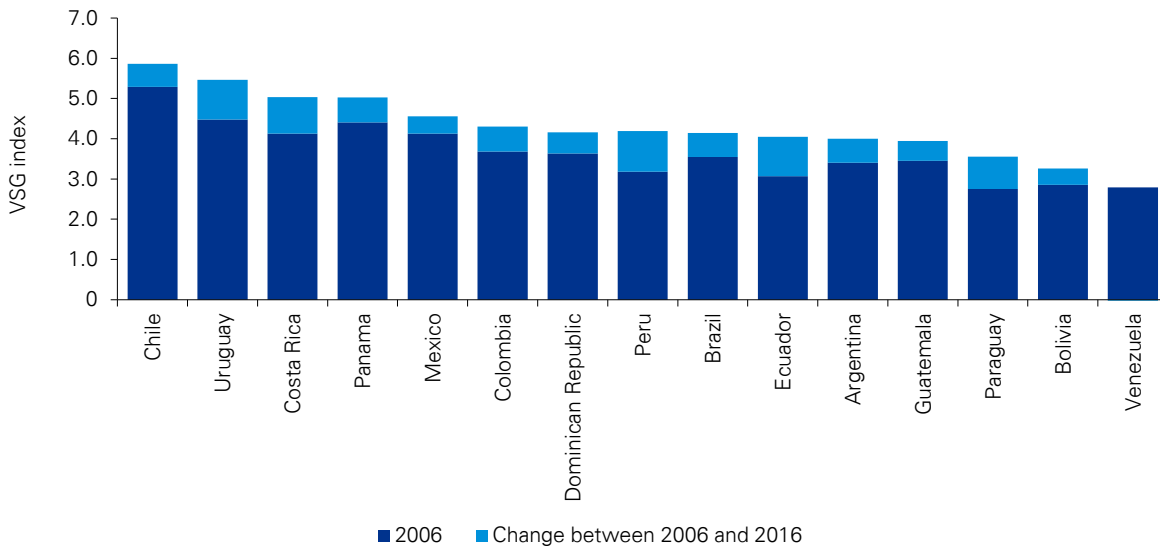
Source: KPMG Macroeconomics

Africa

Overall, the larger African economies were less consistent in their VSG ratings than other regions (see Chart 4).However, the majority of countries demonstrated a positive trend in improvements to infrastructure over the past 10 years. Similarly, technology readiness, mostly driven by positive and substantial improvements in 3G coverage, is evident, with South Africa quickest to make the transformation. In fact, South Africa displayed the highest ranking in 2016, thanks also to a significant increase in human development, which helped drive up its VSG Index score over the decade.

Nigeria's poor transparency in policy making saw its overall score decline compared with 2006. More recently, the country's debt and deficit figures have deteriorated due to falling oil prices. Better education and stronger public institutions helped Ghana to increase its score between 2006 and 2016.

While Cote d'Ivoire ranked lower than a number of large African countries a decade ago, it caught up with many over the last 10 years. It has demonstrated significant improvements in areas where its peers' performances declined, most notably in its macroeconomic stability and quality of institutions.

Chart 4: VSG performance in selected African countries, 2006 vs. 2016
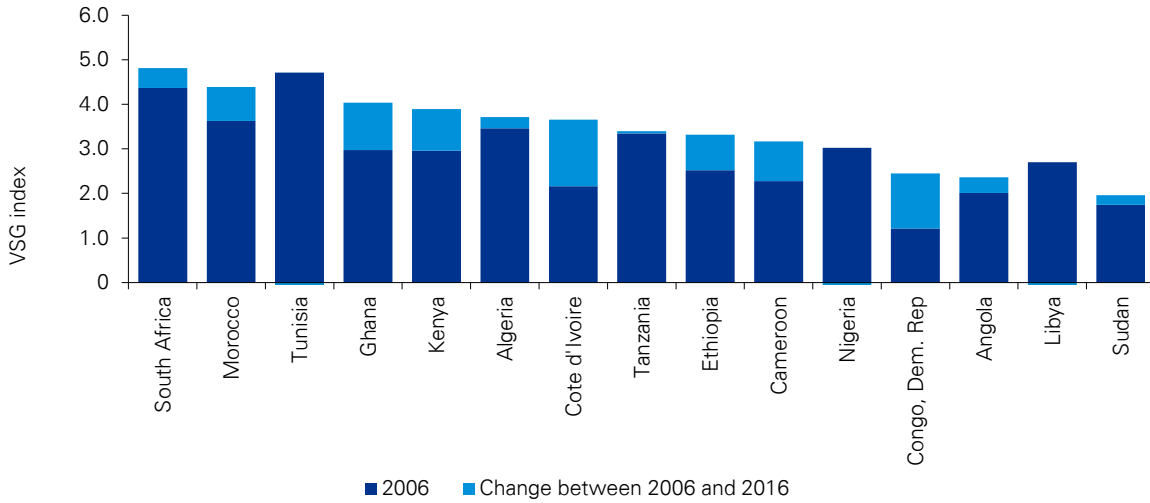
Source: KPMG Macroeconomics

Developing countries' improvement in the quality of education and financial services availability helped the grouping accelerate the catch-up process. The gap between developed countries' average VSG score and the world average has fallen to just 1.4% in 2016 (see Chart 5).

