



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).

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 in which data for the indicator were collected. 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).

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*.¹ Thus *Doing Business* uses the simplest method: weighting all topics equally and, within each topic, giving equal weight to each of the topic components.²

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

TABLE 15.1 What is the frontier in regulatory practice?

Topic and indicator	Who sets the frontier	Frontier	Worst performance
Starting a business			
Procedures (number)	Canada; New Zealand	1	18 ^a
Time (days)	New Zealand	0.5	100 ^b
Cost (% of income per capita)	Slovenia	0.0	200.0 ^b
Minimum capital (% of income per capita)	Australia; Colombia ^c	0.0	400.0 ^b
Dealing with construction permits			
Procedures (number)	Hong Kong SAR, China	5	30 ^a
Time (days)	Singapore	26	373 ^b
Cost (% of warehouse value)	Qatar	0.0	20.0 ^b
Getting electricity			
Procedures (number)	Germany; Korea, Rep. ^d	3	9 ^a
Time (days)	Korea, Rep.	18	248 ^b
Cost (% of income per capita)	Japan	0.0	8,100.0 ^b
Registering property			
Procedures (number)	Georgia; Norway; Portugal; Sweden	1	13 ^a
Time (days)	Georgia; New Zealand; Portugal	1	210 ^b
Cost (% of property value)	Saudi Arabia	0.0	15.0 ^b
Getting credit			
Strength of legal rights index (0–12)	Colombia; Montenegro; New Zealand	12	0 ^e
Depth of credit information index (0–8)	Ecuador; United Kingdom ^f	8	0 ^e
Protecting minority investors			
Extent of conflict of interest regulation index (0–10)	No economy has attained the frontier yet.	10	0 ^e
Extent of shareholder governance index (0–10)	No economy has attained the frontier yet.	10	0 ^e
Paying taxes			
Payments (number per year)	Hong Kong SAR, China; Saudi Arabia	3	63 ^b
Time (hours per year)	Singapore	49 ^a	696 ^b
Total tax rate (% of profit)	Singapore	26.1 ^b	84.0 ^b
Trading across borders			
Documents to export (number)	France; Ireland	2	11 ^a
Time to export (days)	Denmark; Estonia; Singapore	6	54 ^b
Cost to export (US\$ per container), deflated	Timor-Leste	410.0	5,000.0 ^b
Documents to import (number)	France; Ireland	2	15 ^a
Time to import (days)	Singapore	4	66 ^b
Cost to import (US\$ per container), deflated	Singapore	368.4	6,000.0 ^b

(continued)

TABLE 15.1 What is the frontier in regulatory practice? (continued)

Topic and indicator	Who sets the frontier	Frontier	Worst performance
Enforcing contracts			
Procedures (number)	Singapore	21	53 ^a
Time (days)	Singapore	120	1,340 ^b
Cost (% of claim)	Bhutan	0.1	89.0 ^b
Resolving insolvency			
Recovery rate (cents on the dollar)	Japan	92.9	0.0 ^e
Strength of insolvency framework index (0–16)	No economy has attained the frontier yet.	16	0 ^e

a. Worst performance is defined as the 99th percentile among all economies in the *Doing Business* sample.

b. Worst performance is defined as the 95th percentile among all economies in the *Doing Business* sample.

c. One hundred and ten other economies also have a minimum capital requirement of 0.0.

d. In 11 other economies it also takes only 3 procedures to get an electricity connection.

e. Worst performance refers to the worst value recorded.

f. Twenty-two other economies also score 8 on the depth of credit information index.

g. Defined as the lowest time recorded among all economies in the *Doing Business* sample that levy the 3 major taxes: profit tax, labor taxes and mandatory contributions, and VAT or sales tax.

h. Defined as the highest total tax rate among the 15% of economies with the lowest total tax rate in the *Doing Business* sample.

Source: *Doing Business* database.

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). 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).

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 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.

TABLE 15.2 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*, “File 12: Population of Urban Agglomerations with 300,000 Inhabitants or More in 2014, by Country, 1950–2030 (thousands);” <http://esa.un.org/unpd/wup/CD-ROM/Default.aspx>.

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 15.2). This is done for the aggregate score, the score for each topic and the scores for all the component indicators for each topic.

