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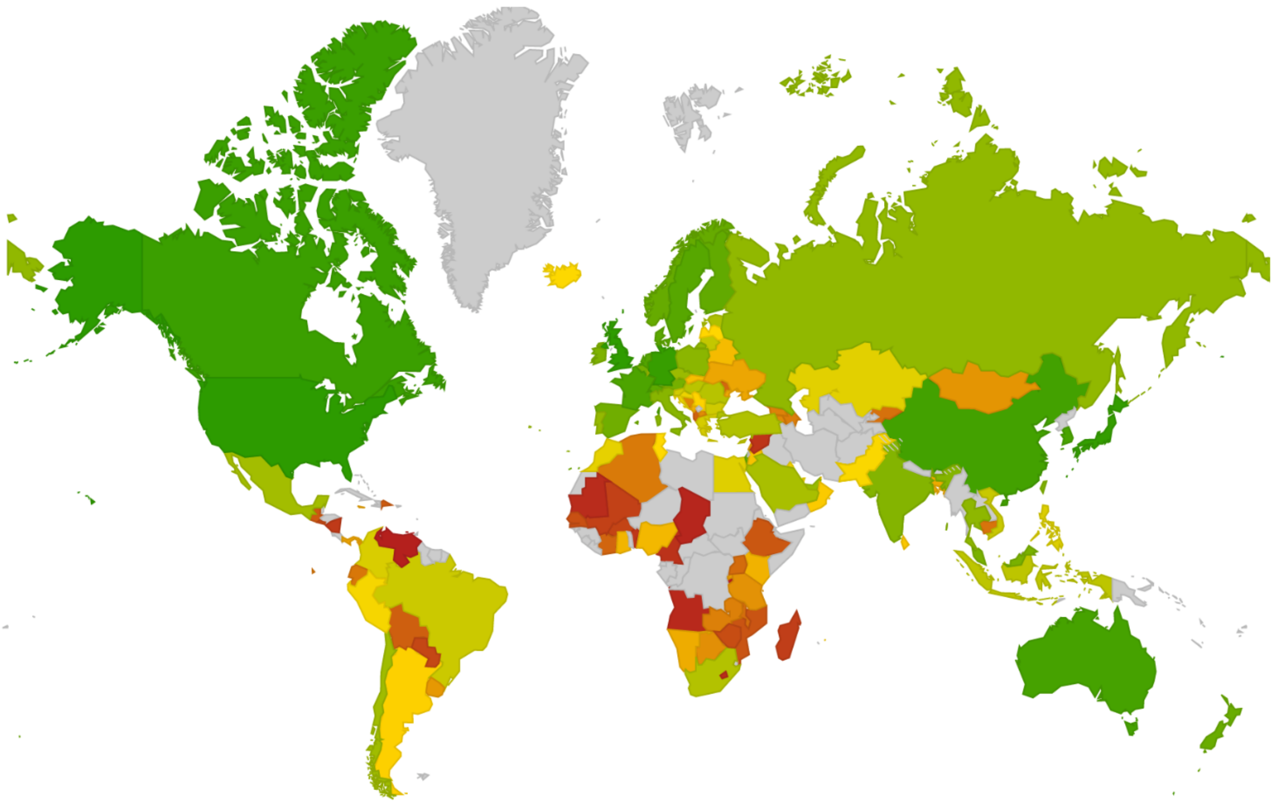
The Venture Capital and Private Equity Country Attractiveness Index 2021

Tenth Edition

Alexander Groh, Heinrich Liechtenstein, Karsten Lieser and Markus Biesinger



Foreword by the Research Team

We are pleased to present the tenth edition of our Venture Capital and Private Equity Country Attractiveness Index. The index measures the attractiveness of countries for investors in the venture capital (VC) and private equity (PE) asset classes. It provides the most up-to-date aggregated information on the quality of the investment environment and an assessment of the ease of transaction-making in 125 countries.

Although we are aware that the stage of development in many of the covered emerging markets is not yet sufficiently mature to support VC or PE transactions, we expect improvements in the future. We have therefore started tracking these emerging economies and our index illustrates the progress of their investment conditions.

As we did in recent years, we prove that our index corresponds with the actual VC and PE investment activity in our sample of countries. This demonstrates the quality of our composite measure and its value to investors. The high explanatory power of our index for the real VC and PE activity results from exclusively focusing on those factors which really shape the attractiveness of particular VC and PE markets, and weighting them reasonably.

In future editions, selected data series may be substituted by newer or more appropriate ones. Additional data could be added, while other series with poor explanatory power can be deleted. As a result, our composite measure remains a dynamic research product that always takes into account the most relevant and recent data. We believe this index is unique in providing such a broad scope of information on the VC and PE capital market segment. We hope that investors appreciate the information generated to aid their decision-making; while politicians may utilise the index to benchmark their countries and to make improvements to attract international risk capital.

We are very grateful for the support of our Research Assistants Ferdinand Schwarzer, Diego Cobián, and Rishin Banerjee. They provided substantial effort to update the data and to compile the new index.

Website

Please visit our website http://blog.iese.edu/vcpeindex/ where you can download the pdf of this annual, and find additional information, links to literature, multimedia presentations, and analytical tools for country benchmarking purposes.

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About the Editors

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Alexander Groh is Professor of Finance at EMLYON Business School, France. He has held visiting positions at the University of California, Berkeley, U.S., the University of New South Wales, Sydney, Australia, IESE Business School, Barcelona, Spain, and INSEAD, Fontainebleau, France. His research focuses on VC and PE, and includes performance measurement and socio-economic determinants for the development of vibrant VC and PE markets. His papers have been published in the Journal of Financial Economics, the European Economic Review, the Journal of Banking and Finance, the Journal of Corporate Finance, the Journal of International Money and Finance, the European Financial Management Journal, the Journal of Alternative Investments, the Journal of Real Estate Finance and Economics, the Emerging Markets Review, in Venture Capital, the Journal of Business Venturing, and Research Policy among others. He was involved in VC/PE fund management education courses for Invest Europe (formerly EVCA), and has worked for Quadriga Capital, a Frankfurt based Private Equity fund, since 1996.

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How to Measure a Country's Attractiveness for Investors in VC and PE Assets

Without being familiar with the socio-economic environment in various host countries, an investor cannot make rational international VC and PE allocation decisions. Investors overcome potential knowledge deficits and gather data to analyse the determinants they deem important before allocating to a particular country. However, this country due diligence is time-consuming and costly. Additionally, the pace of economic development of many emerging countries makes the selection of those that meanwhile support VC and PE activity more and more cumbersome. Our index guides institutional investors to solve the problem of where to allocate their capital. We aggregate and provide the requisite information for international VC and PE allocation decisions. Of course, this information cannot act as a substitute for investors' own efforts to build up country knowledge and experience. It can only facilitate this process and support the initial due diligence stage.

We propose a composite measure that benchmarks the attractiveness of 125 countries to receive institutional VC and PE allocations. Our intention is to serve the investment community, preparing and analysing a large quantity of socio-economic data. However, it is not only the financial community that can benefit from our research, politicians may also conclude that vibrant risk capital markets increase innovation, entrepreneurial activity, economic growth, employment, competitiveness and wealth and hence they may be interested in increasing the supply of risk capital in their countries.

There is a major shift of focus from "traditional" and mature VC and PE markets towards emerging regions. Emerging countries attract investors by high economic growth opportunities. Nevertheless, as we subsequently discuss, growth opportunities are not the only factor that renders countries attractive for VC and PE investments, and it is these broader conditions that motivate our index. The existence of a prospering VC and PE market infrastructure and investment environment requires many socio-economic and institutional prerequisites. We presume that several emerging countries are not yet sufficiently mature in terms of their socio-economic development to support the VC and PE business model. Too early entrance in those countries does not appear to be a beneficial strategy. However, our index tracks the countries' socio-economic and institutional development and reveals improvements. This allows investors to better observe foreign markets and to recognise good timing for allocations.

What are Institutional Investors' International VC and PE Allocation Criteria?

Our index addresses the first level of investors' concerns from a top-down perspective and evaluates countries with respect to socio-economic criteria for international VC and PE allocation. These criteria assess, in the first instance, the determination of local demand for VC and PE and second, the expectation of an efficient deal-making environment which allows matching with the supplied capital. Further levels of the allocation process include the selection of particular fund management teams. Thereby, the investors evaluate the general partners' competencies, their track records and other parameters in their fund due diligence before committing to a general partner.[1] However, these criteria cannot be considered in our index because they depend on individual cases, personal judgment and mostly undisclosed data.