However, despite more than half of African countries experiencing a rise in their VSG scores between 2001 and 2016, the gap between the Africa region average and the world average widened over the period.

Chart 5: Selected regional performance relative to world's VSG average, 2001-2016
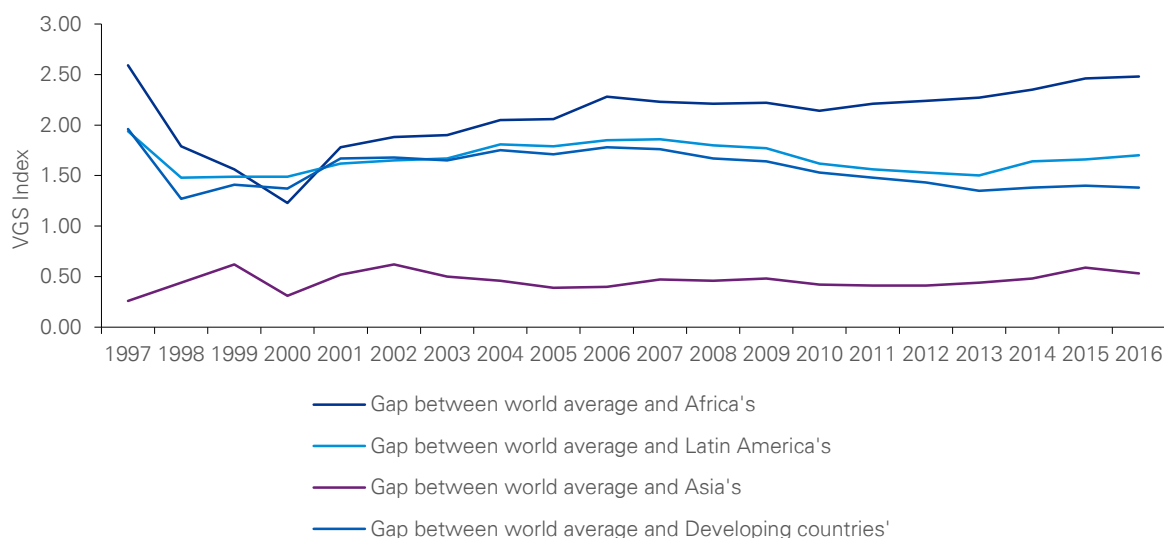
Source: KPMG Macroeconomics

Focus: The impact of Brexit on the UK's VSG

The UK's decision to leave the EU, following the referendum vote in June 2016, is likely to affect its economy on multiple levels.

The UK's VSG performance has progressed in a number of areas over the past decade, as depicted in Table 2, with FDI attractiveness and technology readiness among the most notable improvements.

Our 2016 index puts UK performance above the G7 average for macroeconomic stability, despite significant deterioration in the UK's public finances since the Great Recession. Openness to catch-up and institutional strength, are where the UK is particularly strong (see Table 2).

Table 2: UK VSG comparison

	UK 2006	UK 2016	G7 2016
Macroeconomic stability	**6.46**	**3.70**	**2.66**
Government deficit	4.03	3.92	3..87
Government debt	7.07	3.64	2.36
Openness to catch-up	**2.70**	**2.72**	**1.52**
FDI stock	2.92	3.42	1.97
Total trade	2.64	2.55	1.41
Infrastructure	**5.82**	**7.41**	**7.27**
Quality of transport	**8.30**	**7.49**	**7.85**
Roads	7.92	6.88	7.66
Rail	7.64	6.30	7.19
Ports	7.30	7.67	7.53
Air	8.90	7.93	8.12
Technology readiness	**4.24**	**7.19**	**6.85**
3G coverage	8.17	9.80	9.87
Broadband penetration	4.29	7.54	6.58
Secure internet servers	2.23	5.53	5.62
Financial institutions – availability of financial services	**7.80**	**8.46**	**8.07**
Human capital	**6.08**	**6.25**	**6.22**
Education	5.13	5.19	5.21
Life expectancy	7.85	8.21	8.10
Institutional strength	**8.57**	**8.60**	**7.81**
Regulatory quality	8.69	8.71	7.68
Judicial independence	8.52	8.84	7.41
Transparency of government policymaking	7.15	7.78	7.12
Government effectiveness	8.44	8.48	8.03
Corruption	8.58	8.73	7.86
Business rights	**8.93**	**8.65**	**7.90**
Property rights	9.02	8.70	7.87
Intellectual property rights	8.58	8.49	8.02
Total VSG	**6.85**	**7.23**	**6.76**

