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CBO

International Comparisons of Corporate Income Tax Rates

MARCH 2017

Notes

Unless otherwise indicated, all years referred to in this document are calendar years.

Numbers in the text, tables, exhibits, and figures may not sum to totals because of rounding.

The data underlying the exhibits and figures in this report are posted along with the report on CBO's website (www.cbo.gov/publication/52419).

In this report, the top statutory tax rate encompasses national and local tax rates: The top statutory rate equals the sum of the corporate income tax rate applied to income in the top bracket at the national level and, generally, the average of the highest rates set by subnational governments in a given country (states or provinces, for example).

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Summary and Introduction

In the United States, the top federal statutory corporate income tax rate (the rate set by law that applies to the highest corporate income tax bracket) has been 35 percent since 1993. Most corporate income is taxed at that rate. With state taxes added in, the top statutory rate is even higher; on average, that combined rate was 39.1 percent in 2012, among the highest in the world (see Summary Table 1).[1]

The *statutory* corporate tax rate is one of many features of the tax system that influence corporate behavior. Companies are likely also to consider other provisions of the tax system—including tax preferences, surtaxes, and noncorporate taxes—that affect the amount of taxes they owe. Among the alternative measures of tax rates that account for some of those provisions are the average and effective marginal corporate tax rates.

The *average* corporate tax rate is a measure of the total amount of corporate taxes that a company pays as a share of its income. The Congressional Budget Office estimates that the U.S. average corporate tax rate for foreign-owned companies incorporated in the United States in 2012 was 29 percent—about 10 percentage points below the top U.S. statutory corporate tax rate.[2]

The *effective marginal* corporate tax rate (in this document, the effective corporate tax rate), is a measure of a corporation's tax burden on returns from a marginal investment (one that is expected to earn just enough, after taxes, to attract investors). CBO estimates that the effective corporate tax rate was 19 percent in the United States in 2012. That rate, the fourth highest among the Group of 20 (G20) countries, was about 20 percentage points below the top U.S. statutory corporate tax rate.[3]

This chart book is an update and expansion of CBO's 2005 report that examined statutory and effective corporate tax rates for the United States and member countries of the Organisation for Economic Co-operation and Development and the Group of 7 between 1982 and 2003.[4] This report focuses mainly on the 2012 tax rates in countries

1. At the time that the tax rates considered in this analysis were computed, 2012 was the most recent year for which complete data were available.

2. The average corporate tax rate faced by foreign-owned companies incorporated in the United States is used as a proxy for the measure that a U.S. corporation with operations in several countries would consider when comparing a new investment in a foreign country with a new investment in the United States. See Appendix A for further discussion of CBO's analytical methods.

3. The G20 consists of Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, the United States, and the European Union (a group of 28 countries, including France, Germany, Italy, and the United Kingdom).

4. Congressional Budget Office, *Corporate Income Tax Rates: International Comparisons* (November 2005), www.cbo.gov/publication/17501.

Summary Table 1.

Corporate Tax Rates in G20 Countries, From Highest to Lowest, 2012

Top Statutory Corporate Tax Rate[a]		Average Corporate Tax Rate[b]		Effective Corporate Tax Rate[c]	
United States	**39.1**	Argentina	37.3	Argentina	22.6
Japan	37.0	Indonesia	36.4 [d]	Japan	21.7
Argentina	35.0	**United States[e]**	**29.0**	United Kingdom	18.7
South Africa	34.6	Japan	27.9	**United States**	**18.6**
France	34.4	Italy	26.8	Brazil	17.0
Brazil	34.0	India	25.6	Germany	15.5
India	32.5	South Africa	23.5 [d]	India	13.6
Italy	31.4	Brazil	22.3	Mexico	11.9
Germany	30.2	Russia	21.3	Indonesia	11.8
Australia	30.0	South Korea	20.4	France	11.2
Mexico	30.0	Mexico	20.3	Australia	10.4
Canada	26.1	France	20.0	China	10.0
China	25.0	Turkey	19.5	South Africa	9.0
Indonesia	25.0	China	19.1	Canada	8.5
South Korea	24.2	Australia	17.0	Saudi Arabia	8.4
United Kingdom	24.0	Canada	16.2	Turkey	5.1
Russia	20.0	Germany	14.5	Russia	4.4
Saudi Arabia	20.0	United Kingdom	10.1	South Korea	4.1
Turkey	20.0			Italy	-23.5

Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, the Internal Revenue Service, and the Oxford University Centre for Business Taxation.