Institutional investors communicated to us that levels of valuation are also important for their decisions. Unfortunately, we cannot compare valuation levels across countries for two major

[1] For more details please refer to Groh, Alexander and Liechtenstein, Heinrich (2011): The First Step of the Capital Flow from Institutions to Entrepreneurs: The Criteria for Sorting Venture Capital Funds, European Journal of Financial Management, Vol. 17, Issue 3, 2011, pp. 532-559. Related working papers are available on http://blog.iese.edu/vcpeindex/.

reasons. First, there is too little information provided on transaction multiples. Second, multiples reflect the relationship between the expected growth in certain industries (and countries) and the opportunity cost of capital. It is impossible to estimate these parameters and to find a common benchmark for all of our sample countries. Instead, we need to take a practical approach and assess the expected deal opportunities arising from the socio-economic environment in a country without addressing valuation levels. Investors will need to enrich our assessment with their own knowledge and expectations about deal values.

Our index summarises factors that shape national VC and PE markets into one single composite measure. The determinants of vibrant VC and PE markets have been extensively studied in academic literature. We reviewed this literature and collect data for our index spanning several years to verify these studies and actually contribute to a better understanding of the drivers of international VC and PE activity. With every subsequent index edition, we become more confident in our ability to assess the right criteria for VC and PE investors. These criteria are derived from the research on the topic that we group into six sub-headings. These sub-headings illustrate the structure of our index as each presents one of six "key drivers" of country attractiveness for investors in VC and PE assets:

1. Economic Activity,
2. Depth of Capital Market,
3. Taxation,
4. Investor Protection and Corporate Governance,
5. Human and Social Environment, and
6. Entrepreneurial Culture and Deal Opportunities.

These key drivers define a subset of criteria we need to assess for our sample countries in order to aggregate our index.[2]

Importance of Economic Activity

Evidently, the state of a country's economy affects its VC/PE attractiveness. An economy's size and employment levels are proxies for prosperity, the number and diversity of corporations and general entrepreneurial activity, and therefore also for expected VC and PE deal flow. Economic growth expectations require investments and provide the rationale to enter many emerging countries. Gompers and Lerner (1998) argue that more attractive VC and PE investment opportunities exist if an economy is growing quickly. Romain and van Pottelsberghe de la Potterie (2004) find that VC/PE activity is cyclical and significantly related to GDP growth. Wilken (1979) highlights the fact that economic prosperity and development facilitate entrepreneurship, as they provide a greater accumulation of capital for risky investments. The number of new ventures that qualify for VC backing is related to societal wealth, not solely because of generally better access to financing, but also because of higher income among potential customers in the domestic market. Economic size and growth are certainly very important criteria to assess expected deal opportunities and VC/PE country attractiveness. However, economic growth itself is also a result of many other criteria which we discuss within the subsequent key drivers.

Importance of Depth of Capital Market

Black and Gilson (1998) discuss major differences between bank-centred and stock market-centred capital markets. They argue that well-developed stock markets, which allow general partners to exit via IPOs, are crucial for the establishment of vibrant VC/PE markets. In general, bank-centred capital markets are less able to produce an efficient infrastructure of institutions that support VC/PE deal-making. They affirm that it is not only the strong stock market that is missing in bank-centred capital markets; it is also the secondary institutions in place, including bankers' conservative approach to lending and investing, and the social and financial incentives that reward entrepreneurs less richly (and penalise

[2] For a comprehensive review please refer to Groh, Alexander, Liechtenstein, Heinrich and Lieser, Karsten (2010): The European Venture Capital and Private Equity Country Attractiveness Indices, Journal of Corporate Finance, Volume 16, Issue 2, April 2010, pp. 205 – 224.

failure more severely), that compromise entrepreneurial activity. Jeng and Wells (2000) stress that IPO activity is the main force behind cyclical VC and PE swings because it directly reflects the returns to investors. Kaplan and Schoar (2005) confirm this. Similar to Black and Gilson (1998), Gompers and Lerner (2000) point out that risk capital flourishes in countries with deep and liquid stock markets. Similarly, Schertler (2003) uses the capitalisation of stock markets or the number of listed companies as measures for stock market liquidity and finds that they significantly impact VC and PE investments.

As well as the disadvantages of bank-centred capital markets, Greene (1998) emphasizes that low availability of debt financing is an obstacle for economic development, especially for start-up activity in many countries. Corporations and entrepreneurs need to find backers — whether banks or VC/PE funds — who are willing to bear risk. Cetorelli and Gambera (2001) provide evidence that bank concentration promotes the growth of those industrial sectors that have a higher need for external finance by facilitating credit access to companies.

To summarise, the state of a country's capital market evidently affects its VC and PE activity. There is a direct link between the quoted capital market, banking activity and the unquoted segment. Banks are required for transaction financing and credit facilities. The size of the IPO market indicates the potential for the preferred exit channel and IPOs likewise spur entrepreneurial spirit because they reward entrepreneurs. This may be considered as analogous to the size of the M&A market, which also incentivises entrepreneurial managers and presents the second preferred VC/PE divestment channel, as well as deal sourcing opportunities. Therefore, the liquidities of the M&A, banking, and public capital markets provide good proxies for the VC and PE segment because they assess the quality of the VC and PE deal-making infrastructure. In countries with a strong public capital market, M&A, and banking activity, we also find the professional institutions, such as investment banks, accountants, lawyers, M&A boutiques or consultants, which are essential for successful VC and PE deal-making.

Importance of Taxation

Bruce (2000 and 2002), and Cullen and Gordon (2002) reveal that tax regimes matter for business entry and exit. Djankov et al. (2008) show that direct and indirect taxes affect entrepreneurial activity. Poterba (1989) builds a decision model showing the advantages of becoming an entrepreneur, driven by taxation incentives. Bruce and Gurley (2005) explain that increases in personal income tax can raise the probability of becoming an entrepreneur: large differences between personal income tax rates and corporate tax rates provide an incentive for start-up activity.

While it is much discussed in economic literature and reasonable to predict that taxation of income drives corporate activity and new venture creation, it is more difficult to detect a direct link with VC and PE investments. There are countries with relatively high corporate income tax rates but also very large VC and PE investments at the same time. On the other hand, there are many (especially emerging) countries with low corporate tax rates where no remarkable VC and PE investments are reported. In general, developed countries have higher tax brackets, but also more VC and PE investments. This signals that the levels of taxes themselves do not strongly affect VC and PE activity. It also points to the characteristic reliance of the VC and PE asset classes on tax transparent fund and transaction structures that neutralise the differentials across tax regimes. Therefore, we focus on the incentives for new venture creation provided by the spread between personal and corporate income tax rates as suggested by Bruce and Gurley (2005) and reward tax regimes with low administrative burdens and requirements in our index. However, since these tax aspects are more important for start-up activity, and hence for the VC segment, we assign a low weight to this key driver and do not use it to assess attractiveness in the PE-only index as subsequently discussed.

Importance of Investor Protection and Corporate Governance

Legal structures and the protection of property rights strongly influence the attractiveness of VC and PE markets. La Porta et al. (1997 and 1998) confirm that the legal environment determines the size and extent of a country's capital market and local companies' ability to receive outside financing. They emphasize the differences between statutory law and the quality of law enforcement. Roe (2006) discusses and compares the political determinants of corporate governance legislation for the major economies and focuses on the importance of strong shareholder protection to develop a vibrant capital market. Glaeser et al. (2001) and Djankov et al. (2003 and 2005) suggest that parties in common-law countries have greater ease in enforcing their rights from commercial contracts.

Cumming et al. (2006) find that the quality of a country's legal system is even more closely related to facilitating VC/PE backed exits than the size of a country's stock market. Cumming et al. (2009) extend this finding and show that cross-country differences in legality, including legal origin and accounting standards, have a significant impact on the governance of investments in the VC/PE industry. Desai et al. (2006) show, that fairness and property rights protection largely affect growth and the emergence of new enterprises. Cumming and Johan (2007) highlight the perceived importance of regulatory harmonisation with respect to investors' commitments to the asset class. La Porta et al. (2002) find a lower cost of capital for companies in countries with better investor protection, and Lerner and Schoar (2005) confirm these findings. Johnson et al. (1999) show that weak property rights limit the reinvestment of profits in start-up companies. Finally, and more broadly, Knack and Keefer (1995), Mauro (1995), and Svensson (1998) demonstrate that property rights significantly impact investments and economic growth.

