



## 2. Measuring Global Connectedness

**This chapter explains how the DHL Global Connectedness Index was constructed and describes the rationale for key methodological decisions. For additional technical details and a full list of data sources employed, please refer to Appendix B of this report.**

**This explanation proceeds in five parts. First, it describes the selection of a set of specific aspects of the broad phenomena of global connectedness that will be covered in the index. Second, it defines quantitative metrics for the measurement of each of these aspects of connectedness. Third, it identifies gaps in the availability of the data required to calculate those metrics, and discusses how such gaps were addressed. Fourth, it describes how these diverse metrics were made comparable before they were combined into the index (“normalization”). Fifth, it explains the aggregation and weighting mechanisms via which the metrics were finally combined into the index.**

**Throughout this chapter, the example of the Netherlands (the top ranked country in the 2011 DHL Global Connectedness Index) will be used to illustrate the calculations that were performed to generate the index.**

### **1. Selecting Aspects of Connectedness to Measure**

Global connectedness is a multifaceted phenomenon incorporating many types of connections, so its measurement necessarily requires one to proceed from a specific definition of the phenomenon to the selection of a set of underlying metrics that will be included in its assessment.

For the purpose of constructing the DHL Global Connectedness Index, the starting point is the definition of global connectedness articulated in chapter 1 of this report: *Global Connectedness refers to the depth and breadth of a country’s integration with the rest of the world, as manifest by its participation in international flows of products and services, capital, information, and people.*

As this definition implies, connectedness is measured here based on actual flows that take place between and among countries. The focus on actual flows is motivated by the sense that while connectivity or the technical potential for connectedness has improved a great deal thanks to changes in transportation and communications technologies, actual levels of flows significantly lag that potential. This focus also allows the index to be generated based solely on hard data, which makes it ideal for dispelling myths about globalization (“globaloney”).

Furthermore, by focusing the index itself on actual flows, enablers of connectedness (such as the political variables covering tariffs, embassies, and so on, included in many other globalization indexes) may be analyzed separately in relation to the index (since they are not mixed into the index along with the actual flows). This is intended to make the index more useful for policymakers seeking insight into how to foster the aspects of connectedness that they deem most constructive for their countries. The analysis of enablers of connectedness is covered in chapter 5 of this report.

The definition of global connectedness used here also identifies four specific categories of flows that are covered as the four pillars of the index. These are: trade flows (products and services), capital flows (investment), information flows, and people flows. While the selection of these categories of flows was ultimately a subjective choice, they seem to encompass broadly the aspects of international connectedness that have maximum relevance for business people, policymakers, and ordinary citizens concerned with the impact of globalization on their life opportunities.

Within these four pillars, individual types of flows become the component building blocks from which the index is built up. These were selected via an extensive search for data on actual flows within each of the four pillars followed by the choice of a small set of flows within each based on their

Pillars	Components
1. Trade	1.1 Merchandise Trade
	1.2 Services Trade
2. Capital	2.1. Foreign Direct Investment (FDI) Stocks
	2.2. Foreign Direct Investment (FDI) Flows
	2.3. Portfolio Equity Stocks
	2.4. Portfolio Equity Flows
3. Information	3.1. Internet Bandwidth
	3.2. Telephone Call Minutes
	3.3. Trade in Printed Publications
4. People	4.1. Migrants (foreign born population)
	4.2. Tourists (departures and arrivals)
	4.3. International Students

importance to the overall phenomenon of connectedness as well as the availability of hard data on which they could be measured. The twelve components that were ultimately selected across the four pillars are shown in **Table 2.1**.

A few points merit elaboration regarding the selection of aspects of connectedness for measurement. First, two departures from the focus on actual flows are noteworthy. In the capital pillar, flows are paired with stocks. Foreign investment stocks (the result of flows accumulated over time) are an important broader indicator of enduring connections between countries, that have ongoing effects via corporate governance, and in the case of FDI, through managerial control. Investment stocks also help balance out the high year-to-year volatility of capital flows.

The second departure from the standard focus on flows is the inclusion of internet bandwidth, which is used as a proxy for internet traffic, because of lack of available data on the latter.

Additionally, it is worth noting that some aspects of connectedness were excluded due to normative considerations. Because the policy component of this analysis is intended to help countries identify and pursue opportunities to capture more of the potential benefits of connectedness, flows that are generally viewed as primarily harmful (especially on a global net basis) are not covered in the index. For ex-

ample, an index focused on harms might include international transmission of diseases and cross-border environmental pollution, but these are not covered here.<sup>1</sup>

Somewhat more controversially, the coverage of capital flows in this index is restricted to equity capital, and excludes cross-border debt. This reflects both academic research demonstrating the more favorable impacts of international equity investment (especially foreign direct investment but also portfolio equity) relative to debt investment, as well as the obvious harm caused by the debt crisis unfolding at the time of this writing.