Variability of economies' scores across topics

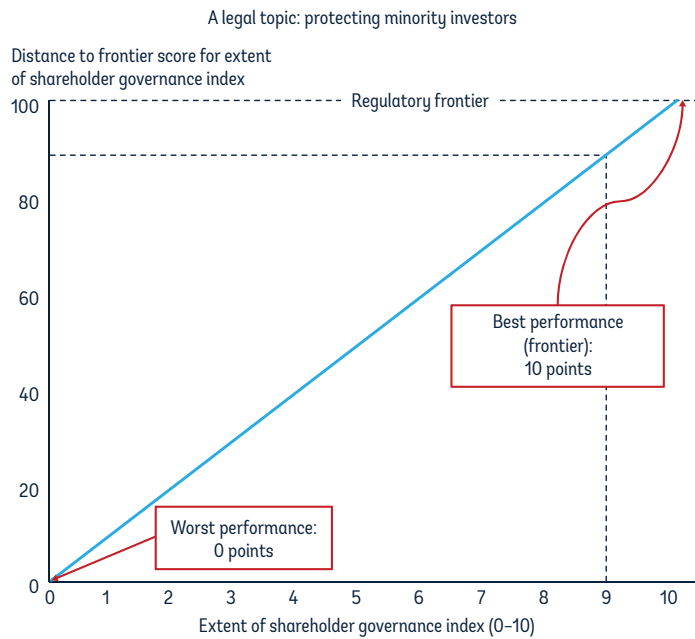
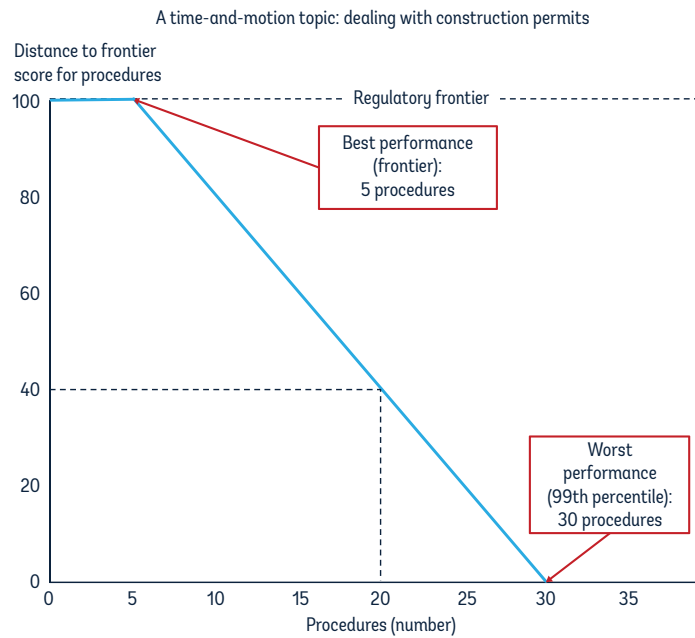
Each indicator set measures a different aspect of the business regulatory environment. The distance to frontier scores and associated rankings of an economy can vary, sometimes significantly, across indicator sets. The average correlation coefficient between the 10 indicator sets included in the aggregate distance to frontier score is 0.37, and the coefficients between 2 sets of indicators range from 0.19 (between getting electricity and registering property) to 0.60 (between protecting minority investors and resolving insolvency). These correlations suggest that economies rarely score universally well or universally badly on the indicators (table 15.3).

Consider the example of Portugal. Its aggregate distance to frontier score is 76.03. Its score is 96.27 for starting a business and 85.20 for trading across borders. But its score is only 59.17 for protecting minority investors and 45.00 for getting credit.

Figure 2.1 in the chapter "About *Doing Business*" illustrates the degree of variability for each economy's performance across the different areas of business regulation covered by *Doing Business*. The figure draws attention to economies with a particularly uneven performance by showing, for each economy, the distance between the average of its highest 3 distance to frontier scores and the average of its lowest 3 across the 10 topics included in this year's aggregate distance to frontier score. While a relatively small distance between these 2 averages suggests a broadly consistent approach across the areas of business regulation measured by *Doing Business*, a relatively large distance suggests a more uneven approach, with greater room for improvement in some areas than in others.

