

DISTANCE TO FRONTIER AND EASE OF DOING BUSINESS RANKING

This year's report presents results for 2 aggregate measures: the distance to frontier score and the ease of doing business ranking, which for the first time this year is based on the distance to frontier score. The ease of doing business ranking compares economies with one another; the distance to frontier score benchmarks economies with respect to regulatory best practice, showing the absolute distance to the best performance on each *Doing Business* indicator. When compared across years, the distance to frontier score shows how much the regulatory environment for local entrepreneurs in an economy has changed over time in absolute terms, while the ease of doing business ranking can show only how much the regulatory environment has changed relative to that in other economies.

Distance to Frontier

The distance to frontier score captures the gap between an economy's performance and a measure of best practice across the entire sample of 31 indicators for 10 *Doing Business* topics (the labor market regulation indicators are excluded). For starting a business, for example, Canada and New Zealand have the smallest number of procedures required (1), and New Zealand the shortest time to fulfill them (0.5 days). Slovenia has the lowest cost (0.0), and Australia, Colombia and 110 other economies have no paid-in minimum capital requirement (table 15.1 in the *Doing Business 2015* report).

Calculation of the distance to frontier score

Calculating the distance to frontier score for each economy involves 2 main steps. First, individual component indicators are normalized to a common unit where each of the 31 component indicators y (except for the total tax rate) is rescaled using the linear transformation $(\text{worst} - y)/(\text{worst} - \text{frontier})$. In this formulation the frontier represents the best performance on the indicator across all economies since 2005 or the third year after data for the indicator were collected for the first time. For legal indicators such as those on getting credit or protecting minority investors, the frontier is set at the highest possible value. For the total tax rate, consistent with the use of a threshold in calculating the rankings on this indicator, the frontier is

defined as the total tax rate at the 15th percentile of the overall distribution for all years included in the analysis. For the time to pay taxes the frontier is defined as the lowest time recorded among all economies that levy the 3 major taxes: profit tax, labor taxes and mandatory contributions, and value added tax (VAT) or sales tax. In addition, the cost to export and cost to import for each year are divided by the GDP deflator, to take the general price level into account when benchmarking these absolute-cost indicators across economies with different inflation trends. The base year for the deflator is 2013 for all economies.

In the same formulation, to mitigate the effects of extreme outliers in the distributions of the rescaled data for most component indicators (very few economies need 700 days to complete the procedures to start a business, but many need 9 days), the worst performance is calculated after the removal of outliers. The definition of outliers is based on the distribution for each component indicator. To simplify the process, 2 rules were defined: the 95th percentile is used for the indicators with the most dispersed distributions (including time, cost, minimum capital and number of payments to pay taxes), and the 99th percentile is used for number of procedures and number of documents to trade. No outlier was removed for component indicators bound by definition or construction, including legal index scores (such as the depth of credit information index, extent of conflict of interest regulation index and strength of insolvency framework index) and the recovery rate (figure 15.1 in the *Doing Business 2015* report).

Second, for each economy the scores obtained for individual indicators are aggregated through simple averaging into one distance to frontier score, first for each topic and then across all 10 topics: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency. More complex aggregation methods—such as principal components and unobserved components—yield a ranking nearly identical to the simple average used by *Doing Business*⁶. Thus *Doing Business* uses the simplest

⁶ See Djankov, Manraj and others (2005). Principal components and unobserved components methods yield a ranking nearly identical to

method: weighting all topics equally and, within each topic, giving equal weight to each of the topic components⁷.

An economy's distance to frontier score is indicated on a scale from 0 to 100, where 0 represents the worst performance and 100 the frontier. All distance to frontier calculations are based on a maximum of 5 decimals. However, indicator ranking calculations and the ease of doing business ranking calculations are based on 2 decimals. The difference between an economy's distance to frontier score in any previous year and its score in 2014 illustrates the extent to which the economy has closed the gap to the regulatory frontier over time. And in any given year the score measures how far an economy is from the best performance at that time.

Treatment of the total tax rate

This year, for the first time, the total tax rate component of the paying taxes indicator set enters the distance to frontier calculation in a different way than any other indicator. The distance to frontier score obtained for the total tax rate is transformed in a nonlinear fashion before it enters the distance to frontier score for paying taxes. As a result of the nonlinear transformation, an increase in the total tax rate has a smaller impact on the distance to frontier score for the total tax rate—and therefore on the distance to frontier score for paying taxes—for economies with a below-average total tax rate than it would have in the calculation done in previous years (line B is smaller than line A in figure 15.2 of the *Doing Business 2015* report). And for economies with an extreme total tax rate (a rate that is very high relative to the average), an increase has a greater impact on both these distance to frontier scores than before (line D is bigger than line C in figure 15.2 of the *Doing Business 2015* report).

The nonlinear transformation is not based on any economic theory of an "optimal tax rate" that minimizes distortions or maximizes efficiency in an economy's

that from the simple average method because both these methods assign roughly equal weights to the topics, since the pairwise correlations among indicators do not differ much. An alternative to the simple average method is to give different weights to the topics, depending on which are considered of more or less importance in the context of a specific economy.

⁷ For getting credit, indicators are weighted proportionally, according to their contribution to the total score, with a weight of 60% assigned to the strength of legal rights index and 40% to the depth of credit information index. Indicators for all other topics are assigned equal weights

overall tax system. Instead, it is mainly empirical in nature. The nonlinear transformation along with the threshold reduces the bias in the indicator toward economies that do not need to levy significant taxes on companies like the *Doing Business* standardized case study company because they raise public revenue in other ways—for example, through taxes on foreign companies, through taxes on sectors other than manufacturing or from natural resources (all of which are outside the scope of the methodology). In addition, it acknowledges the need of economies to collect taxes from firms.

Calculation of scores for economies with 2 cities covered

For each of the 11 economies for which a second city was added in this year's report, the distance to frontier score is calculated as the population-weighted average of the distance to frontier scores for the 2 cities covered (table 12.1). This is done for the aggregate score, the scores for each topic and the scores for all the component indicators for each topic.

Table 12.1 Weights used in calculating the distance to frontier scores for economies with 2 cities covered

Economy	City	Weight (%)
Bangladesh	Dhaka	78
	Chittagong	22
Brazil	São Paulo	61
	Rio de Janeiro	39
China	Shanghai	55
	Beijing	45
India	Mumbai	47
	Delhi	53
Indonesia	Jakarta	78
	Surabaya	22
Japan	Tokyo	65
	Osaka	35
Mexico	Mexico City	83
	Monterrey	17
Nigeria	Lagos	77
	Kano	23
Pakistan	Karachi	65
	Lahore	35
Russian Federation	Moscow	70
	St. Petersburg	30
United States	New York	60
	Los Angeles	40

Source: United Nations, Department of Economic and Social Affairs, Population Division, World Urbanization Prospects, 2014 Revision. <http://esa.un.org/unpd/wup/CD-ROM/Default.aspx>.