G20 = Group of 20.

a. Statutory corporate tax rates are specified in law. The top rate applies to each additional dollar of taxable income in the highest tax bracket.

b. The average corporate tax rate is the total amount of corporate income taxes that companies pay relative to their income. In G20 countries other than the United States, those are the rates that U.S.-owned foreign companies faced, by country of incorporation. They reflected total worldwide income and corporate taxes paid to all countries in which that income was taxable. The U.S. average rate is shown for foreign-owned companies incorporated in the United States. It is based on income those companies earned in the United States and on U.S. corporate taxes.

   Because of the small number of businesses incorporated in Saudi Arabia, the Internal Revenue Service's disclosure rules prevented the release of information for that country in most years. Similarly, tax information for Indonesia and South Africa could not be disclosed for 2012. For those two countries, CBO substituted the 2010 average tax rates for the 2012 rates. In 2011, Indonesia introduced a provision that reduced taxes on new investment in specified sectors for a limited period; that provision might have lowered the 2012 average tax rate relative to the rate reported for 2010.

c. The effective corporate tax rate is the percentage of income from a marginal investment—that is, an investment that pays just enough to make the investment worthwhile—that must be paid in corporate income taxes.

d. 2010 value.

e. Because the calculation of the U.S. average rate differs from the calculations used for other countries, the U.S. rate is not directly comparable to the rates estimated for the other countries. See Appendix A for an explanation of the difference.

that are members of the G20. CBO expanded the analysis to include average tax rates, which were estimated on the basis of information reported for income and taxes paid by corporations in a given year. For both this report and the 2005 report, effective corporate tax rates were derived from simulations based on certain features of the various countries' tax systems.

The first section of the report reviews statutory corporate tax rates in the United States and elsewhere. The second covers average corporate tax rates. The third examines effective corporate tax rates and the factors that affect them. Appendix A details CBO's analytical methods, and Appendix B describes some alternative approaches to test the sensitivity of CBO's estimates of effective corporate tax rates.

How Do Different Tax Rates Affect Business Decisions?

All three types of corporate tax rates affect a company's decisions, but each influences a different choice. Because of their broader scope, average and effective corporate tax rates are better indicators of a company's incentives to invest in a particular country than is the statutory corporate tax rate. The average corporate tax rate reflects a country's corporate tax rate schedule, the system's tax preferences for business investments, any surtaxes, and possibilities for tax avoidance or evasion. Companies consider the average corporate tax rate when deciding whether to undertake a large or long-term investment in a particular country. The effective corporate tax rate, which is a measure of the tax on a marginal investment, is more informative for decisions about whether to expand ongoing projects in those countries in which a company already operates. In contrast, businesses focus on the narrower statutory corporate tax rate when they develop legal and accounting strategies to shift income earned in high-tax countries to low-tax jurisdictions—especially low-tax jurisdictions in which those businesses do not plan to invest and from which they thus expect no benefits from tax preferences for business investments.[5]

Is the U.S. Statutory Corporate Tax Rate Comparable to Rates of Other Countries?

The top statutory corporate tax rate in the United States in 2012 was 10 percentage points higher than the average (weighted by gross domestic product, or GDP) of the top rates in the other G20 countries, CBO estimates. In 2003, Japan, Germany, and the United States had the highest statutory corporate tax rates among G20 countries; by 2012, reductions in Japan's and Germany's top rates had dropped them to second and ninth place, respectively, boosting the United States to the top of the list. The United States also had the highest rate among the 15 countries with GDP above $1 trillion in 2012, according to one survey of 129 jurisdictions.[6]

In countries outside the G20, tax rates varied more widely in 2012. On the one hand, the United Arab Emirates taxed corporate income at rates up to 55 percent. On the other hand, some jurisdictions had rates so low (and in some cases collected no corporate income taxes at all) that they were considered tax havens, attracting companies to relocate income from other countries with higher corporate income tax rates.

How Do Average Corporate Tax Rates Differ by the Country of Incorporation?