Source: KPMG Macroeconomics

While the new government is expected to pursue a different policy path, influenced by the referendum results, it is still too early to tell how many variables will be affected. The two areas, however, where Brexit could make a clearer impact are skills and trade.

A recent paper by Monique Ebell at National Institute of Economic and Social Research (NIESR[2]) estimates that leaving the European Economic Area (EEA) could result in losses of around 23-29% of the UK's total trade over the long run. This could see the UK's VSG value for trade fall to 1.37 from its current 2.55, prompting an overall decline in VSG to 7.18.

Lower EU migration to the UK, another expected consequence of Brexit, could have a negative impact on the average level of skills. A paper by Christian Dustmann and Tommaso Frattini at University College London (UCL)[3] shows that the proportion of people born in the UK who attain a university degree is lower than among those who arrived in the UK from the EEA. Meanwhile, the proportion of the population that left full time education before the age of 17 is significantly higher among the UK-born population. Although not directly captured by the VSG measure used for education, this effect will negatively impact the human capital pillar.

[2] ner.sagepub.com/content/238/1/R31.full.pdf+html

[3] http://www.cream-migration.org/publ_uploads/CDP_22_13.pdf

Focus: The new US presidency and the US' VSG

The results of the November 2016 presidential election will likely affect the United States in the medium term. It is still difficult, however, to forecast the magnitude of changes that might occur.

The VSG Index for the United States shows an overall improvement over the past decade, driven mostly by better infrastructure and human capital (see Table 3).

Compared with other G7 countries, the US is notably more technology-ready and does better on most infrastructure measures, but performs less well when it comes to human capital and openness to catch-up, as well as macroeconomic stability and institutions' strength.

Table 3: US VSG comparison

	US 2006	US 2016	G7 2016
Macroeconomic stability	**5.23**	**2.56**	**2.66**
Government deficit	4.32	3.72	3.87
Government debt	5.45	2.27	2.36
Openness to catch-up	**0.43**	**0.61**	**1.52**
FDI stock	1.57	2.08	1.97
Total trade	0.15	0.24	1.41
Infrastructure	**5.79**	**7.57**	**7.27**
Quality of transport	**8.57**	**8.07**	**7.85**
Roads	8.50	7.69	7.66
Rail	6.39	6.88	7.19
Ports	8.05	7.83	7.53
Air	8.99	8.48	8.12
Technology readiness	**3.89**	**7.14**	**6.85**
3G coverage	4.47	9.90	9.87
Broadband penetration	4.00	6.31	6.58
Secure internet servers	3.48	6.60	5.62
Financial institutions – availability of financial services	**8.88**	**8.64**	**8.07**
Human capital	**5.37**	**6.04**	**6.22**
Education	4.20	5.09	5.21
Life expectancy	7.54	7.79	8.10
Institutional strength	**7.91**	**7.72**	**7.81**
Regulatory quality	8.30	7.60	7.68
Judicial independence	6.95	7.11	7.41
Transparency of government policymaking	6.30	7.32	7.12
Government effectiveness	8.21	7.92	8.03
Corruption	7.63	7.76	7.86
Business rights	**8.42**	**7.88**	**7.90**
Property rights	8.47	7.82	7.87
Intellectual property rights	8.24	8.10	8.02
Total VSG	**6.26**	**6.72**	**6.76**

Source: KPMG Macroeconomics

Areas of the VSG Index most likely to be affected by the new presidency are government deficit, debt, trade and infrastructure. The current plans for tax reduction, if enacted, would reduce fiscal revenues, increasing the budget and government debt.

Trump's threats to start trade wars should not be completely ignored. While the economic damage may be significant, states that gave Trump the presidency such as Ohio, Pennsylvania, Michigan and Wisconsin all have significant manufacturing economies that would benefit greatly from increased on-shoring and greater exports.

On the positive side, improvements to infrastructure and streamlining of regulations could cause those scores to rise. If the Trump administration is successful at increasing US exports that too would be beneficial and would raise the country's VSG Index score on the trade front. Only as 2017 progresses, will we be able to gauge the impact of the new administration and Congress, but the outcome is likely to be binary.

