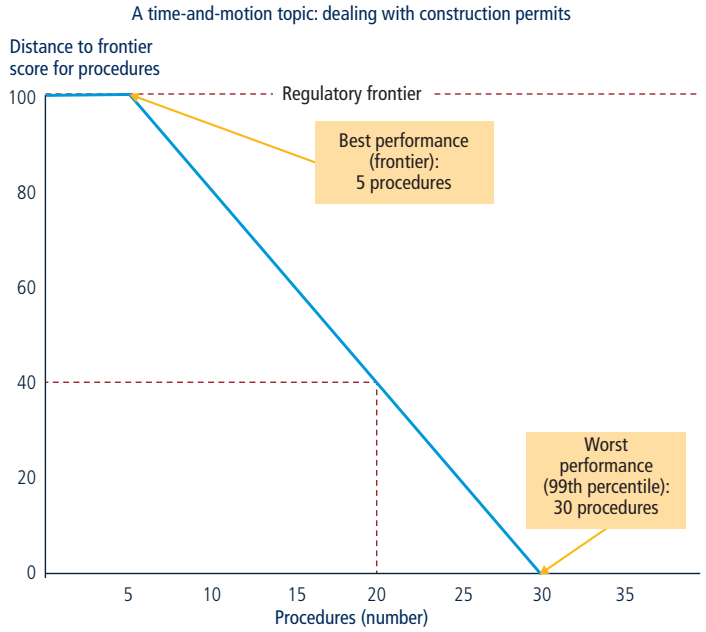
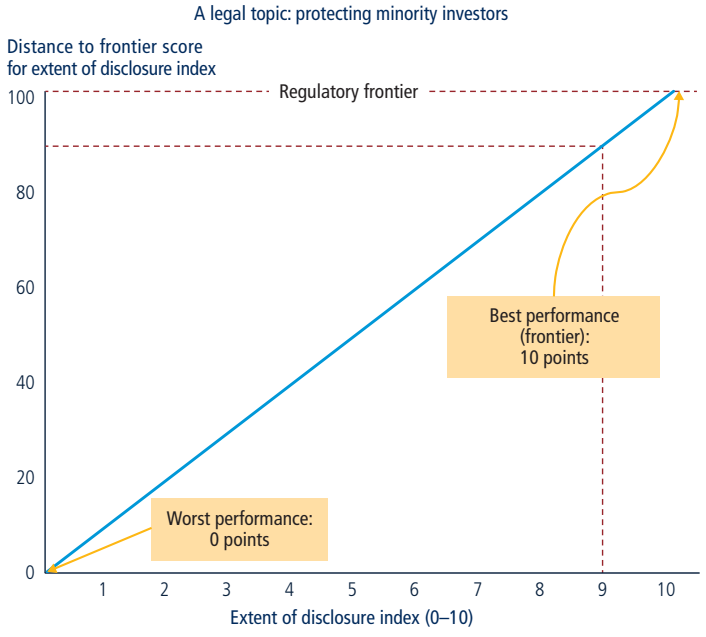
process two rules were defined: the 95th percentile is used for the indicators with the most dispersed distributions (including minimum capital, number of payments to pay taxes, and the time and cost indicators), and the 99th percentile is used for the number of procedures. No outlier is removed for 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 14.1).

In the second step for calculating the distance to frontier score, the scores obtained for individual indicators for each economy 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]

FIGURE 14.1 How are distance to frontier scores calculated for indicators? Two examples





Source: Doing Business database.

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 five decimals. However, indicator ranking calculations and the ease of doing business ranking calculations are based on two decimals.

The difference between an economy's distance to frontier score in any previous year and its score in 2016 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

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 had before

this approach was adopted in *Doing Business 2015* (line B is smaller than line A in figure 14.2). 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 it would have had before (line D is bigger than line C in figure 14.2).

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.

Calculation of scores for economies with two cities covered

For each of the 11 economies in which *Doing Business* collects data for the second largest business city as well as the largest one, the distance to frontier score is calculated as the population-weighted average of the distance to frontier scores for these two cities (table 14.2). This is done for the aggregate score, the scores for each topic and the scores for all the component indicators for each topic.

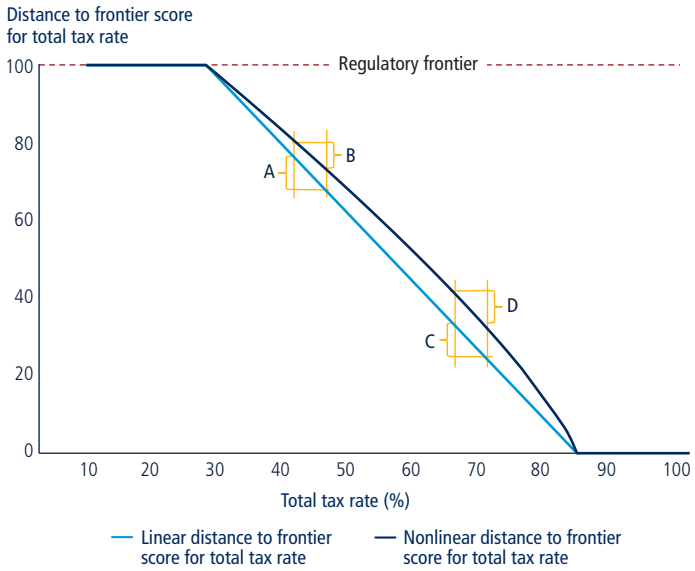
Variability of economies' scores across topics

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 0.48, and the coefficients between 2 sets of indicators range from 0.32 (between getting credit and paying taxes) to 0.61 (between registering property and enforcing contracts). These correlations suggest that economies rarely score universally well or universally badly on the indicators (table 14.3).

Consider the example of Portugal. Its aggregate distance to frontier score is 77.40. Its score is 92.85 for starting a business and 100.00 for trading across borders. But its score is only 56.67 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

FIGURE 14.2 How the nonlinear transformation affects the distance to frontier score for the total tax rate



Source: Doing Business database.
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.

TABLE 14.2 Weights used in calculating the distance to frontier scores for economies with two 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 City	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.