A U.S.-owned foreign company is one that is incorporated outside the United States and has more than half of its shares (a controlling interest) owned by a single U.S. taxpayer. About 49,000 U.S.-owned companies were incorporated in G20 countries in 2012. CBO estimates that those companies faced average corporate tax rates in 2012 that were nearly always lower than the top statutory corporate tax rate in the country of incorporation. Two exceptions were Argentina and Indonesia, which had the G20 countries' highest average corporate tax rates for U.S.-owned foreign companies. Average corporate tax rates in the G20 for those businesses ranged from a high of 37 percent in Argentina to a low of 10 percent in the United Kingdom—the G20 country with the greatest number of U.S.-owned foreign companies in 2012.

In this report, CBO compares average corporate tax rates for U.S.-owned foreign companies with the rates faced by foreign-owned companies incorporated in the United States. Those businesses have more than half of their shares owned by a single foreign taxpayer. If it were possible to calculate,

5. For a discussion of profit shifting, see Congressional Budget Office, *Options for Taxing U.S. Multinational Corporations* (January 2013), pp. 14–16, www.cbo.gov/publication/43764.

6. See KPMG International, "Corporate Tax Rates Table" (accessed March 3, 2017), http://tinyurl.com/qbf9wmu.

the best measure for comparing new investments in a foreign country with those in the United States would be the average tax rate faced by the U.S.-located affiliates of U.S.-owned foreign companies. That rate, however, cannot be calculated with available information. Instead, the average tax rate faced by foreign-owned companies incorporated in the United States is used as an approximation because both types of companies operate outside of their domestic markets. In 2012, the average tax rate faced by foreign-owned U.S. companies was higher than the average rates that U.S.-owned companies faced in all but two other G20 countries.[7]

Average corporate tax rates were lower in 2012 than they were in 2004 in the United States and eight other G20 countries, CBO estimates.[8] Top statutory corporate tax rates fell in most G20 countries between those two years, but other changes in the tax system and the economy also affected average corporate tax rates.

How Do Effective Corporate Tax Rates Differ From Top Statutory Corporate Tax Rates?

Two key features of national tax systems cause effective corporate tax rates to differ—both in magnitude and direction—from top statutory corporate tax rates: the treatment of depreciation (the loss in value attributable to wear and tear of an asset) and the sources of financing for investments. CBO estimates that, at 18.6 percent, the U.S. effective corporate tax rate in 2012 was more than 20 percentage points lower than the top statutory rate.[9] Other tax preferences that are part of the U.S. tax code but that are not included in this analysis would lower that rate even more.

The U.S. tax code provides companies with deductions for depreciation (known as cost recovery allowances) that are more generous for equipment than for buildings, although the opposite is true for most other G20 countries. As a result, the U.S. effective corporate rate on investments in equipment was only the 10th highest among G20 countries in 2012, but the effective corporate rate on investments in buildings was 2nd highest among the G20 countries.

Because companies in most countries can deduct interest payments—but not payments of dividends to shareholders or the capital gains they earn—from taxable income, effective corporate tax rates on debt-financed investments are lower than are those for equity-financed investments. That difference is greater when there is a high statutory corporate tax rate because the high rate increases the value of the interest deduction.[10] The value of that deduction, in combination with the depreciation schedule, caused the U.S. effective corporate tax rate for debt-financed investments in equipment to be the second lowest among G20 countries in 2012. The U.S. effective corporate tax rate is ranked near the middle for comparable equity-financed investments. Italy is unique among the G20 countries in that since 2012, its tax system has provided an allowance for corporate equity that permits companies to take a deduction for equity

7. The estimates of the average tax rates faced by U.S.-owned foreign companies are not precisely comparable to those faced by foreign-owned U.S. companies. For U.S.-owned foreign companies, data available from tax returns and financial reports show only the worldwide amounts of income and tax liabilities; hence, the average tax rates faced by U.S.-owned foreign companies include income and taxes from all of the countries (possibly including the United States) in which those companies operate. For foreign-owned companies incorporated in the United States, by contrast, the average corporate tax rates were estimated solely from data on U.S. income and taxes.