Conclusions

The top of the 2016 VSG Index is dominated by higher income countries. However, income alone does not determine VSG performance. Policy makers have a role to play in improving their countries' growth potential, across all areas measured by the VSGs.

New Zealand, for instance, ranked 11th in the world in the 2016 VSG Index, and is the best performer compared with other economies with similar income levels (between US$31,000 and US$41,000 PPP per capita). It has shown steady improvement over the past 15 years. In this income group, only Finland comes close to New Zealand on macroeconomic stability, availability of financial services and strong public institutions. New Zealand outperforms more than two-thirds of its peers on quality of transport, technology readiness, trade flows and business rights.

On the other hand, some countries with comparatively high levels of income perform relatively poorly on the VSG Index. This is particularly true of producers and exporters of natural resources. For instance, Qatar, Brunei, and Kuwait enjoy very high income levels, but underperform in many areas on the VSG Index compared with countries with similar income brackets such as Norway, Singapore, and Luxembourg. Their lower ability to attract FDI and the mixed quality of their infrastructure, combined with weak public institutions drag them down by 40% – on average – from expected VSG levels based on income per capita. Despite having large resources at their disposal, governments in these countries may not allocate sufficient resources to key areas that could boost potential productivity.

The pattern is similar for countries such as United Arab Emirates, Bahrain, and Saudi Arabia where VSG Index scores are between 11 and 18% lower than expected given per capita income level alone. VSG scores in these countries have improved in the past 10 years but performance in some areas remains mixed.

Other countries are experiencing a change in policy direction, which could also have a significant impact on their VSG performance. Brexit in the UK could see its VSG score fall as a result of lower trade and a reduction in the level of skills due to lower EU migration. In the US, the impact of new policies under a new presidency may be more binary.

Appendix 1: Methodology

The VSG Index comprises 21 series that were selected to assess countries' productivity potential, based on relevant academic studies and business survey results. The index covers 181 countries and tracks their performance since 1997. For each series, a higher value on the index denotes a strictly better outcome for the country. For each series, a fixed floor and ceiling value were established and the series score was calculated in the range of 0-10 from the value of the underlying variable.

The values for the floor and ceiling were chosen to be reasonable maxima and minima for the data available. For series with defined ranges, these values were used instead. Scores for values below the floor or above the ceiling were truncated at zero and 10 respectively. This has the effect of reducing the influence of outliers in terms of the distribution of the underlying variable.

Weights used to aggregate the series, sub-series and pillars were derived using the results of our econometric analysis in conjunction with the results of previous studies and business survey outputs. The weights are fixed between different countries and over time.

While twenty of our series came directly from a range of sources (see Table 4 below for more detail on the sources used), we calculated a bespoke education series to feed into the Human Capital pillar. The education values incorporate data on enrolment rates in primary, secondary and tertiary education with the results from the Program for International Student Assessment (PISA). Enrolment rates were weighted according to their importance in terms of educational returns, based on estimates by Caselli (2005) and Psacharoopoulos (1994).

During the aggregation stage of sub-series to series, pillars and eventually to the final index, we made an allowance for the possibility of missing data. Where a single measurement was unavailable we allowed the weighting of the index to take this into account and aggregated only over the remaining available data. Our aggregate series, such as for the G7, are weighted by the real GDP of the individual countries, in this way the scores of larger economies' weigh more heavily in the aggregate series.

We used historical Total Factor Productivity (TFP) from the World Penn Table database (9.0) and compared the values against the results of our VSG Index. The relationship between the overall VSG Index and TFP was statistically significant in the cross-sectional dimension (in terms of variation between countries at each point in time, as shown in Chart 9).

Chart 6: TFP versus VSG relative to the US, 2014
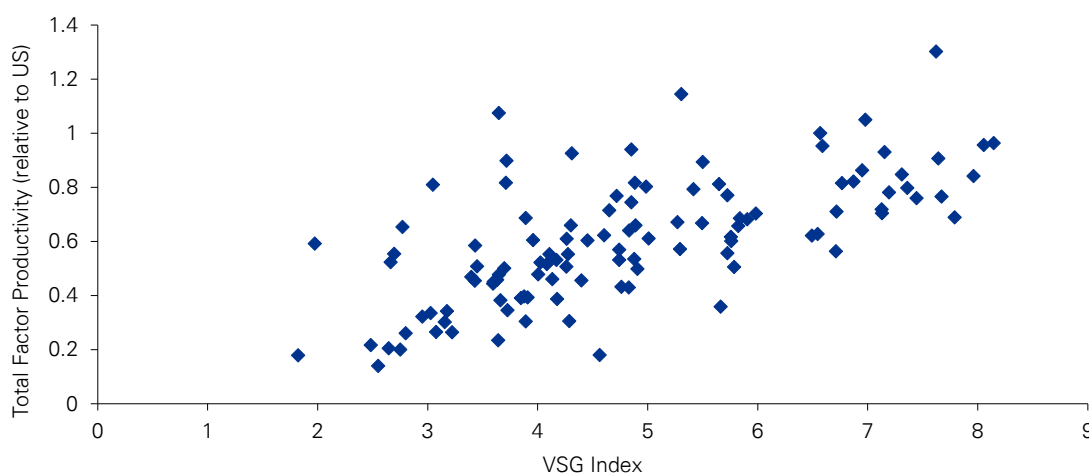
Source: KPMG Macroeconomics and World Penn Table (9.0)