The numerous studies cited above illustrate the importance of the quality of a country's legal system for its capital market, be it in terms of the quoted or unquoted segment. Nevertheless, what is important for financial claims is equally valid for any claim in the corporate world. Doing business becomes costly without proper legal protection and enforcement possibilities. VC and PE are strongly exposed to this circumstance because they are based on long-term relationships with institutional investors, where the investment source and host countries can be distant and different. Investors rely on their agents, and the general partners themselves rely on the management teams they back. If investors are not confident that their claims are well protected in a particular country, they refuse to allocate capital.

Importance of Human and Social Environment

Black and Gilson (1998), Lee and Peterson (2000), and Baughn and Neupert (2003) argue that cultures shape both individual orientation and environmental conditions, which may lead to different levels of entrepreneurial activity. Megginson (2004) argues that, in order to foster a growing risk capital industry, education with respect to schools, universities and research institutions plays an important role.

Rigid labour market policies negatively affect the evolution of a VC/PE market. Lazear (1990) and Blanchard (1997) discuss how protection of workers can reduce employment and growth. It is especially important for start-up and medium-size corporations to respond quickly to changing market conditions. Black and Gilson (1998) argue that labour market restrictions influence VC/PE activity, though not to the same extent as the stock market.

Djankov et al. (2002) investigate the role of several societal burdens for start-ups. They conclude that the highest barriers and costs are associated with corruption, crime, a larger unofficial economy and bureaucratic delay. This argument is of particular importance in some emerging countries with high perceived levels of corruption.

Importance of Entrepreneurial Culture and Deal Opportunities

The expectation regarding access to viable investments is probably the most important factor for international risk capital allocation decisions. Particularly for the early stage segment, we expect the number and volume of investments to be related to the innovation capacity and research output in an economy. Gompers and Lerner (1998) show that both industrial and academic research and development (R&D) expenditure significantly correlates with VC activity. Kortum and Lerner (2000) highlight that the growth in VC fundraising in the mid-1990s may have been due to a surge of patents in the late 1980s and 1990s. Schertler (2003) emphasizes that the number of both R&D employees and patents, as an approximation of the human capital endowment, has a positive and highly significant influence on VC activity. Furthermore, Romain and von Pottelsberghe de la Potterie (2004) find that start-up activity interacts with the R&D capital stock, technological opportunities and the number of patents. However, innovations and R&D are not only important for early stage VC investments. Without modernisation and sufficient R&D, it will be impossible for established businesses to maintain brand names and strong market positions, factors which attract later stage PE investors.

Despite the innovative output of a society, Djankov et al. (2002), and Baughn and Neupert (2003) argue that bureaucracy in the form of excessive rules and procedural requirements, multiple institutions from which approvals are needed and cumbersome documentation requirements, may severely constrain entrepreneurial activity. Lee and Peterson (2000) stress that the time and money required to meet such administrative burdens may discourage new venture creations.

Summary on the Determinants of Vibrant VC and PE Markets

The research papers emphasise the difficulty of identifying the most appropriate parameters for our index. There is no consensus about a ranking of the criteria. While some parameters are more comprehensively discussed, and certainly of high relevance, it remains unclear how they interact with others. For example, it is arguable whether the VC/PE activity in a country with a high quality of investor protection is affected more by the liquidity of its stock market or by its labour regulations.

While an IPO exit is, in principle, possible at any stock exchange in the world, the labour market frictions in a particular country can hardly be evaded. On the other hand, many of the criteria are highly correlated with each other. Black and Gilson (1998) call it a “chicken and egg” problem: it is impossible to detect which factor causes the other. One line of argument is that modern, open and educated societies develop a legislation that protects investors’ claims, which favours the output of innovation and the development of a capital market. This leads to economic growth and to demand for VC and PE. However, the causality might be the reverse: economic growth spurs innovation and the development of modern educated societies. There is a third suggestion: only competitive legal environments allow the development of the societal requirements that support innovations, economic growth, the capital market, and VC and PE activity. Finally, there is a fourth alternative, which may also be relevant: low taxes attract investors who provide financing for growth which in turn leads to modern and educated societies.

All lines of argument are reasonable and validated by the economic development of selected countries in different historic periods. Nevertheless, it seems to be the combination of all these factors which need to be improved in parallel to increase VC and PE attractiveness of countries and regions. For this reason, we do not rely on a selection of only a small number of parameters. For a country to receive a high index rank, it needs to achieve a high score on all of the individual criteria. Therefore, we propose a structure of the discussed determinants to achieve a comprehensive result and to facilitate interpretation. Firstly, we differentiate the six key drivers: economic activity, depth of the capital market, taxation, investor protection and corporate governance, human and social environment, and entrepreneurial culture and deal opportunities. We then confirm their choice via a survey of institutional investors, reported in Groh and Liechtenstein (2009) and (2011), and base our index structure upon them. Unfortunately, none of these six key drivers is directly measurable, so we seek data series that adequately express their character. Hence, we try to find best proxies for the aforementioned drivers of VC/PE attractiveness. One constraint is that these proxies must be available for a large number of countries.

Building the 2021 Index

Assessing Six Latent Key Drivers

The most important principle of our index is to assess the six latent drivers of VC/PE attractiveness:

1. Economic Activity,
2. Depth of Capital Market,
3. Taxation,
4. Investor Protection and Corporate Governance,
5. Human and Social Environment, and
6. Entrepreneurial Culture and Deal Opportunities.

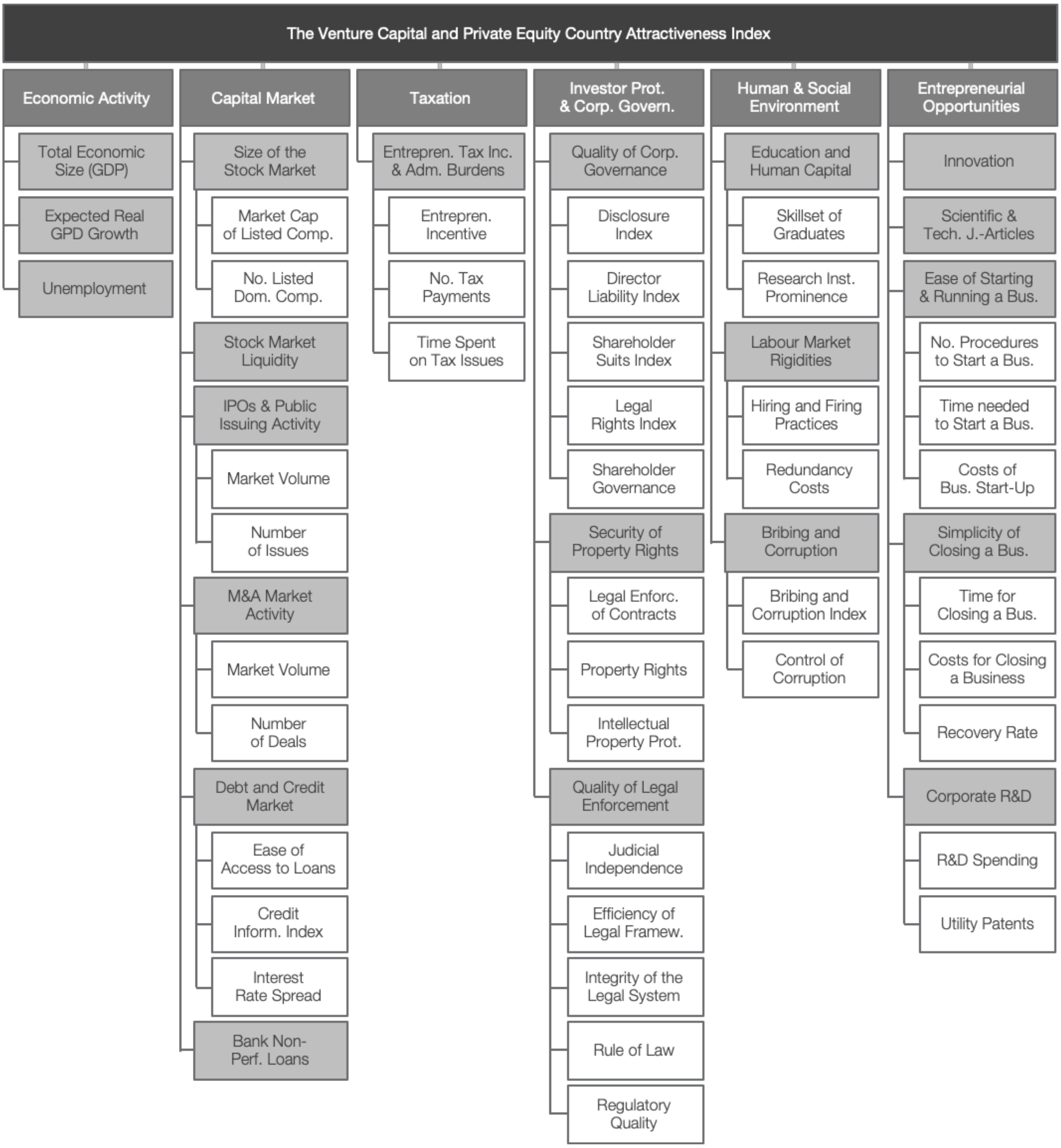
Latent drivers are criteria that are not directly observable, but driven by others which can be measured. For example, we assume in a first step that the VC/PE attractiveness of a country is determined by six key drivers. Nevertheless, as pointed out, the key drivers themselves are not measurable but need to be estimated. For example, ideally the quality of the deal-making environment in a country would be expressed by the number of investment banks, M&A boutiques, law firms, accountants and consultants. Unfortunately, while it might be possible to obtain these data for a selected number of developed countries, such data does not exist on a global scale. Our only alternative is to gather more general information, for example on the level of debt provided by the banking sector, or estimates about the perceived sophistication of the financial system. We submit that these criteria affect the latent key driver, the depth of the capital market. Even if they are not perfect proxies, we maintain that in countries where these criteria are better developed, the capital market will be deeper and more deal-supporting institutions will exist to facilitate VC and PE activity. Hence, we assess the latent key driver with observable data. This principle is maintained at all individual levels for the index construction. An unobservable criterion is assessed with several proxy parameters. In principle, we measure the attractiveness of a country by the six key drivers but use many more proxies for their assessment. We always use several proxies so as not to be reliant on single individual data series which might be biased by different gathering procedures across the countries or by insufficient reporting.