## 2. Defining Metrics

Having identified the set of component flows based on which global connectedness will be measured, the next step is to identify appropriate metrics to quantify each of these flows. Building on the definition of global connectedness shown above, these metrics must capture each flow's depth as well as its breadth. Consider each of these aspects in turn.

*Depth* refers to the size of a country's international flows as compared to a relevant measure of the size of its domestic economy. It reflects in simple terms how important or pervasive interactions with the rest of the world are in the context of business or life in a particular country.

For the merchandise trade component, depth is measured by comparing each country's merchandise exports and imports to its GDP, yielding the metrics merchandise exports as percent of GDP and merchandise imports as percent of GDP. Thus, in 2010, the Netherlands' merchandise exports accounted for 73% of its GDP and merchandise imports accounted for 66%.

A comparison of the Netherlands versus the United States illustrates the importance of scaling depth metrics based on the size of each country's national economy. U.S. exports

were more than twice as large as Netherlands' exports in 2010, but the U.S. economy was roughly twenty times larger. Thus, even though the U.S. was a much larger exporter, Netherlands was far more connected than the U.S. internationally with respect to merchandise exports, as reflected by its exports as percent of GDP ratio of 73% versus the U.S.'s only 9%. As tends to be the case, the vast majority of economic activity in a large country such as the U.S. takes place within the country's borders, whereas small countries tend to have a much higher proportion of their business activity involving foreign buyers or sellers.

To implement these depth metrics, a relevant measure of a country's domestic economy must be selected as the basis of comparison for each type of flow. Such measures are identified in **Table 2.2**, which also provides additional details about the flow metrics used for assessing depth. Foreign direct investment (FDI) flows are compared with gross fixed capital formation. This measure is a more precise domestic match for FDI flows than GDP, allowing the metric to characterize the percentage of a country's fixed capital investment that takes place within versus across international borders.

FDI and portfolio equity flows are measured using a three year moving average because these flows tend to be especially volatile.<sup>2</sup> Year-to-year fluctuations in such metrics tend to reflect macroeconomic conditions and merger waves more than long-lived changes in levels of connectedness.

For the measurement of the depth of services trade, only commercial services are included; government services are excluded. This is due to data availability (particularly for 2010) rather than to a conceptual preference.

*Breadth* measures how closely a country's distribution of international flows across its partner countries matches

**Table 2.2**  
Depth Metrics by Component

Pillar	Component	Domestic Comparison for Depth
1. Trade	1.1 Merchandise Trade	GDP
	1.2 Services Trade (Commercial Services Only)	GDP
2. Capital	2.1. Foreign Direct Investment (FDI) Stocks	GDP
	2.2. Foreign Direct Investment (FDI) Flows (moving average of last 3 years)	Gross Fixed Capital Formation (GFCF)
	2.3. Portfolio Equity Stocks	GDP
	2.4. Portfolio Equity Flows (moving average of last 3 years)	GDP
3. Information	3.1. Internet Bandwidth	Internet Users
	3.2. Telephone Call Minutes	Population
	3.3. Trade in Printed Publications (H.S. Code 49 covering printed books, newspapers, pictures, etc.)	Population
4. People	4.1. Migrants (foreign born population)	Population
	4.2. Tourism (departures and arrivals of overnight tourists)	Population
	4.3. International Students	Tertiary Education Enrollment

the global distribution of the same flows in the opposite direction. The breadth of a country's merchandise exports, for example, is measured based on the difference between the distribution of its exports across destination countries versus the rest of the world's distribution of merchandise imports.