The data sources used to compile the index are listed in Table 4. Great care has been taken to verify the accuracy and measurement reliability of the sources in all the series selected for the VSG Index. We cannot, however, guarantee the absolute correctness of the underlying data.

Not all the data sources that make up our index go back as far as 1997. In such cases, we calculated our own estimates for the series, based on alternative proxy series that were available, using correlations between the two series.

Table 4: Data sources for the VSG Index

Series	Sources
Government deficit	IMF, World Economic Outlook Database
Government debt	IMF, World Economic Outlook Database
FDI stock	UNCTADstat
Total trade	World Development Indicators, The World Bank
Quality of transport - Roads	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 IRF Geneva, World Road Statistics WRS
Quality of transport - Rail	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 The World Bank
Quality of transport - Air	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 The World Bank
Quality of transport - Ports	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 UNCTADstat
Technological readiness - 3G Network coverage by population	© GSMA Intelligence (2016)
Technological readiness - Broadband penetration	World Development Indicators, The World Bank
Technological readiness - Secure internet servers	World Development Indicators, The World Bank
Financial institutions - Availability of financial services	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 World Development Indicators, The World Bank
Life expectancy	World Development Indicators, The World Bank
Education – Net enrolment rate : primary	UNESCO Institute for Statistics (UIS), http://data.uis.unesco.org, December 2016
Education – Net enrolment rate : secondary	UNESCO Institute for Statistics (UIS), http://data.uis.unesco.org, December 2016
Education – Gross enrolment rate : tertiary	UNESCO Institute for Statistics (UIS), http://data.uis.unesco.org, December 2016
Education – Reading, math and science PISA test results	OECD (2016), PISA, PISA,http://www.oecd.org/pisa/data/2015database/, (December 2016)
Regulatory quality	Worldwide Governance Indicators, The World Bank
Judicial independence	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 Worldwide Governance Indicators
Transparency of government policymaking	Global Competitiveness Report, World Economic Forum, Switzerland, 2015 Worldwide Governance Indicators
Government effectiveness	Worldwide Governance Indicators, The World Bank

Series	Sources
Corruption	Worldwide Governance Indicators, The World Bank
Business rights - Property rights	World Economic Forum, Executive Opinion Survey Worldwide Governance Indicators
Business rights - Intellectual property rights	World Economic Forum, Executive Opinion Survey W.G Park, 2005, International Patent Protection, Research Policy 37 (2008)