How We Disaggregate the Six Key Drivers

In accordance with the principle of assessing latent key drivers with observable data, we disaggregate each key driver into sub-categories. These sub-categories are either individual data series or, again, latent drivers dependent on determinants that we name “level-2 constructs.” For example, as documented in Exhibit 1, we split the key driver “2. Depth of the capital market” into six sub-categories:

- 2. Depth of Capital Market
- 2.1 Size of the Stock Market,
- 2.2 Stock Market Liquidity (Trading Volume),
- 2.3 IPOs and Public Issuing Activity,
- 2.4 M&A Market Activity,
- 2.5 Debt and Credit Market,
- 2.6 Bank Non-Performing Loans to Total Gross Loans, and

Exhibit 1: The VC and PE Country Attractiveness Index – Construction Scheme



Data series 2.2 and 2.6 are provided by the World Bank while the other indicators are constructs themselves. For instance, we assess “2.3 IPOs & Public Issuing Activity” by volume and by number of issues. This approach has two major advantages. First, individual data series do not gain too much weight when they are grouped, and this limits the impact of outliers. Second, the overall results can be traced to more granulated levels which provide complete transparency and better interpretation.

The Weighting Scheme

We spent a great deal of effort refining the statistical analyses and optimising the structure for previous index editions.[3] We keep this optimised structure and apply equal weights for all data series when we aggregate them to the level-2 constructs and equal weights for the level-2 constructs or indicators to aggregate them on the next higher level of the six key drivers. Finally, the individual weights for the six key drivers depend on the number of their level-2 constructs/indicators. For example, “1. Economic Activity” consists of three level-2 indicators, “2. Depth of Capital Market” of six indicators/constructs, while “3. Taxation” consists of only one. Overall, we use 21 level-2 constructs for our index, and hence, “1. Economic Activity” receives a weight of 3/21, which is 0.143, while the weight of “2. Depth of Capital Market” is 6/21, which is 0.286, and for “3. Taxation” it is 1/21 =0.048, respectively.

The advantage of this weighting scheme is that the key drivers which include more level-2 constructs/indicators, and hence more data, gain more weight. First, this represents their actual importance for VC and PE attractiveness as revealed by our own analyses and second, we diminish the effect of potential outliers. This final index structure results from substantial prior optimisation effort. We find that any statistically “more sophisticated” technique does not improve the index quality. The weighting scheme assigns appropriate emphasis according to the explanatory power of the individual key drivers. We will return to this topic in a later section of this annual.

Separate VC and PE Indices

To account for differences with respect to the two market segments, VC vs. PE, we propose three related indices. The first one combines both segments (VC/PE). The second focuses on early stage VC only and the third index on later stage PE. The combined index includes all data series proposed in Appendix 1, while we discard the data series that are less important for either of the two market segments when calculating the individual VC and PE indices.

For the VC index, we consider the level-2 construct “2.5 Debt & Credit Market” to be of minor importance and hence, discard it. We also delete “2.6 Bank Non-Performing Loans to Total Gross Loans” from the VC index.

For the PE index, we discard key driver “3. Taxation,” because the criteria considered are barely relevant for later-stage PE. Similarly, we drop “5.1 Education & Human Capital” from the human and social environment key driver and keep only “6.5 Corporate R&D” to assess the deal opportunities related to proprietary research output of corporations.

The weights for the individual index items in the separate VC and PE indices are determined in the same way, and this leads to changes of some of the key driver weights. The results are highlighted on the individual country pages subsequent in this annual.

Appendix 1 shows the data series, the level-2 constructs and the weights for the combined VC/PE, and the separate VC-only and PE-only indices. The weights are presented with respect to the next aggregation level. Hence, “1.1 Size of the Economy”, “1.2 Expected Real GDP Growth” and “1.3 Unemployment” receive each a weight of 33.3% when determining the Economic Activity key driver. The key driver itself has an importance of 14.3% for the aggregation of the overall VC/PE

[3] Details about the applied statistical procedures to determine weights for the data series are provided in our paper Groh, Alexander, Liechtenstein, Heinrich and Lieser, Karsten (2010): The European Venture Capital and Private Equity Country Attractiveness Indices, Journal of Corporate Finance, Volume 16, Issue 2, April 2010, pp. 205 – 224. Related working papers are available at http://ssrn.com/author=330804.

index. We provide more information about the aggregation technique in the appendix.

Changes with Respect to the Prior Index Version

Compared to our previous index structure, the number of underlying data series has decreased. The providers of five individual indicators discontinued gathering/publishing their data and we were unable to retrieve appropriate replacement at the desired data quality level and for the necessary sampling period. Therefore, we needed to discard data series “5.2.2. Rigidity of Hours Index”, “5.2.3. Difficulty of Firing Index”, “5.3.3.Extra Payments/Bribes”, “6.1.2. Capacity for Innovation”, and “2.7. Financial Market Sophistication” from our 2021 Index calculation. The latter data series was a level 1 indicator. Thus, its discontinuation also affects the overall index weighting scheme. The modifications cause rank changes for some countries compared to previously published index versions. We comment on important incidents in the subsequent section.

Country Coverage

We aim to cover as many countries as possible, and the inclusion/exclusion of a particular country is only contingent on data availability. This allows us to cover 125 countries.

Region*	Countries
Africa (31)	Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Côte d'Ivoire, Egypt, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe
Asia (22)	Armenia, Azerbaijan, Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Japan, Kazakhstan, Korea South, Kyrgyzstan, Malaysia, Mongolia, Pakistan, Philippines, Russia, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam
Australasia (2)	Australia, New Zealand
Eastern Europe (21)	Albania, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Slovakia, Slovenia, Turkey, Ukraine, Serbia
Latin America (17)	Argentina, Bolivia, Brazil, Chile, Colombia, Dominican Republic, Ecuador, El Salvador Guatemala, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
Middle East (10)	Bahrain, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates
North America (2)	United States, Canada
Western Europe (20)	Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

Note: * Number of countries covered in parentheses.