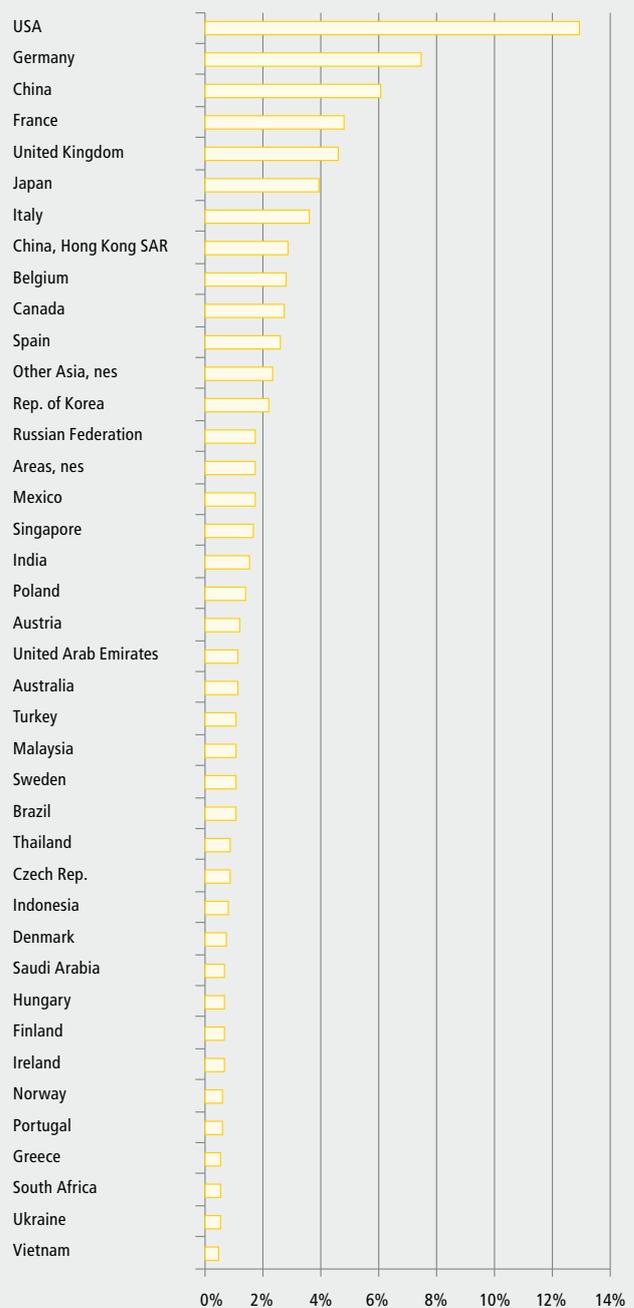
To elaborate how this metric works, compare the breadth of the Netherlands' merchandise exports versus those of Switzerland and Botswana. Netherlands ranks 27th globally on this metric, and Switzerland and Botswana are the top and bottom ranked countries on this metric respectively. **Figure 2.1.a–c** juxtaposes each of these countries' distributions of merchandise exports by destination against the distribution of the rest of the world's merchandise imports. To make the charts easier to read, only the top 40 importers are shown in each pair. Notice how Switzerland's exports most closely resemble world imports, Netherlands' bear fairly close resemblance, and Botswana's bear almost no resemblance at all (more than half of Botswana's exports—

Figure 2.1.a  
Netherlands Exports vs. Rest of World Imports (%), Top 40 Importing Countries Only