Appendix 2: VSG Index performance by pillar

Rank	Country	Overall score	Macro stability	Openness to catch-up	Infrastructure	Human capital	Institutional strength
1	Switzerland	8.3	6.4	7.4	9.1	6.3	9.1
2	Netherlands	8.2	5.3	9.2	9.1	6.4	8.7
3	Luxembourg	8.1	7.8	10.0	8.4	5.9	8.7
4	Hong Kong	7.9	9.1	10.0	7.2	6.4	8.7
5	Norway	7.7	7.8	3.3	7.9	6.4	8.8
6	Finland	7.7	5.2	3.7	7.8	6.5	9.0
7	Denmark	7.7	6.2	5.3	8.2	6.3	8.4
8	Sweden	7.6	6.5	4.7	7.6	6.3	8.8
9	Iceland	7.5	6.8	5.4	8.2	6.2	8.0
10	Singapore	7.5	3.1	10.0	7.0	5.7	9.0
11	New Zealand	7.4	7.3	2.6	6.8	6.4	8.9
12	Germany	7.3	5.1	4.4	7.7	6.3	8.2
13	United Kingdom	7.2	3.7	2.7	7.4	6.2	8.6
14	Canada	7.2	3.6	3.2	7.3	6.7	8.4
15	Ireland	7.2	4.7	10.0	6.1	6.4	8.4
16	Belgium	7.1	2.8	9.4	7.0	6.3	7.9
17	Australia	7.0	6.5	1.6	6.7	6.4	8.3
18	Estonia	6.9	8.5	9.1	6.1	6.2	7.5
19	Austria	6.9	4.0	5.5	6.9	6.0	7.9
20	Japan	6.8	0.7	0.8	6.7	6.7	8.4
21	Korea, South	6.8	6.8	4.0	8.1	6.6	6.1
22	Malta	6.7	5.4	10.0	7.4	5.5	6.6
23	France	6.7	3.2	2.8	7.1	6.4	7.6
24	United States	6.7	2.6	0.6	7.6	6.0	7.7
25	Israel	6.3	5.0	2.7	5.5	6.2	7.6
26	United Arab Emirates	6.3	7.2	1.7	5.7	5.0	7.8
27	Qatar	6.0	5.7	4.4	5.2	5.1	7.4
28	Czech Republic	6.0	6.6	8.8	5.8	4.7	6.3
29	Cyprus	6.0	2.9	10.0	5.4	5.7	6.4
30	Slovenia	5.9	4.2	8.1	5.4	6.4	6.1
31	Lithuania	5.9	6.5	8.5	5.2	5.6	6.3
32	Portugal	5.9	1.5	4.3	5.8	6.2	6.6
33	Spain	5.9	3.1	3.1	5.9	6.5	6.3
34	Chile	5.9	7.6	3.4	4.7	5.9	6.9
35	Latvia	5.8	6.9	6.7	5.2	5.7	6.1
36	Malaysia	5.7	5.5	7.5	4.6	5.0	6.6
37	Barbados	5.6	2.6	5.6	5.2	4.8	6.8
38	Poland	5.5	5.8	5.1	4.9	6.0	5.7

Rank	Country	Overall score	Macro stability	Openness to catch-up	Infrastructure	Human capital	Institutional strength
39	Uruguay	5.5	5.1	1.8	4.5	5.3	6.8
40	Mauritius	5.4	5.4	5.8	4.5	4.4	6.5
41	Bahamas	5.3	5.1	6.4	3.7	4.8	6.7
42	Bahrain	5.3	3.7	5.2	5.1	3.7	6.5
43	Saudi Arabia	5.2	7.3	3.4	4.3	4.6	6.1
44	Slovakia	5.1	5.8	8.7	4.6	4.1	5.4
45	Croatia	5.1	3.8	5.3	4.9	5.7	5.0
46	Georgia	5.1	6.5	6.6	3.8	4.9	5.7
47	Costa Rica	5.0	6.1	3.5	3.5	5.3	6.1
48	Oman	5.0	6.8	1.6	4.1	4.9	6.0
49	Panama	5.0	6.6	5.2	4.6	4.7	5.3
50	Italy	5.0	1.2	2.3	4.9	6.3	5.3
51	Seychelles	5.0	5.3	10.0	3.3	4.2	6.0
52	Bulgaria	5.0	7.2	8.0	4.4	5.4	4.6
53	Hungary	5.0	4.6	5.2	4.9	5.6	4.7
54	Jordan	4.9	3.4	5.8	3.9	4.8	5.9
55	China	4.9	6.1	1.2	4.3	5.6	5.4
56	Greece	4.9	0.0	2.4	5.1	6.1	5.2
57	Brunei	4.9	7.8	2.6	3.6	4.5	6.0
58	Turkey	4.9	7.1	2.4	4.5	5.3	5.0
59	South Africa	4.8	5.8	2.9	4.6	2.0	6.5
60	Namibia	4.8	6.2	5.9	3.1	4.0	6.1
61	Romania	4.8	6.5	4.2	4.0	5.2	5.0
62	Montenegro	4.8	4.6	5.2	4.5	5.1	4.7
63	Trinidad and Tobago	4.8	5.6	3.5	4.3	5.1	5.0
64	Antigua and Barbuda	4.8	3.7	6.7	3.5	4.4	5.8
65	Macedonia FYR	4.7	6.5	6.3	4.2	4.4	4.9
66	Rwanda	4.7	6.3	1.5	3.4	3.5	6.5
67	Botswana	4.7	8.0	5.2	2.8	3.5	6.2
68	Thailand	4.7	6.5	3.0	4.1	4.9	5.0
69	Mexico	4.6	5.6	3.5	4.0	4.9	4.8
70	Vietnam	4.5	5.0	8.7	3.0	5.6	4.7
71	Jamaica	4.5	2.2	4.7	3.9	4.0	5.6
72	Belarus	4.5	5.5	6.5	4.5	4.7	4.0
73	Kazakhstan	4.5	7.5	2.7	3.4	5.0	4.9
74	Saint Vincent and the Grenadines	4.5	4.3	5.4	3.0	4.5	5.4
75	Russia	4.5	7.7	1.9	4.2	5.5	4.1
76	Serbia	4.5	4.5	6.1	3.7	5.5	4.3
77	Azerbaijan	4.4	5.9	3.5	4.3	4.2	4.6
78	Morocco	4.4	5.1	3.2	3.6	4.2	5.1
79	Sri Lanka	4.4	4.2	1.7	3.7	4.5	5.2