The 2021 VC and PE Country Attractiveness Ranking

We gathered the individual data series in Appendix 1 for all our sample countries from 2000 onwards to most recent data retrieved including the expected economic growth rates for 2021. We calculate the 2021 index and find that, not surprisingly, the United States remains the most attractive country for VC and PE allocations, retaining its ranking from all previous index editions. We rescaled the US score to 100.[4] The US is followed by the United Kingdom, Japan, Germany, and Canada. While the distance between the US and the UK has widened in our new index version, the gaps between the UK and her followers and among the followers themselves have become rather small. The UK scores 90.3 and her followers achieve 87.4, 87.3, and 87.2, respectively. These scores assign virtually equal ranks to Japan, Germany, and Canada. We further note remarkable rank changes compared to previous index versions for Germany, China, South Korea, and France which could improve their positions, while Canada lost attractiveness. These changes are partly driven by the modification of the index structure as described in the previous section and partly by the impact of the Covid pandemic. All high ranked countries are assumed to recover relatively quickly from the Covid related recession with China leading their peers. Covid also strongly affected overall financial market activity, thus narrowing the gaps among the "Depth of Capital Market" key driver of many countries. Potential Brexit effects are not (yet) visible in the data and superimposed by the Covid-related damages.

Table 1 presents the ranking of The VC and PE Country Attractiveness Index 2021. The table is open to debate. Some readers might argue that particular countries are ranked too high, others too low. However, we note that the index ranking is the result of commonly available, transparent, aggregated socio-economic data, which describes relevant characteristics for investors in VC and PE assets. The results can be traced to the level of the individual data series, and hence, can be reconciled. Our index assesses a "probability for success" from the institutional and socio-economic perspective. This probability increases with better developed key driving forces as defined above.

Please note that the underlying data is the most recent information available. Hence, we show the current attractiveness ranking including the economic outlook for 2021 and invite investors and advisers to enrich the information with their own knowledge, experience and expectations when drawing their conclusions on asset allocation.

[4] We explain the rescaling procedure in the appendix.

Table 1: The Venture Capital and Private Equity Country Attractiveness Ranking 2021

Country	Rank	Score	Country	Rank	Score	Country	Rank	Score
United States	1	100.0	Indonesia	43	57.8	Uruguay	85	34.8
United Kingdom	2	90.3	Cyprus	44	57.4	Mongolia	86	34.8
Japan	3	87.4	Lithuania	45	57.3	Tanzania	87	33.9
Germany	4	87.3	Vietnam	46	56.9	Botswana	88	33.5
Canada	5	87.2	Brazil	47	56.5	Macedonia	89	33.2
Singapore	6	85.0	Bulgaria	48	56.5	Armenia	90	32.9
China	7	84.7	Slovenia	49	56.5	Bosnia-Herzegovina	91	32.2
Australia	8	84.0	Greece	50	55.5	Georgia	92	31.7
Korea, South	9	83.8	Colombia	51	54.9	Zambia	93	31.4
France	10	83.6	Philippines	52	54.5	Azerbaijan	94	30.3
Hong Kong	11	82.4	Egypt	53	54.2	Algeria	95	29.5
Netherlands	12	81.7	Kazakhstan	54	54.1	Ecuador	96	29.2
Sweden	13	81.0	Morocco	55	54.0	Cambodia	97	28.4
Denmark	14	80.8	Malta	56	53.8	Kyrgyzstan	98	28.3
Switzerland	15	79.5	Croatia	57	53.1	Malawi	99	28.1
Finland	16	78.9	Qatar	58	52.3	Uganda	100	27.8
Norway	17	78.1	Kuwait	59	51.9	Moldova	101	27.0
New Zealand	18	76.7	Peru	60	51.8	Ivory Coast	102	25.9
Israel	19	76.5	Pakistan	61	51.6	Albania	103	25.6
Spain	20	76.1	Iceland	62	50.9	Bolivia	104	25.3
Belgium	21	75.0	Tunisia	63	50.7	Dominican Republic	105	24.2
Austria	22	75.0	Latvia	64	50.2	Guatemala	106	24.0
Malaysia	23	74.8	Serbia	65	50.0	Ethiopia	107	22.8
Ireland	24	73.9	Argentina	66	49.4	Mozambique	108	22.3
Taiwan	25	71.9	Bahrain	67	49.2	Senegal	109	22.1
India	26	71.0	Oman	68	48.4	Zimbabwe	110	21.9
Italy	27	70.8	Sri Lanka	69	48.0	El Salvador	111	21.9
Poland	28	67.8	Mauritius	70	47.8	Paraguay	112	21.2
Thailand	29	66.3	Jordan	71	47.7	Burkina Faso	113	20.9
Russian Federation	30	66.1	Slovakia	72	47.5	Mali	114	20.5
Portugal	31	65.4	Belarus	73	47.3	Madagascar	115	20.5
United Arab Emirates	32	64.8	Nigeria	74	46.7	Nicaragua	116	19.9
Czech Republic	33	64.1	Ghana	75	45.3	Benin	117	19.6
Chile	34	64.0	Kenya	76	44.8	Syria	118	19.5
Mexico	35	61.4	Montenegro	77	43.9	Cameroon	119	19.2
Luxembourg	36	61.4	Namibia	78	42.7	Lesotho	120	17.0
Saudi Arabia	37	61.4	Bangladesh	79	41.8	Mauritania	121	16.2
Estonia	38	61.0	Ukraine	80	40.7	Angola	122	15.1
Turkey	39	60.8	Panama	81	40.6	Chad	123	12.8
South Africa	40	60.3	Jamaica	82	39.8	Burundi	124	12.1
Romania	41	58.8	Rwanda	83	38.5	Venezuela	125	5.2
Hungary	42	58.8	Lebanon	84	37.6			

The Regional VC and PE Attractiveness Landscape

Our methodology allows calculating regional key driver scores as presented in Table 2. Note that these regional scores are not computed as "simple averages". They result from weighting the individual data series of the countries corresponding to a particular region either by GDP or population, whatever is more appropriate. We realize that the higher ranked core markets (North America, Australasia and Western Europe) have consistently better developed key drivers with the exception of economic activity. The table also reveals particular weaknesses of emerging (Asia, Middle East and Eastern Europe) and frontier markets (Latin America and Africa) with respect to their capital market depth, investors' protection, their human and social environment, and related to that, innovation driven entrepreneurial and deal opportunities. We stress again that "Taxation" does not measure the levels of marginal corporate or capital gains tax rates. The key driver rather assesses incentives for entrepreneurship resulting from the differential of the personal and corporate income tax rates and the administrative burdens when determining and paying taxes.