8. No data were available to compute such rates for U.S.-owned foreign companies for 2003.

9. CBO's analysis of effective corporate tax rates does not include the effects of expiring tax provisions, such as "bonus depreciation"—a feature of the tax code that allowed the immediate deduction of expenses from some types of investment—in the United States. See Appendix B for an estimate of the U.S. effective corporate tax rate that includes the effects of bonus depreciation.

10. Another factor that increases the value of the interest deduction is the inflation rate. In many countries, including the United States, companies deduct the current-dollar value of interest payments. Thus, the amount of the deduction increases as inflation rises, causing both taxable income and the effective corporate tax rate to fall. For this analysis, CBO generally used an inflation rate of 2.5 percent for all G20 countries. To examine the effects of inflation on effective corporate tax rates, CBO also estimated those rates under scenarios that used a higher rate of inflation for all countries or rates that differed from one country to the next (see Appendix B).

that is similar to the deduction for interest payments.[11] That feature is the chief reason that Italy's overall corporate effective tax rate was estimated to be negative in 2012.

CBO estimates that the U.S. effective corporate tax rate overall was essentially unchanged between 2003 and 2012. In 2003, the U.S. rate ranked fifth among those of the G20 countries, and it followed Japan's, Argentina's, Canada's, and Germany's. In 2012, the U.S. rate ranked fourth, and it followed Argentina's, Japan's, and the United Kingdom's. In Italy, largely because of the adoption of the allowance for corporate equity, the effective corporate tax rate declined by 36 percentage points from 2003 to 2012. By that year, Italy's rate, at –23 percent, was by far the lowest among G20 countries and constituted a net government subsidy for corporations' marginal investments.

The estimates of effective corporate tax rates presented in this report reflect differences among the G20 countries only in statutory corporate tax rates and depreciation allowances for buildings and equipment. However, countries also differ in their tax treatment of other sources of income or expenditures (for example, investments in research and experimentation) and in their economic conditions (such as their inflation rates). Appendix B includes estimates that incorporate additional differences among the G20 countries. Accounting for those differences results in estimates for the United States that range from 13 percent (accounting for the tax treatment of investments in research and experimentation) to 19 percent (using the actual U.S. inflation rate in 2012).

How Much Have Tax Rates Changed Since 2012?

The necessary data are not available to estimate average corporate tax rates for a year more recent than 2012. It is possible, however, to examine how statutory and effective corporate tax rates have changed since 2012. Four G20 countries modified their corporate income tax systems after 2012, generally resulting in lower effective tax rates. Japan, South Africa, and the United Kingdom reduced their top statutory corporate tax rates. As of 2015, Japan's top statutory corporate tax rate was 32.1 percent—5 percentage points lower than its top rate in 2012. As a result, CBO's estimates of Japan's effective corporate tax rate fell from 21.7 percent in 2012 to 18 percent in 2015. South Africa's top statutory corporate tax rate fell from 34.6 percent in 2012 to 28 percent in 2015, and its estimated effective corporate tax rate fell from 9.0 percent in 2012 to 6.2 percent in 2015. The United Kingdom reduced its top statutory corporate tax rate from 24 percent in 2012 to 20 percent in 2015 but also slightly tightened the tax treatment of depreciation for equipment. On net, those changes led to a reduction in the estimates of effective corporate tax rates from 18.7 percent in 2012 to 15.7 percent in 2015. An increase in a surcharge caused India's top statutory corporate tax rate to rise from 32.5 percent in 2012 to 34.6 percent in 2015. That change led to an increase in the estimates of the effective corporate tax rates from 13.6 percent in 2012 to 15 percent in 2015.

11. Other countries have adopted similar measures, among them Turkey in 2015. Since 1995, Brazil has allowed corporations to deduct payments of interest on net equity to shareholders but not to deduct the return on retained earnings or the payment of normal dividends. Countries outside of the G20, including Belgium and Croatia, also provide for the deduction of some portion of returns on equity.

Statutory Corporate Tax Rates in the United States and Other Countries

The exhibits in this section illustrate statutory corporate tax rates on taxable income. The amounts that corporations actually pay in taxes, however, are not determined solely by those rates. Corporations' tax liability may be reduced through credits for various types of income and expenditures (for example, on research and experimentation). Nevertheless, statutory tax rates often are important to corporations that are deciding how to allocate their profits, as opposed to their investments, to one country or another. Incremental changes in profits generally are taxed at the statutory rate.