### Netherlands Exports



### World Except Netherlands Imports

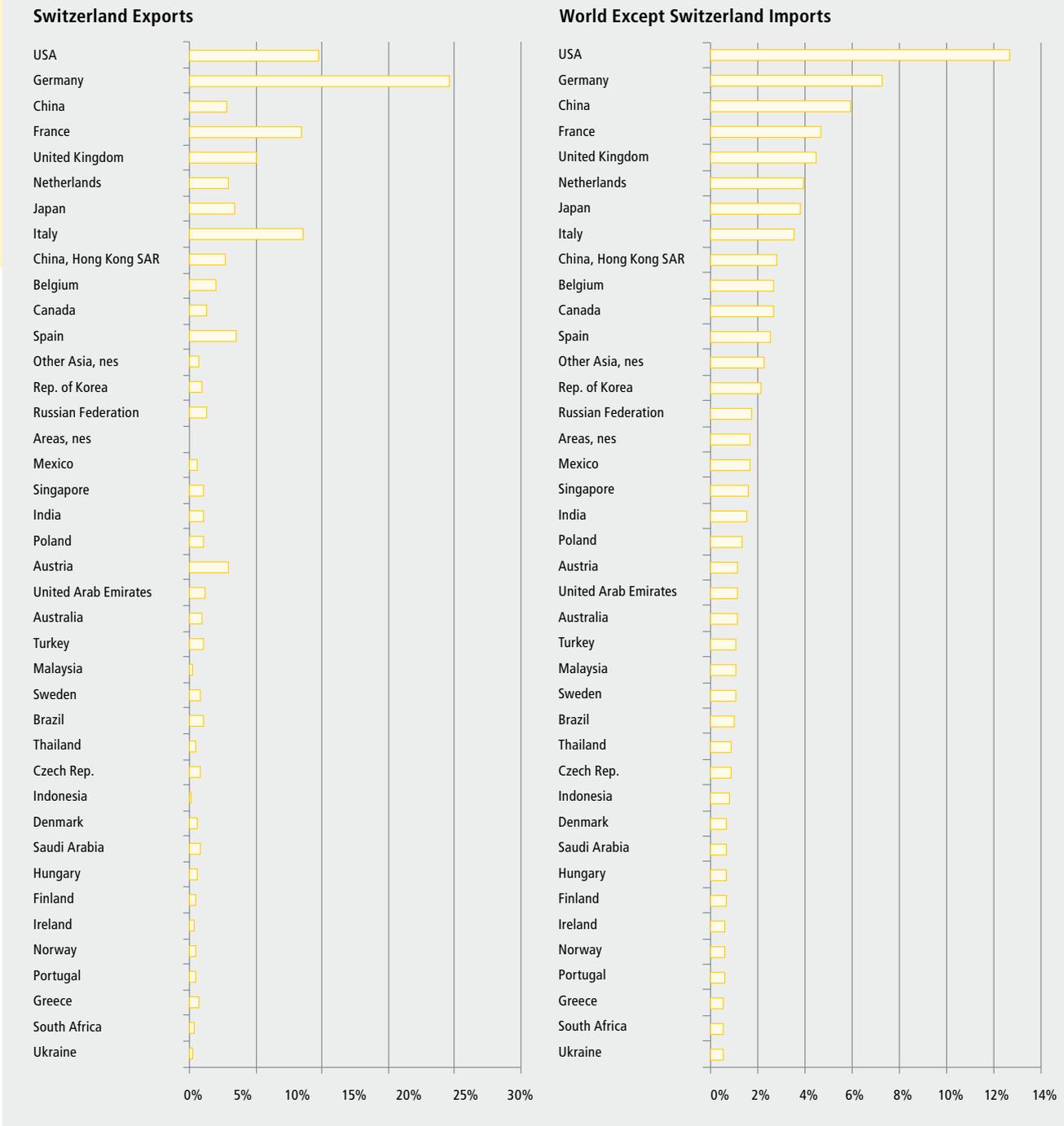


mostly diamonds—go to the United Kingdom alone, even though the United Kingdom accounts for less than 5% of world imports). Thus, Switzerland's exports have the most breadth, Netherlands' are close behind, and Botswana's have very low breadth.

To convert the graphical pattern exhibited on these charts into a numerical metric, the absolute value of the difference between each bar on the right and left charts in each set (exports minus world except focal country imports) is

computed, and then these values are summed vertically across all of the bars (partner countries). The scores are then re-scaled between 0 and 1 and subtracted from the number 1 in order to reverse the order, so that the country with the highest breadth score (lowest sum of the absolute values) is the country whose exports best match world imports and the country with the lowest score (highest sum of the absolute values) has the least close match between its exports and world imports.

Figure 2.1.b  
Switzerland Exports vs. Rest of World Imports (%), Top 40 Importing Countries Only



To summarize mathematically, breadth is calculated for a Country A by finding the Sum across all partner countries of [Absolute Value of (Partner Country's % Share of Country A's Exports minus Partner Country's % Share of World Imports Excluding Country A's Imports)]. Then, these results are re-scaled between 0 and 1 and then subtracted from the number 1.

Figure 2.1.c  
Botswana Exports vs. Rest of World Imports (%), Top 40 Importing Countries Only

### Botswana Exports



### World Except Botswana Imports



### 3. Addressing Data Gaps

Given the very large data requirements of an analysis such as the DHL Global Connectedness Index (nearly one million data points were used to produce the index over a six year period), there are many cases where the targeted data are unavailable. Data availability constraints are especially severe for breadth and for smaller and less developed countries. Therefore, three methods are employed to generate the index in spite of missing data: exclusion of some com-

ponents from the breadth analysis, adjusting weights to account for missing countries for specific components, and filling gaps via interpolation and repetition.<sup>3</sup>

First, it is not possible to cover all of the same component flows in breadth as in depth, because for many countries data are only available on the total magnitude of the flows in question, not how they are distributed by origin and destination. Therefore, some components that are

**Table 2.3**  
Breadth Coverage by Component

Pillar	Component	Covered in Breadth?
1. Trade	1.1 Merchandise Trade	Yes
	1.2 Services Trade	No
2. Capital	2.1. Foreign Direct Investment (FDI) Stocks	Yes
	2.2. Foreign Direct Investment (FDI) Flows (average of last 3 years)	Yes
	2.3. Portfolio Equity Stocks	Yes (Outward Only)
	2.4. Portfolio Equity Flows (average of last 3 years)	No
3. Information	3.1. Internet Bandwidth	No
	3.2. Telephone Call Minutes	Yes
	3.3. Trade in Printed Publications (H.S. Code 49 covering printed books, newspapers, pictures, etc.)	Yes
4. People	4.1. Migrants (foreign born population)	Yes
	4.2. Tourism (departures and arrivals of overnight tourists)	Yes (Inbound Only)
	4.3. International Students	Yes (Inbound Only)

included in depth are excluded from breadth, as shown in **Table 2.3**.