Table 2: Regional VC and PE Attractiveness Landscape

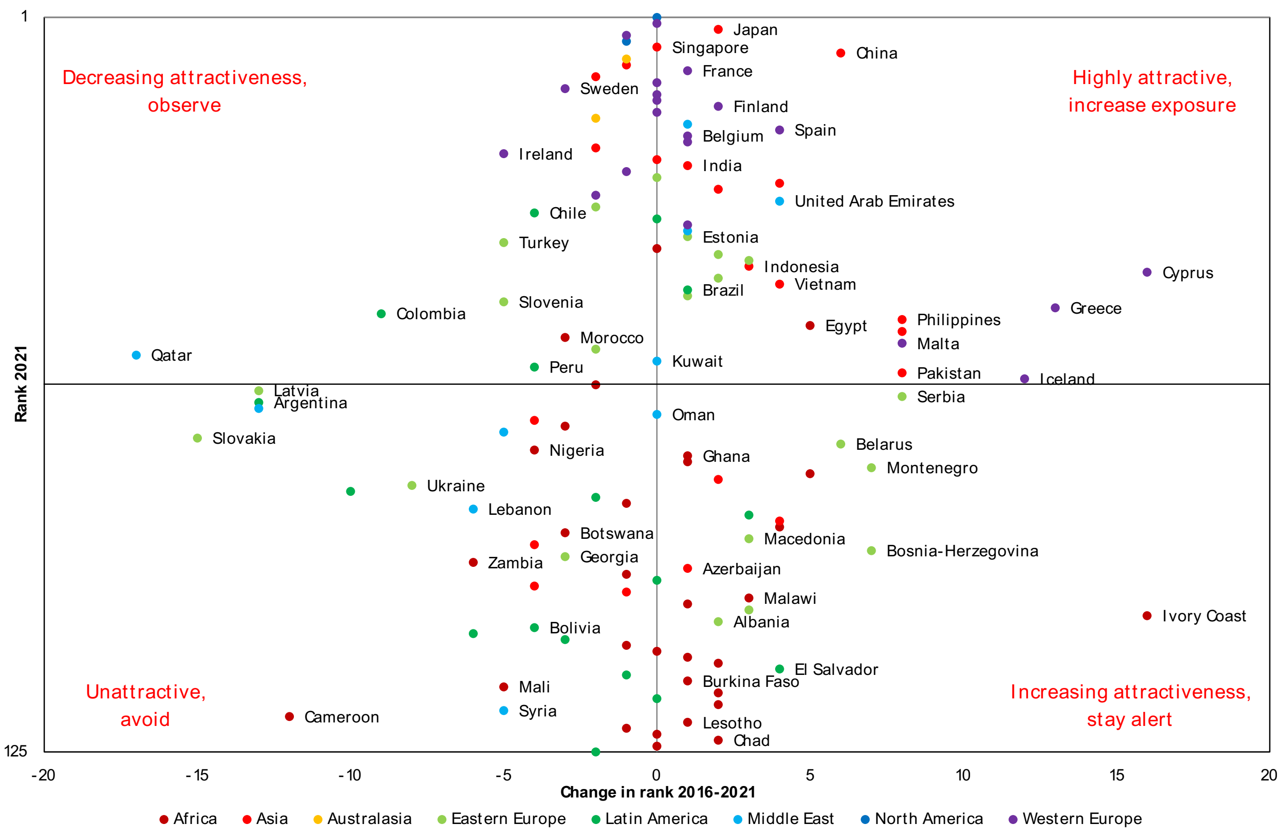
Region	VC/PE Index	Economic Activity	Depth of Capital Market	Taxation	Investor Protection and Corporate Governance	Human and Social Environment	Entrepreneurial Culture and Deal Opportunities
1. North America	95.4	95.0	95.8	100.2	101.5	89.3	94.3
2. Australasia	81.4	83.2	80.7	101.8	107.4	56.0	82.3
3. Western Europe	75.7	79.3	71.1	106.4	89.8	57.5	79.0
4. Asia	65.6	81.8	66.0	91.7	76.7	42.9	62.8
5. Middle East	56.1	71.9	54.5	88.9	69.3	36.6	51.8
6. Eastern Europe	53.6	68.6	45.5	95.1	71.2	33.9	55.8
7. Latin America	44.9	69.0	40.2	85.3	55.1	27.2	41.8
8. Africa	38.9	62.4	28.5	82.2	59.0	26.5	35.9

Historic comparison and allocation recommendations

In order to demonstrate shifts in the VC and PE country attractiveness, we calculate our current index back for the year 2016 and compare the rankings. Exhibit 2 shows the current country ranks (ordinate) and the historic rank changes (abscissa - positive to the right and negative to the left) between the two indices. It provides interesting insights and reveals strong increases of VC and PE attractiveness for certain countries, and downgrades for others. We aim to avoid commenting on individual countries and rather refer the reader to our website where Exhibit 2 is linked with the individual country profiles and additional analytic tools. Exhibit 2 allows insights from interpreting the four quadrants of the graph. Obviously, all countries on the left-hand side of the exhibit should be carefully observed by investors, in particular the lower their current rank. It seems reasonable to recommend to investors avoidance of the countries in the lower left quadrant. Contrarily, we see the promising development of the countries to the right-hand side of the ordinate. The countries in the right upper quadrant can be considered highly attractive investment hosts. The lower right corner groups the countries with increasing but yet moderate levels of attractiveness. The further down we get in the graph the lower the maturity of these countries to support VC and PE transactions. However, investors should stay alert not to miss the right time to enter.

For more information and comparisons, we refer to the individual country profiles on our website http://blog.iese.edu/vcpeindex/ where additional graphs, analyses, and benchmarking tools are available.

Exhibit 2: Current Ranks and Rank Changes between Index Version 2016 and 2021



Tracking Power of our Index

Our index ranks the attractiveness of countries from the perspective of institutional investors deciding on their VC/PE allocations. The index relies on a large number of socio-economic data series which need to be available for all countries over the observation period. The composite measure can deviate from the actual risk capital market activity.

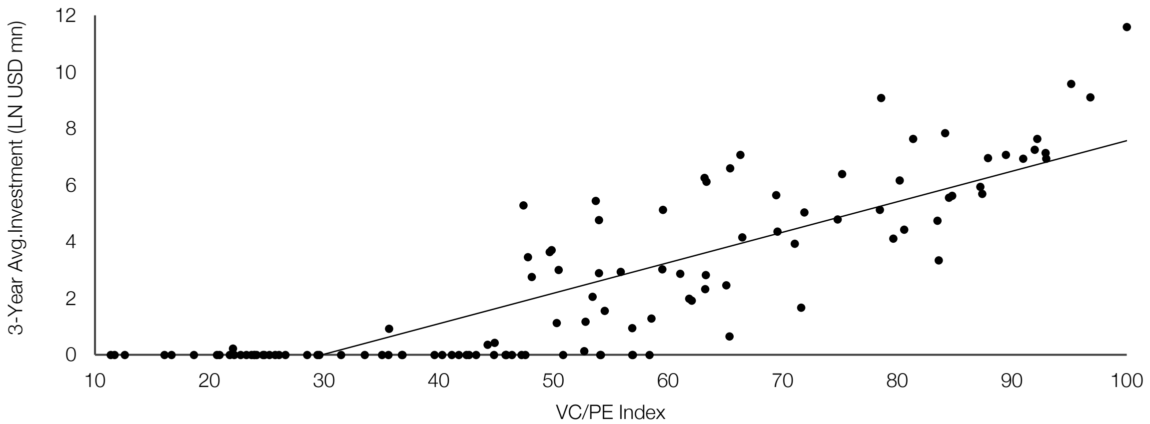
To analyse the index' tracking power, we compare the rankings with the actual VC and PE activity in the respective countries. Therefore, we refer to the logarithm of an average of all VC and PE investments made in a certain country over the last three years. We use logarithmic transformation to account for the large activity divergence (e.g. activity in the US vs. several emerging countries), and we refer to an average over three years to smooth annual fluctuations.

The statistical measure for such a comparison is the Pearson correlation coefficient which ranges between -1 and 1. The closer to 1, the higher the predictive power of our index. Negative correlation would mean a contradictive signal of our index while correlations close to 0 would indicate that our index has no predictive power.

We determine a Pearson correlation of 0.87 between the VC/PE activity measure and our index scores. This is a notably strong result confirming the appropriateness of the underlying data and our index methodology. We illustrate this high correlation in Exhibit 5.

The exhibit shows the tracking power of our index. We plot the countries' investment activity on their index scores and identify a strong link. The exhibit further illustrates that we only observe VC and PE activity at index levels above approximately 45 points. For countries with scores below this level, no activity is (publicly) reported. Hence, 45 points can be considered a threshold for the emergence of VC and PE markets.

Exhibit 5: Tracking Power of our Index



Summary and Outlook

We provide a composite measure that determines the attractiveness of 125 countries to receive capital allocations from investors in the VC and PE asset class. The composite measure is based on six main criteria: economic activity, depth of the capital markets, taxation, investor protection and corporate governance, the human and social environment, and entrepreneurial culture and deal opportunities. The definition of these criteria is based on an extensive review of academic literature, on a survey of institutional investors we conducted prior to our study, and on our own econometric analyses. The six criteria are not directly observable. Therefore, we use proxy variables to assess them for each country. As a result, we obtain a country ranking and provide detailed analyses on the strengths and weaknesses of the particular nations and information on the historic development of the criteria. Our index performs well in terms of explaining the differences of observed VC and PE activity, and excellently tracks historic country performance. However, it does not qualify as a crystal ball for investment advisers. We highlight our intention to enrich the discussion regarding national VC and PE markets and to propose a valuable informational tool, rather than an arbitrage instrument.