Exhibit 1.

Statutory Rates for U.S. Federal Corporate Income Taxes, 2012

Taxable Income Range (Dollars)		Percent		
Over	But Not Over	Statutory Corporate Tax Rate	Excess Tax Rate	Total Rate
0	50,000	15	0	15
50,000	75,000	25	0	25
75,000	100,000	34	0	34
100,000	335,000	34	5	39
335,000	10,000,000	34	0	34
10,000,000	15,000,000	35	0	35
15,000,000	18,333,333	35	3	38
18,333,333	n.a.	35	0	35

Source: Internal Revenue Service.

n.a. = not applicable.

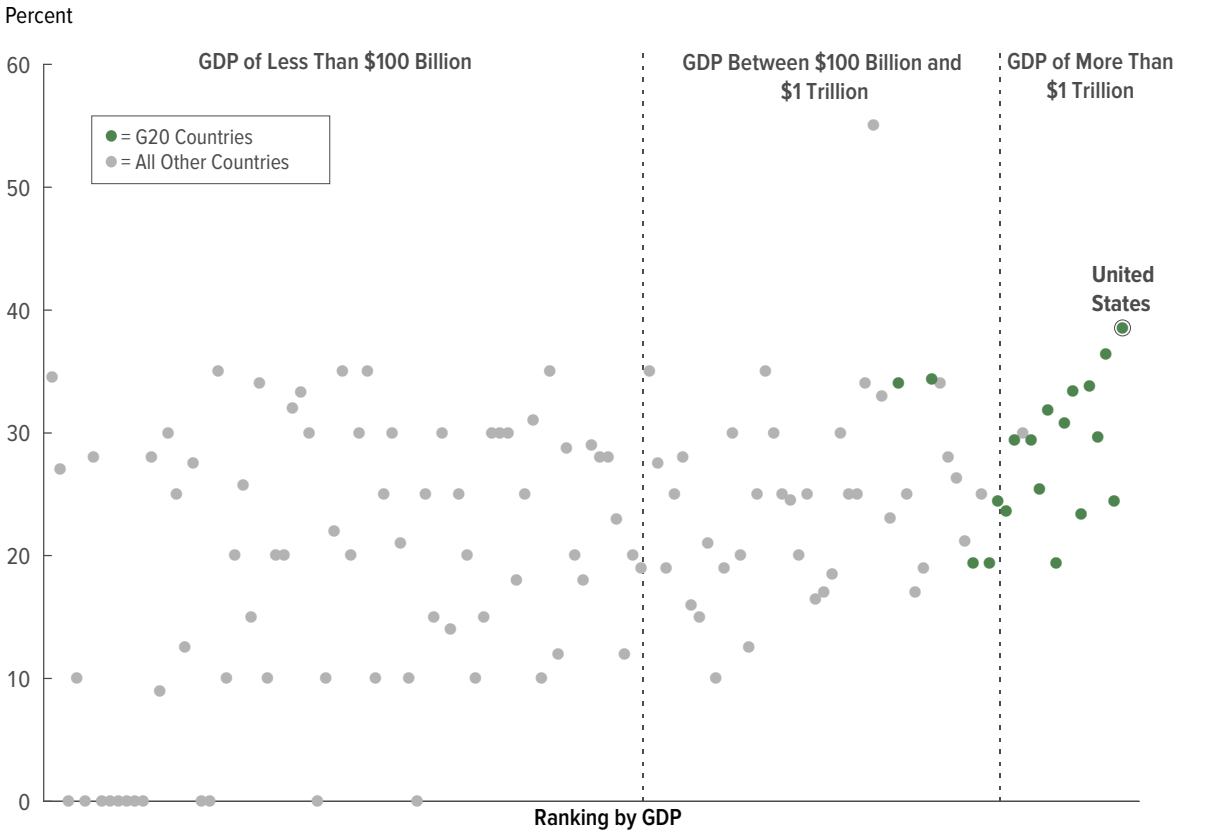
Under current law, corporations' annual federal income tax liabilities are computed according to a progressive rate structure that starts at 15 percent for the first $50,000 of taxable income and rises to 35 percent (before credits) for income above $10 million. Any income in the range of $100,000 to $335,000, already taxed at a rate of 34 percent, is subject to an excess tax of 5 percent (raising the rate to 39 percent). An excess tax of 3 percent is assessed on income between $15 million and $18.3 million, boosting the total statutory rate in that range from 35 percent (which would otherwise apply) to 38 percent.