Second, there are also situations where the data required to calculate metrics for both depth and breadth are available for some but not all of the target countries. In such cases the weights for calculating a country's pillar and index scores are adjusted so that the weight that would normally be applied to a missing component is redistributed proportionally across the remaining available components.

If many of the components for a particular country are unavailable, a country's score at the pillar or the overall index level may be deemed to be based on inadequate data and thus not displayed. To address such cases the following rules<sup>4</sup> are applied:

- At the pillar level, if more than 30% of the depth components (by weight) or if more than 50% of the breadth components (by weight) are missing, then the pillar score is not displayed.

- For the overall index, if more than 33% of the depth components (by weight) or if more than 50% of the breadth components (by weight) are missing, the overall index is not computed, and the country is dropped from the analysis.

Why the stricter rules for depth than for breadth and the acceptance of only a subset of components for the latter? This reflects both the challenge entailed with producing breadth measures (which require hundreds of data points per country covered for each component versus only two for depth) and their importance and novelty.

Furthermore, the differences in coverage may also be justified in part by the fact that the unavailable data are unlikely to be distributed randomly. The countries that are missing data, especially in the capital pillar, where the data constraints are most severe, tend to have more limited levels of capital market integration (lower depth). When a country has a very low level of depth on a given component, its score on breadth for that component is less relevant for the assessment of its overall level of global connectedness.

Third, for both depth and breadth, there are cases where the required data for one or more countries are available in some but not all of the years for which the index is to be calculated. The 2011 DHL Global Connectedness Index is based primarily on 2010 data, but where 2010 data are unavailable, the most recent available data are used.

When there are gaps in the available data in the middle of a data series (e.g. data are available for 2007 and 2009 but not 2008), linear interpolation is used to fill the gaps. When data gaps lie before or after all of the available data, they are filled by repeating the values for the closest available year. So, for example, if the latest data available are from 2009 (no data are available for 2010), the 2009 value will be repeated in 2010. This method was selected instead

**Table 2.4 Missing Components in Depth  
(Data Missing for Full Component in at Least One Year)**

Component	Data Gap	Remedy
<b>3.2 Telephone Call Minutes</b>	No 2010 Data	2009 data repeated in 2010
<b>4.1. Migrants</b>	Outbound: Most recent available data are from 2000–2002	2000–2002 data repeated in all years
	Inbound: Data available only for 2005 and 2010	Linear interpolation employed for 2006–2009
<b>4.2. Tourists</b>	Outbound (Departures): No 2010 Data	2009 data repeated in 2010
<b>4.3. Students</b>	No 2010 Data	2009 data repeated in 2010

**Table 2.5 Missing Components in Breadth  
(Data Missing for Full Component in at Least One Year)**

Component	Data Gap	Remedy
<b>2.1. FDI Stocks</b>	No 2010 Data	2009 data repeated in 2010
<b>2.2. FDI Flows</b>	No 2010 Data	2009 data repeated in 2010
<b>2.3. Portfolio Equity Stocks</b>	No 2010 Data	2009 data repeated in 2010
<b>3.2. Telephone Call Minutes</b>	No 2005 and 2010 Data	2006 data repeated in 2005; 2009 data repeated in 2010
<b>4.1. Migrants</b>	Most recent available data are from 2000–2002	2000–2002 data repeated in all years
<b>4.2. Tourists</b>	No 2010 Data	2009 data repeated in 2010
<b>4.3. Students</b>	No 2010 Data	2009 data repeated in 2010

of linear extrapolation because the trend directions on many international flows shifted in recent years due to the economic crisis, making linear extrapolation particularly prone to large errors.

In most cases, data gaps affect only a subset of the countries on any given component in any given year. However, there are some components where all countries have missing data for at least one year. Those cases and the remedies employed are described in **Tables 2.4 and 2.5**. Note that the data gaps are especially severe in 2010 for breadth, owing to much more limited and slower reporting of flows by partner as compared to aggregate flows.

Finally, the data available to calculate the breadth of telephone call minutes only covers a sample of each country's partners, and the size of that sample varies across countries and years. The sample coverage is deemed adequate for calculating breadth only where it covers 70 percent or more of a country's total international calling minutes in a given year.