Rank	Country	Overall score	Macro stability	Openness to catch-up	Infrastructure	Human capital	Institutional strength
80	Kuwait	4.4	7.1	0.6	3.5	4.4	5.1
81	Bhutan	4.4	2.9	6.0	2.5	3.8	6.0
82	Tunisia	4.3	5.4	5.1	3.1	4.6	4.9
83	Colombia	4.31	6.1	1.6	3.5	4.8	4.7
84	Albania	4.3	4.7	3.5	3.6	5.3	4.3
85	Cabo Verde	4.3	1.9	6.3	2.8	4.2	5.4
86	Indonesia	4.3	7.2	1.4	3.4	4.3	4.9
87	Grenada	4.3	4.1	4.8	3.1	4.6	4.9
88	Saint Lucia	4.3	4.2	6.5	2.8	4.0	5.2
89	Samoa	4.2	5.5	3.5	1.9	4.6	5.8
90	Lebanon	4.2	0.5	7.8	4.2	4.7	4.0
91	Peru	4.2	7.4	1.9	3.4	4.7	4.4
92	Armenia	4.2	5.8	3.5	3.7	3.8	4.7
93	Dominican Republic	4.2	6.7	2.4	3.9	4.3	4.2
94	Brazil	4.1	3.9	0.5	3.7	4.8	4.6
95	Philippines	4.1	7.0	2.6	3.0	3.9	4.9
96	Honduras	4.1	6.1	6.2	3.4	4.1	4.0
97	Ecuador	4.1	6.6	1.5	4.2	4.6	3.7
98	Fiji	4.0	5.8	8.4	2.1	4.4	4.5
99	Ghana	4.0	5.0	5.7	2.9	3.2	5.0
100	El Salvador	4.0	5.3	3.2	3.5	4.2	4.3
101	India	4.0	4.6	0.8	3.1	3.8	5.1
102	Argentina	4.0	5.6	0.2	3.6	5.1	4.0
103	Moldova	4.0	6.3	6.6	3.5	4.5	3.4
104	Guatemala	3.9	7.5	2.0	3.4	3.8	4.2
105	Kenya	3.9	5.5	1.4	3.4	3.5	4.6
106	Tajikistan	3.9	6.0	1.6	3.0	4.1	4.4
107	Cambodia	3.8	6.9	8.6	2.9	3.8	3.6
108	Iran	3.8	8.0	0.7	2.6	4.7	4.2
109	Senegal	3.8	5.4	3.4	2.6	3.3	4.8
110	Bosnia and Herzegovina	3.8	6.4	2.8	3.0	4.7	3.7
111	Zambia	3.8	5.2	5.0	2.1	3.7	4.7
112	Maldives	3.8	3.3	9.2	2.6	3.1	4.3
113	Belize	3.7	3.3	8.0	2.7	4.0	3.9
114	Suriname	3.7	5.6	4.7	2.5	4.2	4.1
115	Ukraine	3.7	3.5	6.1	3.3	4.5	3.4
116	Mongolia	3.7	2.0	5.8	2.8	4.3	4.2
117	Egypt	3.7	2.8	1.1	3.4	4.2	4.2
118	Guyana	3.7	5.9	7.3	2.5	3.5	4.0
119	Algeria	3.7	7.3	0.9	2.7	4.5	3.9
120	Tonga	3.7	3.8	7.1	1.9	4.4	4.2
121	Cote d'Ivoire	3.7	6.0	4.3	3.1	2.3	4.4