Those excess taxes offset the benefit of the lower tax rates applied to taxable income in lower brackets. As a result, any corporation with taxable income between $335,000 and $10 million faces a rate of 34 percent on its *total* taxable income, and any corporation with taxable income above $18.3 million faces a rate of 35 percent on its *total* taxable income. Most corporate income is taxed at that 35 percent rate; more than 90 percent of U.S. corporate taxable income is generated by companies with income above $18.3 million.

Corporations often pay state taxes as well, although state taxes are to some extent deductible from federal taxes. In 2012, 44 states and the District of Columbia levied taxes on corporate income, and, on average, the top combined rate for federal and state taxes paid by corporations (accounting for the deduction of state taxes) was 39.1 percent. ◆

Exhibit 2.

Top Statutory Corporate Income Tax Rates in Selected Countries, Arrayed by GDP, 2012



Source: Congressional Budget Office, using data from KPMG International and the Organisation for Economic Co-operation and Development.

GDP = gross domestic product; G20 = Group of 20.

In 2012, the United States' top statutory corporate income tax rate of 39.1 percent was second only to that of the United Arab Emirates, according to a survey of 129 jurisdictions by KPMG International. The U.S. rate was 10 percentage points higher than the average rate (weighted by GDP) for the rest of the G20 countries.

The U.S. rate exceeded the 32 percent that was the average of top tax rates among all of the 15 countries with GDP above $1 trillion. After the United States, Japan had the next-highest rate of that group at 37 percent, and Russia had the lowest rate, at 20 percent.

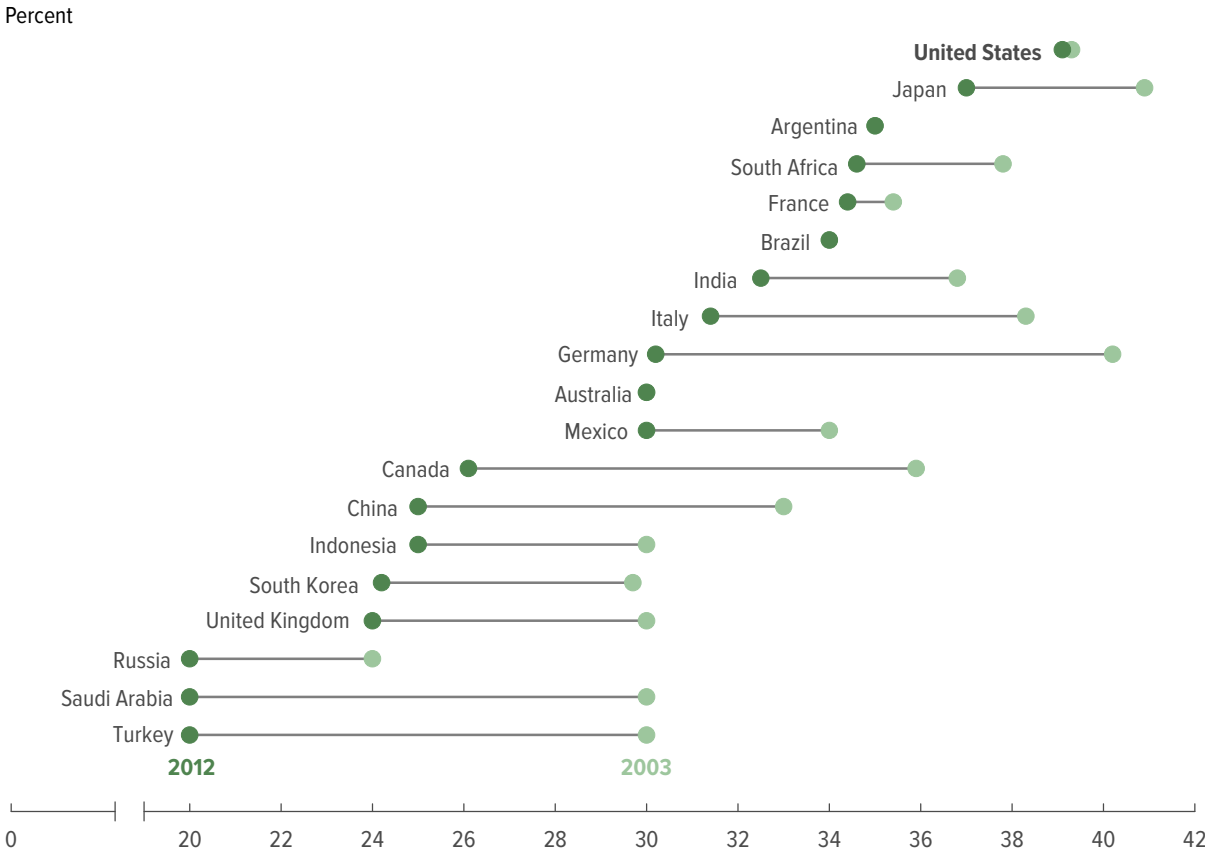
The top statutory corporate tax rate for countries with GDP between $100 billion and $1 trillion was 25 percent, on average. Among that group, the United Arab Emirates' top rate was 55 percent, the highest among all countries surveyed, and Qatar had the lowest, at 10 percent.