#### **4. Making Metrics Comparable (Normalization)**

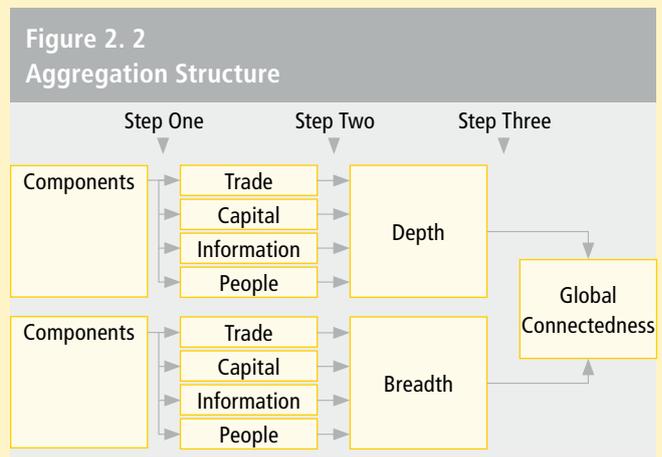
After computing the metrics and filling in the data gaps as described above, the results must be made comparable or "normalized" before they can be combined into the index. This is necessary because the various metrics have different units, distributions, etc.

The simple method employed in the DHL Global Connectedness Index to make all of the diverse metrics comparable is to convert each distribution into its corresponding

percentile ranks, over the period from 2005 to 2010. Thus, rather than comparing the different metrics directly, instead, each country's rank position on each of the metrics' distributions is compared.

For example the Netherlands' merchandise exports as percentage of GDP ratio (the metric employed to measure the depth of its merchandise exports), was 73% in 2010. 95% of the scores across all countries on this metric over the period from 2005 to 2010 were lower than 73%. Thus, Netherlands' raw score of 73% converts to a normalized score of .95. The United States' score of 9% converts to a normalized score of .06, because only 6% of the all of the scores observed on that metric were less than 9%.

Note that the normalization calculations are performed over the period 2005 to 2010 rather than year-by-year. This method, called "panel normalization," was selected because it permits the comparison of global connectedness scores across this period to spot trends in levels of connectedness. However, an update of the Global Connectedness Index with the addition, for example, of scores based on 2011 data, would require the normalization to be re-computed over the period 2005–2011, suggesting that scores be compared within editions rather than across them.<sup>5</sup>



### 5. Aggregation and Weights

The overall index is built up from its constituent components via three steps, as illustrated in **Figure 2.2**. First, the individual components are aggregated into pillars, resulting in the computation of distinct pillars of the same type for depth and breadth. Then, overall depth and breadth scores are computed. Finally, these two dimensions of the analysis are combined to produce the DHL Global Connectedness Index.

At each stage of the aggregation process, the constituent components are added together as weighted sums, according to the weights shown in **Table 2.6**. These weights reflect the author's judgment of the relative importance and value of each pillar and component to the overall evaluation of global connectedness, based on the rationales described below.

The trade and capital pillars are each assigned higher weights (35% each) than the information and people flow pillars (15% each). This reflects the fact that trade and capital flows are significantly more integrated on a global basis as indicated by depth measures at the global level, shown in **Figure 2.3** (a reformatted version of Figure 1.2 that categorizes flows by pillar). While the specific levels vary based on the flows covered and the definitions used, there is a clear step change between the trade and capital metrics shown on the exhibit (which average 18%) and the people and information metrics (which average 2%), a pattern that generally bears out across metrics, though finer analyses do tend to indicate a higher level of intensity of information flows relative to people flows.

Within the trade pillar, 75% of the weight is assigned to merchandise trade and 25% is assigned to services trade. Over the past decade, merchandise trade on average has been four times larger than services trade. However, the growth rate of services trade is higher. Thus, in 2009,

merchandise trade was only 3.5 times larger than services trade. Reflecting this long term trend, three times higher weight is assigned to merchandise versus services trade.

In the capital pillar, equal weights are assigned to FDI and portfolio equity. The relative magnitudes of FDI versus portfolio equity investment stocks vary year-to-year, without one consistently far outstripping the other, as was the case in the trade pillar. Furthermore, within FDI, equal weights are assigned to both stocks and flows because they both measure distinct and important aspects of connectedness: flows indicating a country's current participation in cross-border investment activity and stocks indicating its participation in another country's economy via the exercise of its rights as a shareholder (and manager in the case of FDI).

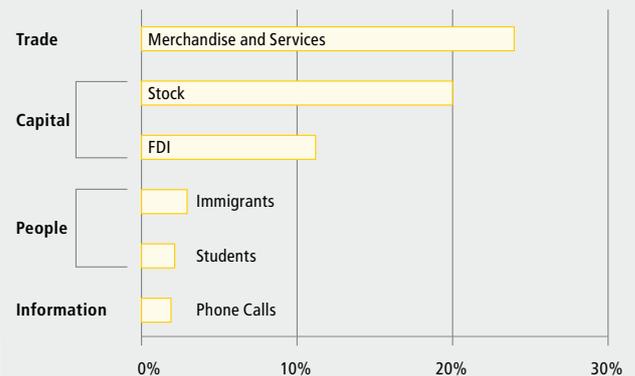
Among the information components, telephone calls and internet bandwidth are both assigned 40% each, double the weight assigned to trade in books and other printed publications (20%). This reflects the imperfection of the latter indicator (publications are often printed in multiple locations rather than traded across borders in physical form) and the trend toward more information flows taking place in digital form rather than via physical trade in printed publications.