Rank	Country	Overall score	Macro stability	Openness to catch-up	Infrastructure	Human capital	Institutional strength
122	Nicaragua	3.6	7.2	5.3	2.8	4.5	3.1
123	Laos	3.6	5.2	4.0	2.6	3.6	4.2
124	Paraguay	3.6	7.4	3.9	2.6	4.2	3.4
125	Nepal	3.5	7.3	1.8	2.3	3.9	4.0
126	Kyrgyzstan	3.5	4.6	3.8	2.7	4.2	3.6
127	Micronesia	3.5	7.7		0.6	4.2	4.7
128	Tanzania	3.4	6.6	2.1	2.0	3.3	4.3
129	Kiribati	3.4	6.9	5.2	0.6	4.3	4.4
130	Liberia	3.3	6.0	7.6	2.2	2.5	3.8
131	Bangladesh	3.3	6.8	1.2	2.3	3.9	3.6
132	Ethiopia	3.3	5.5	1.0	2.0	3.3	4.3
133	Uganda	3.3	6.6	2.0	2.1	2.8	4.2
134	Benin	3.3	6.3	2.7	2.0	3.0	4.1
135	Gambia	3.3	2.7	2.5	2.7	2.8	4.1
136	Pakistan	3.3	4.9	0.4	2.7	3.3	3.9
137	Bolivia	3.3	6.2	2.2	2.7	4.0	3.1
138	Vanuatu	3.2	6.4	4.6	1.3	3.7	3.9
139	Cameroon	3.2	6.7	1.5	2.1	2.7	4.0
140	Gabon	3.2	6.0	3.8	2.1	2.3	4.0
141	Congo	3.1	4.2	10.0	2.2	3.3	2.8
142	Mali	3.1	7.0	2.0	1.9	2.5	4.0
143	Sao Tome and Principe	3.1	3.1	8.0	1.1	3.5	3.8
144	Lesotho	3.1	5.1	0.9	1.6	2.1	4.7
145	Solomon Islands	3.0	8.4	5.4	1.2	3.2	3.4
146	Uzbekistan	3.0	8.1	1.3	1.7	3.7	3.1
147	Nigeria	2.9	7.8	1.1	2.3	1.5	3.8
148	Mozambique	2.9	2.3	6.3	1.9	2.4	3.7
149	Djibouti	2.9	6.2	6.4	1.4	2.8	3.4
150	Sierra Leone	2.9	5.9	2.8	2.1	2.7	3.3
151	Malawi	2.9	4.5	2.7	1.4	2.4	4.1
152	Mauritania	2.9	4.5	8.6	1.5	2.9	3.0
153	Zimbabwe	2.9	5.5	3.6	2.2	2.8	3.0
154	Papua New Guinea	2.8	6.6	1.3	0.8	3.8	3.6
155	Swaziland	2.8	7.1	1.3	1.2	2.0	4.1
156	Madagascar	2.8	6.4	3.8	1.7	2.6	3.1
157	Burkina Faso	2.8	6.7	3.0	0.6	2.5	4.0
158	Venezuela	2.8	6.1	0.2	2.8	4.6	1.7
159	Central African Republic	2.7	6.1	1.4	4.0	1.9	1.8
160	Myanmar	2.6	6.7	2.2	1.3	3.5	2.7
161	Togo	2.6	5.0	5.7	0.9	3.1	3.0
162	Niger	2.6	5.8	3.0	0.4	2.6	3.8
163	Timor-Leste	2.6	1.5	0.4	1.6	3.7	3.1

Rank	Country	Overall score	Macro stability	Openness to catch-up	Infrastructure	Human capital	Institutional strength
164	Guinea	2.5	5.9	3.8	1.1	2.7	2.9
165	Turkmenistan	2.5	7.5	4.4	1.1	2.3	2.8
166	Afghanistan	2.5	8.7	1.9	1.6	2.5	2.4
167	Congo, Dem. Rep	2.4	7.9	3.2	1.3	1.8	2.9
168	Chad	2.4	6.0	3.3	1.4	2.4	2.5
169	Angola	2.4	4.1	3.3	1.3	2.5	2.8
170	Burundi	2.4	5.3	1.0	1.6	2.7	2.6
171	Yemen	2.3	3.6	0.1	1.9	3.2	2.3
172	Haiti	2.3	7.0	3.0	2.3	2.2	1.6
173	Equatorial Guinea	2.2	7.3	9.5	0.1	2.8	1.9
174	Libya	2.1	2.2	7.8	1.6	2.8	1.5
175	Comoros	2.1	7.0	1.3	0.1	3.2	2.6
176	Iraq	2.0	3.7	1.8	0.8	2.6	2.4
177	Eritrea	2.0	0.9	1.7	n/a	2.6	1.9
178	Sudan	2.0	5.3	0.4	0.9	2.9	2.0
179	Syria	2.0		1.4	1.2	3.6	1.8
180	South Sudan	1.9	6.9	3.4	0.7	2.4	1.8
181	Guinea-Bissau	1.8	6.5	0.8	0.4	2.9	2.0

Source: KPMG Macroeconomics

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KPMG's macroeconomics team

The macroeconomics team at KPMG advises clients on the impact that the future economic environment may have on their businesses, combining economics with data analytics to help them develop their strategies.

With the economic environment expected to remain diverse and unpredictable, risks as well as opportunities for growth across the world are more difficult to identify. At the same time, the rewards for the few who unearth those risks and opportunities can be significant.

The macroeconomics team helps clients to identify risks and opportunities in their current and future markets.