The average top statutory tax rate for countries with GDP below $100 billion was about 22 percent in 2012. Honduras, Malta, Sudan, and Zambia shared the top rate of 35 percent. Bermuda, the Cayman Islands, and Vanuatu were among the 11 jurisdictions that had no corporate income tax.

Countries in which the statutory rate is zero often are considered tax havens. Some countries with tax rates above zero, such as Ireland, the Netherlands, and Luxembourg, also are sometimes identified as tax havens because of the especially preferential treatment their tax codes offer to multinational corporations. ◆

Exhibit 3.

Top Statutory Corporate Income Tax Rates in G20 Countries, 2003 and 2012



Source: Congressional Budget Office, using data from KPMG International and the Organisation for Economic Co-operation and Development.

Rates in Argentina, Australia, and Brazil were the same in 2003 and 2012.

G20 = Group of 20.

Between 2003 and 2012, top statutory corporate income tax rates fell by at least 5 percentage points in nine of the G20 countries. Japan and Germany, which had the highest rates in 2003, reduced those rates by 4 percentage points and 10 percentage points, respectively.

The United States made no change in federal corporate tax rates between 2003 and 2012, and by 2012, it had the highest top statutory rate in the G20. (The slight decline in the top corporate rate in the United States over that period reflects small changes, on average, in state tax rates.) Argentina, Australia, and Brazil also made no changes to corporate tax rates between 2003 and 2012. But during that time, Argentina went from having the ninth-highest to the third-highest statutory rate.

Russia, Saudi Arabia, and Turkey had the lowest corporate tax rates in 2012; all of those countries cut their top corporate tax rates during the period. Saudi Arabia and Turkey reduced their rates by 10 percentage points, and, along with Germany, those two countries accounted for the largest decreases among all G20 countries. ◆

Average Corporate Tax Rates in G20 Countries

The top statutory corporate income tax rate is just one of several aspects of a tax code that determine the amount a company will face in corporate taxes. First, the structure of tax rates differs from country to country. Most G20 countries apply the same statutory rate to all taxable income, but some, such as South Korea and the United States, have graduated rate structures. Some countries use tax preferences to reduce the amount of taxes that companies owe. For example, the United States offers a general business credit to reduce taxes owed by businesses that engage in one of a list of particular activities, and its tax code includes preferences for certain types of businesses or endeavors. Argentina, Canada, and several other countries tailor their incentives to certain regions or types of investment.

When companies are deciding whether to operate in a particular country, they consider, among other factors, the total amount of corporate income taxes they would pay to that country relative to the income earned there. That ratio—the country's average corporate tax rate—encompasses all of the provisions of the country's corporate income tax code. The advantage of using the average corporate tax rate to evaluate investment incentives is that it can capture features of the tax code that are missed both by the top statutory corporate tax rate and by the effective marginal corporate tax rate. Because the average corporate tax rate is sensitive to economic conditions, however, a disadvantage of its use is the possibly significant variation in estimates—depending on the year and the sample of companies used to calculate the ratio.