Within the people pillar, equal weights are assigned to migration, tourism, and student mobility. Each of these components reflects a distinct aspect of connectedness and spawns distinct effects that span across the other components (e.g. students serving as conduits of information and migrants promoting trade). Without a logical basis for assigning different weights, they are treated as having equal importance.

Thus, in Step 1, Netherlands' trade pillar score for depth is computed as follows. Netherlands' normalized scores for each of the trade components are: merchandise exports .95, merchandise imports, .91, services exports .82, and services

Pillar (Weight % of Total)	Depth Component (Weight % of Pillar)	Breadth Component (Weight % of Pillar)
<b>1. Trade (35%)</b>	1.1 Merchandise Trade (75%)	1.1 Merchandise Trade (100%)
	1.2 Services Trade (25%)	-
<b>2. Capital (35%)</b>	2.1. FDI Stocks (25%)	2.1. FDI Stocks (25%)
	2.2. FDI Flows (25%)	2.2. FDI Flows (25%)
	2.3. Portfolio Equity Stocks (25%)	2.3. Portfolio Equity Stocks (50%)
	2.4. Portfolio Equity Flows (25%)	-
<b>3. Information (15%)</b>	3.1. Internet Bandwidth (40%)	-
	3.2. Telephone Call Minutes (40%)	3.2. Telephone Call Minutes (67%)
	3.3. Trade in Printed Publications (20%)	3.3. Trade in Printed Publications (33%)
<b>4. People (15%)</b>	4.1. Migrants (33%)	4.1. Migrants (33%)
	4.2. Tourism (33%)	4.2. Tourism (33%)
	4.3. International Students (33%)	4.3. International Students (33%)

Figure 2.3 Global Depth Comparison



Sources: Refer to sources and notes associated with Figure 1.2

depth and breadth scores are re-scaled on a scale of 0 to 50. Then, they are simply added together, producing the final DHL Global Connectedness Index, with possible scores ranging from 0 to 100.

Thus, the Netherlands' original depth and breadth scores of .83 and .80 respectively were rescaled to become 41.6 and 44.1. The sum of these scores, 85.7, is Netherlands' overall score in the 2011 DHL Global Connectedness Index.

imports .83. Within each type of flow, the weights are divided equally among the directional flows. Thus, the 75% weight assigned to merchandise trade becomes 37.5% each for merchandise exports and merchandise imports, and the 25% weight assigned to services trade becomes 12.5% each for services exports and services imports. Multiplying the normalized scores times the corresponding weights and then adding up the products, Netherlands receives a score of .90 for the trade pillar for depth.

Step 2 proceeds in the same fashion as Step 1, but includes all of the components across the four pillars to generate overall results for the depth and breadth dimensions. Even if the rules for dealing with missing data outlined above do not allow a given pillar for a particular country to be displayed, the available components from that pillar are still used to generate the depth and breadth results, if missing data rules allow those aggregate results to be shown.

Finally, in Step 3, the depth and breadth scores are combined, applying equal weights to both. However, to ensure that the different shapes of their distributions do not interfere with equal weighting at this step, and to make the results more intuitively understandable for readers, both

- 1 The Maastricht Globalization Index incorporates data on countries' ecological footprints and arms trade. For more details, see <http://pimmartens.info/globalisation-index/>
- 2 Three year averages are also employed in the Maastricht Globalization Index for the same purpose.
- 3 The general approach to addressing data gaps used here is similar to that of the KOF Index of Globalization, though the specific rules have been modified based on the distinct data coverage and priorities of this index.
- 4 Note that in the Depth Dimension, the data availability rules applied here are stricter than those in the KOF Globalization Index (which only measures Depth). The 2011 edition of that index allows results to be displayed if up to 40% of the underlying variables are missing.
- 5 The impact of re-computing the normalization, however, is expected to be minimal. When computing the 2009 Connectedness Index based on normalization over the period 2005–2009 instead of 2005–2010, no country's rank shifted up or down more than one position, 79% of countries did not change ranks at all, and the scores across the versions had a correlation of .999975.