We find a general pattern if we compare country characteristics. There is considerable dispersion with respect to the six key drivers. Some countries attract investors with tax incentives. Many countries show strong entrepreneurial culture and deal opportunities. There is great dispersion in economic activity, especially with respect to emerging markets and in the human and social environment. However, the two key criteria, depth of capital markets, and investor protection and corporate governance make the difference across the large sample. Common law countries dominate the others regarding these criteria. We observe that strong investor protection and corporate governance rules favour deep and liquid capital markets. These elicit the required professional community to secure deal flow and exit opportunities for VC and PE funds which affects a country's attractiveness for institutional investments in the VC and PE asset class.

However, this discussion reflects the capital supply side only. We should also take into account that, as revealed by our analyses, many countries lack several important characteristics. Without a sufficient entrepreneurial culture, and with rigid labour markets, bribery and corruption, there will be firstly less demand for VC and PE, and secondly returns to investors will diminish.

Emerging VC and PE markets provide interesting opportunities to investors. However, it is the discussed lack of balance of the key driving forces that renders emerging VC/PE allocation decisions challenging. Exceptional growth opportunities come at the cost of disadvantageous conditions with respect to investors' protection, usually less liquid exit markets, lower innovation capacity and higher perceived bribery and corruption.

We invite you to examine and thoroughly analyse our results. If you are an investor, please enrich the information provided with your own expertise and knowledge about the key driving forces and market conditions in the individual countries to make your allocation decisions. If you are a politician, please use our analyses as a demonstration of how investors can evaluate and benchmark countries. If you are a researcher, and this is equally valid for the whole constituency, please do not hesitate to criticise our approach and findings. We will continue to update our index annually and very much appreciate any critique and comment.

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Appendix 1: Structure of the VC/PE Index, Separate VC and PE Indices, and Weighting Schemes

ID	Construct	Dimension	VC/PE Index Weight	VC-only Index Weight	PE-only Index Weight
0	**VCPE Index 2016**		100.0%	100.0%	100.0%
1	**Economic Activity**		14.3%	15.8%	20.0%
1.1	**Size of the Economy (GDP)** Source: Euromonitor International, National statistics/Eurostat/OECD/UN/International Monetary Fund (IMF), International Financial Statistics (IFS)	LN US$ mn	33.3%	33.3%	33.3%
1.2	**Expected Real GDP Growth** Source: Euromonitor International, National statistics/Eurostat/OECD/UN/International Monetary Fund (IMF), World Economic Outlook (WEO)	%	33.3%	33.3%	33.3%
1.3	**Unemployment** Source: Euromonitor International, International Labour Organisation (ILO)/Eurostat/national statistics/OECD	%	33.3%	33.3%	33.3%
2	**Depth of Capital Market**		28.6%	21.1%	40.0%
2.1	**Size of the Stock Market**		16.7%	25.0%	16.7%
2.1.1	**Market Capitalization of Listed Companies** Source: World Bank, World Development Indicators; World Federation of Exchanges database	% of GDP	50.0%	50.0%	50.0%
2.1.2	**Number of Listed Domestic Companies** Source: World Bank, World Development Indicators; World Federation of Exchanges database	LN number	50.0%	50.0%	50.0%
2.2	**Stock Market Liquidity (Trading Volume)** Source: World Bank, World Development Indicators; World Federation of Exchanges database	% of GDP	16.7%	25.0%	16.7%
2.3	**IPOs & Public Issuing Activity**		16.7%	25.0%	16.7%
2.3.1	**Market Volume** Source: Thomson One Banker, SDC Platinum Global New Issues	LN US$ mn	50.0%	50.0%	50.0%
2.3.2	**Number of Issues** Source: Thomson One Banker, SDC Platinum Global New Issues	LN number	50.0%	50.0%	50.0%

2.4	**M&A Market Activity**		16.7%	25.0%	16.7%
2.4.1	**Market Volume** Source: Thomson One Banker, SDC Platinum Mergers & Acquisitions	LN US$ mn	50.0%	50.0%	50.0%
2.4.2	**Number of Deals** Source: Thomson One Banker, SDC Platinum Mergers & Acquisitions	LN number	50.0%	50.0%	50.0%
2.5	**Debt & Credit Market**		16.7%		16.7%
2.5.1	**Ease of Access to Loans** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey	% of GDP	33.3%		33.3%
2.5.2	**Credit Information Index** Source: World Bank, Doing Business		33.3%		33.3%
2.5.3	**Lending Rate** Source: Euromonitor International from International Monetary Fund (IMF), International Financial Statistics and national statistics/OECD	%	33.3%		33.3%
2.6	**Bank Non-Performing Loans to Total Gross Loans** Source: World Bank, World Development Indicators; International Monetary Fund, Global Financial Stability Report	%	16.7%		16.7%
3	**Taxation**		4.8%	5.3%	
3.1	**Entrepreneurial Tax Incentives & Administrative Burdens**		100.0%	100.0%	
3.1.1	**Entrepreneurship Incentive** Source: KPMG, Corporate Tax and Personal Income Tax Tables	%	33.3%	33.3%	
3.1.2	**Number of Tax Payments** Source: World Bank, Doing Business		33.3%	33.3%	
3.1.3	**Time spent on Tax Issues** Source: World Bank, Doing Business	Hours per year	33.3%	33.3%	
4	**Investor Protection & Corporate Governance**		14.3%	15.8%	20.0%
4.1	**Quality of Corporate Governance**		33.3%	33.3%	33.3%
4.1.1	**Disclosure Index** Source: World Bank, Doing Business		20.0%	20.0%	20.0%

4.1.2	**Director Liability Index** Source: World Bank, Doing Business	20.0%	20.0%	20.0%
4.1.3	**Shareholder Suits Index** Source: World Bank, Doing Business	20.0%	20.0%	20.0%
4.1.4	**Legal Rights Index** Source: World Bank, Doing Business	20.0%	20.0%	20.0%
4.1.5	**Shareholder Governance** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey	20.0%	20.0%	20.0%
4.2	**Security of Property Rights**	33.3%	33.3%	33.3%
4.2.1	**Legal Enforcement of Contracts** Source: Fraser Institute, Economic Freedom of the World; World Bank, Doing Business	33.3%	33.3%	33.3%
4.2.2	**Property Rights** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey	33.3%	33.3%	33.3%
4.2.3	**Intellectual Property Protection** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey	33.3%	33.3%	33.3%
4.3	**Quality of Legal Enforcement**	33.3%	33.3%	33.3%
4.3.1	**Judicial Independence** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey	20.0%	20.0%	20.0%
4.3.2	**Efficiency of Legal Framework in Challenging Regulations** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey	20.0%	20.0%	20.0%
4.3.3	**Integrity of the Legal System** Source: Fraser Institute, Economic Freedom of the World; PRS Group, International Country Risk Guide	20.0%	20.0%	20.0%
4.3.4	**Rule of Law** Source: World Bank, Worldwide Governance Indicator	20.0%	20.0%	20.0%
4.3.5	**Regulatory Quality** Source: World Bank, Worldwide Governance Indicator	20.0%	20.0%	20.0%
5	**Human & Social Environment**	14.3%	15.8%	13.3%
5.1	**Education & Human Capital**	33.3%	33.3%	0.0%

5.1.1	**Skillset of Graduates** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey		50.0%	50.0%	0.0%
5.1.2	**Research Institutions Prominence** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey		50.0%	50.0%	0.0%
5.2	**Labour Market Rigidities**		33.3%	33.3%	50.0%
5.2.1	**Hiring and Firing Practices** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey		50.0%	50.0%	25.0%
5.2.2	**Redundancy Costs** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey		50.0%	50.0%	25.0%
5.3	**Bribing and Corruption**		33.3%	33.3%	50.0%
5.3.1	**Corruption Perception Index** Source: Transparency International		50.0%	50.0%	50.0%
5.3.2	**Control of Corruption** Source: World Bank, Worldwide Governance Indicator		50.0%	50.0%	50.0%
6	**Entrepreneurial Culture & Deal Opportunities**		23.8%	26.3%	6.7%
6.1	**Innovation** Global Innovation Index Source: INSEAD, WIPO, Johnson Cornell University		20.0%	20.0%	
6.2	**Scientific and Technical Journal Articles** Source: Elsevier, Scopus	LN number	20.0%	20.0%	
6.3	**Ease of Starting & Running a Business**		20.0%	20.0%	
6.3.1	**Number of Procedures to Start of Business** Source: World Bank, Doing Business		33.3%	33.3%	
6.3.2	**Time Needed to Start a Business** Source: World Bank, Doing Business	Days	33.3%	33.3%	
6.3.3	**Costs of Business Start-Up Procedures** Source: World Bank, Doing Business	% of income per capita	33.3%	33.3%	
6.4	**Simplicity of Closing a Business**		20.0%	20.0%	

6.4.1	**Time for Closing a Business** Source: World Bank, Doing Business	Years	33.3%	33.3%	
6.4.2	**Costs for Closing a Business** Source: World Bank, Doing Business	% of estate	33.3%	33.3%	
6.4.3	**Recovery Rate** Source: World Bank, Doing Business	Cents on US$	33.3%	33.3%	
6.5	**Corporate R&D**		20.0%	20.0%	100.0%
6.5.1	**Company Spending on R&D** Source: World Economic Forum, Global Competitiveness Report; World Economic Forum, Executive Opinion Survey		50.0%	50.0%	50.0%
6.5.2	**Utility Patents** Source: Euromonitor International, Trade sources/national statistics	LN Number	50.0%	50.0%	50.0%

Appendix 2: Computation of the Index

The VC/PE attractiveness of each country is computed by calculating a weighted average of country performance scores in the six key drivers. The scores within each key driver are derived from the level-2 constructs, respectively derived from several raw data series.