Variation in performance across the indicator sets is not at all unusual. It

FIGURE 15.1 How are distance to frontier scores calculated for indicators? Two examples



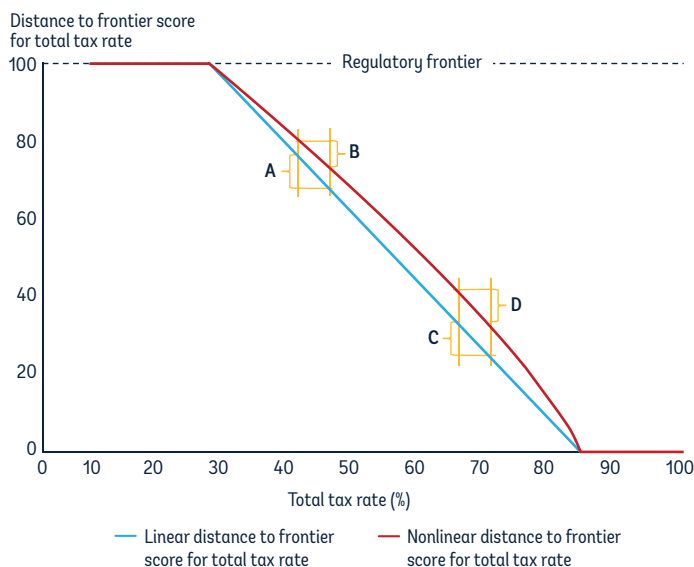
Source: *Doing Business* database.

reflects differences in the degree of priority that government authorities give to particular areas of business regulation reform and in the ability of different government agencies to deliver tangible results in their area of responsibility.

Economies that improved the most across 3 or more *Doing Business* topics in 2013/14

Doing Business 2015 uses a simple method to calculate which economies improved the ease of doing business the most. First, it selects the economies

FIGURE 15.2 How the nonlinear transformation affects the distance to frontier score for the total tax rate



Note: The nonlinear distance to frontier score for the total tax rate is equal to the distance to frontier score for the total tax rate to the power of 0.8.

Source: *Doing Business* database.

that in 2013/14 implemented regulatory reforms making it easier to do business in 3 or more of the 10 topics included in this year's aggregate distance to frontier score.³ Twenty-one economies meet this criterion: Azerbaijan; Benin; the Democratic Republic of Congo; Côte d'Ivoire; the Czech Republic;

Greece; India; Ireland; Kazakhstan; Lithuania; the former Yugoslav Republic of Macedonia; Poland; Senegal; the Seychelles; Spain; Switzerland; Taiwan, China; Tajikistan; Togo; Trinidad and Tobago; and the United Arab Emirates. Second, *Doing Business* sorts these economies on the increase in their

distance to frontier score from the previous year using comparable data.

Selecting the economies that implemented regulatory reforms in at least 3 topics and had the biggest improvements in their distance to frontier scores is intended to highlight economies with ongoing, broad-based reform programs. The improvement in the distance to frontier score is used to identify the top improvers because this allows a focus on the absolute improvement—in contrast with the relative improvement shown by a change in rankings—that economies have made in their regulatory environment for business.

EASE OF DOING BUSINESS RANKING

The ease of doing business ranking ranges from 1 to 189. The ranking of economies is determined by sorting the aggregate distance to frontier scores, rounded to 2 decimals.

TABLE 15.3 Correlations between economy distance to frontier scores for *Doing Business* topics

	Dealing with construction permits	Getting electricity	Registering property	Getting credit	Protecting minority investors	Paying taxes	Trading across borders	Enforcing contracts	Resolving insolvency
Starting a business	0.29	0.28	0.35	0.44	0.48	0.51	0.43	0.43	0.48
Dealing with construction permits		0.33	0.31	0.21	0.23	0.35	0.34	0.27	0.22
Getting electricity			0.19	0.23	0.20	0.41	0.53	0.29	0.31
Registering property				0.42	0.45	0.37	0.20	0.49	0.40
Getting credit					0.51	0.27	0.32	0.38	0.56
Protecting minority investors						0.37	0.35	0.37	0.60
Paying taxes							0.42	0.33	0.35
Trading across borders								0.28	0.49
Enforcing contracts									0.48

Source: *Doing Business* database.

NOTES

1. See Djankov, Manraj and others (2005). Principal components and unobserved components methods yield a ranking nearly identical to 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.
2. 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.
3. Changes making it more difficult to do business are subtracted from the total number of those making it easier to do business.