## Unique Features of the DHL Global Connectedness Index

The DHL Global Connectedness Index is not the first publication to rank countries based on their levels of international integration. One of the earliest treatments of this topic to receive widespread attention was the A.T. Kearney/Foreign Policy Globalization Index, but this has not been updated since its 2007 edition.<sup>1</sup> Perhaps the most systematic and up-to-date index to receive significant attention is Zurich ETH University's KOF Index of Globalization, which recently released its 2011 edition.<sup>2</sup> The Ernst & Young Globalization Index, generated in cooperation with the Economist Intelligence Unit (EIU), is another related treatment that has recently been updated, now in its 2010 edition.<sup>3</sup> The points below highlight the unique features that distinguish the DHL Global Connectedness Index from prior research in this area:

### **Breadth**

Prior indexes have all focused on what is termed here depth rather than breadth. Thus, they really measure only the intensity of a country's international connections without taking into account whether those connections are distributed globally or are more narrowly concentrated with a particular set of partner countries. Thus, for example, Belgium was the top ranked country on the 2011 edition of the KOF Index of Globalization, even though Belgium's international connections are quite regionally focused on Europe (88% of Belgium's merchandise exports were destined to other European countries in 2010). By introducing a unique measure of breadth, the DHL Global Connectedness Index distinguishes countries that are globally connected from those that only have strong international rather than global connections.

### **Directionality**

The DHL Global Connectedness Index provides, wherever data are sufficient, parallel treatment of outward and inward flows between countries, enabling meaningful comparisons of the directionality of each country's global connectedness. This permits the distinction between a country such as Cambodia that does project significant outward flows but has quite limited inward connectedness from a country such as Jordan, where the opposite phenomenon is observed. Prior treatments typically build up from bi-directional flows, precluding such comparisons.

### **Focus on Actual Flows**

Other globalization indexes generally include both actual flows (such as trade) and enablers of or barriers to flows (such as tariffs). By focusing clearly on actual flows, the DHL Global Connectedness Index both provides a clearer picture of connectedness (versus connectivity) and supports analysis of the impact of specific structural and policy enablers on connectedness (because they are not intermingled in the calculation of the index). This is intended to make the DHL Global Connectedness Index a more useful reference for policymakers seeking to increase connectedness.

### **Hard Data Only**

The DHL Global Connectedness Index is calculated exclusively based on hard data inputs, whereas most other indexes, particularly where they incorporate enablers of connectedness, add in qualitative inputs from surveys. The focus on hard data is particularly useful given the prevalence of significant misperceptions about levels of globalization among the general public as well as among business executives, as discussed in chapter 1.

### Importance Based Weighting Scheme

Among the more academically oriented indexes such as KOF, statistical methods such as Principal Component Analysis are used to assign weights to pillars and components to capture as much of the information content in the component variables as possible in the composite index. For the DHL Global Connectedness Index, this method was rejected because the results of such statistical methods do not necessarily reflect the relative importance of the various components for the users of the index. For example, within its treatment of Economic Globalization - Actual Flows, the 2011 KOF index assigned a higher weight to Income Payments to Foreign Nationals (27%) than to Trade (22%), even though trade flows are much larger and figure far more prominently in the general discourse about globalization. The Ernst & Young/EIU index does assign weights according to the relative importance of its components, but does so based on a survey of executives which as noted above introduces the problem of public misperceptions about globalization. The DHL Global Connectedness Index, rather, uses weights assigned based on the author's judgment about the relative importance of the pillars and components, as described in this chapter. While this method is necessarily subjective, it does overcome the concerns raised here about the methods used in prior indexes.

### Recent Data

While 2010 data were not available for all of the components in the DHL Global Connectedness index, the majority of components are updated to 2010, whereas the 2011 edition of the KOF index relies primarily on 2009 data.

1 For more information, see <http://www.atkearney.com/index.php/Publications/globalization-index.html>, and for a useful critique of this index, refer to Ben Lockwood, "How Robust is the Kearney/Foreign Policy Globalisation Index?," *The World Economy*, 27: 507–523, April 2004.

2 For more information, see <http://globalization.kof.ethz.ch/>. The KOF Index of Globalization as well as another index, the Maastricht Globalization Index, are elaborated in detail in Alex Dreher, Noel Gaston, Pim Martens, and Lotte Van Boxem, "Measuring Globalization – Opening The Black Box. A Critical Analysis of Globalization Indices," *Journal of Globalization Studies*, Vol. 1, No. 1. 166–185, May 2010, which also elaborates more generally the issues and choices involved with constructing indices of globalization and reviews a broader set of prior literature on the topic.

3 For more information, see <http://www.ey.com/GL/en/Issues/Business-environment/Winning-in-a-polycentric-world--globalization-and-the-changing-world-of-business---The-Globalization-Index-2010>.