Normalisation

In order to make the cross-sectional data series comparable, the raw data has to be converted into a common range. The rescaling method is used to normalise indicators to such a range by linear transformation. Thereby, 100 represents the best score, while 1 represents the worst.

For every individual variable, we define whether high values influence the attractiveness for investors positively or negatively, and hence, assign 100 points either to the highest score (e.g. in the case of GDP) or to the lowest (e.g. in the case of high hiring costs).

The points are calculated according to the following formula:

$$y_{q,i} = 99 \times \left[\frac{x_{q,i} - \min(x_q)}{\max(x_q) - \min(x_q)} \right] + 1$$

$y_{q,i}$ = normalised value of category q and country i

$x_{q,i}$ = raw data value of category q and country i

$\min(x_q)$ = minimum raw data value of category q within the sample

$\max(x_q)$ = maximum raw data value of category q within the sample

Example:

Raw data value [any unit]	**1 (lowest value in sample)**	**12 (random value in sample)**	**20 (highest value in sample)**
Normalised value [1-100]	99x[(1-1)/(20-1)]+1=1	99x[(12-1)/(20-1)]+1=58	99x[(20-1)/(20-1)]+1=100

Aggregation

For the index score calculation, we use geometric aggregation because it is better suited than arithmetic aggregation. Geometric aggregation rewards those countries or those sub-indicators with higher scores. Overall, a shortcoming in the value of one variable or sub-index can be compensated by a surplus in another. Compensability is constant in linear aggregation, while it is smaller in geometric aggregation for the sub-indicators with low values. Therefore, countries with low scores in some sub-indices would benefit from linear aggregation.

For this reason, we use geometric aggregation as follows:

$$\text{Index Value}_i = \prod_{q=1}^{Q} y_{q,i}^{w_q}$$

Index Value_i = index value of country i

$y_{q,i}$ = normalised value of category q and country i

w_q = weight of category q

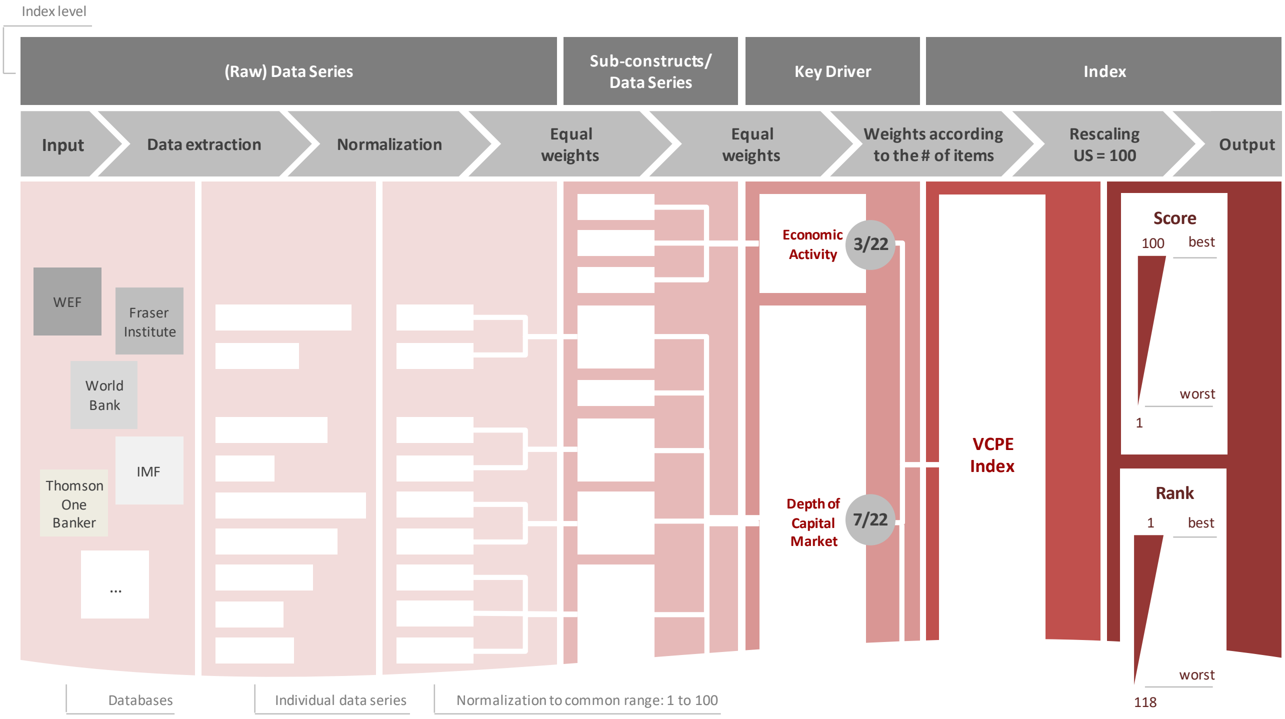
Example:

Category	**Economic Activity**	**Depth of Capital Market**	**Investor Protection and Corporate Governance**
Weight	0.50	0.25	0.25
Normalised value of country i ($y_{q,i}$)	30.0	40.0	50.0
Index value for the country	$(30^{0.5}) \times (40^{0.25}) \times (50^{0.25}) = 36.6$		

Weighting

After calculating the performance scores for each data series on the lowest level, the scores are aggregated using the aforementioned aggregation method. On the lowest level, items are aggregated with equal weights, i.e. the weights are derived from the number of components that are aggregated. Exhibit 7 shows the aggregation path from the normalised (raw) data series to the final VC/PE Country Attractiveness Index score.

Exhibit 7: Computation of the Index



Appendix 3: Statistical Validation of the Index

Correlation is a measure for the strength and directionality of a linear relation between two variables. The Pearson-Correlation-Coefficient ρ_(X,Y) lies between 0 to ±1. Zero indicates a non-linear or missing relation between two data sets and ±1 indicates perfect linearity. A positive (negative) correlation indicates a positive (negative) relation.

$$\rho_{X,Y} = \frac{cov(X,Y)}{\sigma_X \sigma_Y} = \frac{E((X-\mu_X)(Y-\mu_Y)}{\sigma_X \sigma_Y}$$

To test the quality of our index, we calculate the correlation between the index scores with the control variable. The results of these analyses are displayed in the following table. The correlation coefficients are very high for all cases considered. These high values prove the accuracy of the index scores and its ability to measure a countries' attractiveness for investors in VC and PE funds. It should be noted, however, that the accuracy and the volumes of reported VC investments is lower than for PE. Therefore, the correlations for the combined VC/PE and for the PE Index are somewhat higher than for VC.

	VC/PE investments LN (average 2018–2020)	**VC investments LN (average 2018–2020)**	**PE investments LN (average 2018–2020)**
VC/PE Index 2021	0.83	-	-
VC Index 2021	-	0.82	-
PE Index 2021	-	-	0.81

This report presents the results of a comprehensive research project on how to measure the attractiveness of a country for VC and PE investors. Designed to be an index produced annually, it is a dynamic product. An online version that uses the most recent data and allows for country comparisons can be found at:

http://blog.iese.edu/vcpeindex/.