Other factors affect average tax rates. To the extent that a tax system provides opportunities for companies to minimize their taxes or avoid compliance with tax laws altogether, for example, average tax rates will be lower than they otherwise would be. Those opportunities for tax avoidance or evasion may contribute to a country's appeal both as an investment location and as a place to shift profits from higher-tax countries.

If a U.S. multinational corporation was deciding whether to invest in the United States or in some other country, it probably would compare the average tax rate faced by its domestic affiliates with those faced by its foreign affiliates. Although this section contains estimates of the average tax rates faced by companies operating abroad, those rates deviate in two important ways from the rates

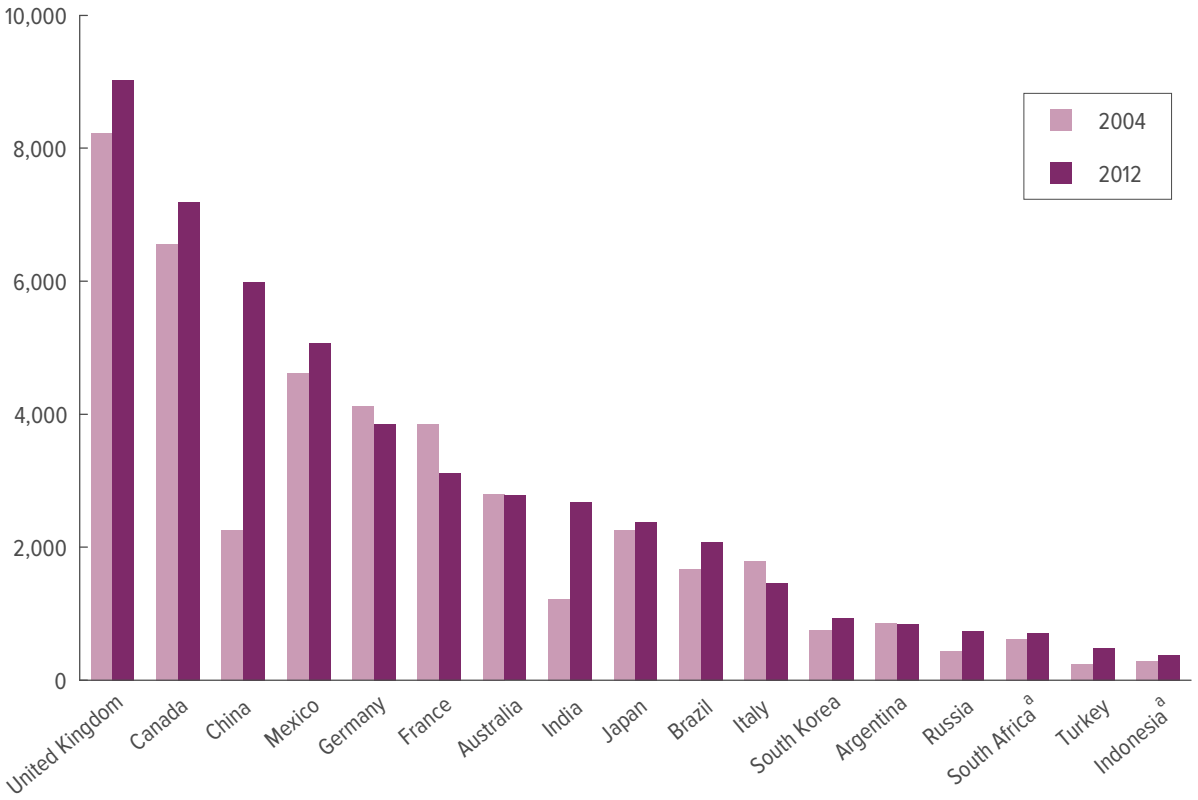
companies consider when they make decisions about their investments.

First, the estimates of U.S. rates in this report use the ratio of U.S. taxes paid to U.S. income for *foreign-owned* companies incorporated in the United States. Data that specifically identify tax payments of the U.S. affiliates of U.S. multinational corporations are not available.

Second, for countries other than the United States, the estimates of average tax rates were calculated as the ratio of *worldwide* tax payments to *worldwide* income for U.S.-owned businesses incorporated in that country. Thus, the estimates of foreign tax rates and the estimate of the U.S. rate are not precisely comparable but can be considered proxies for the information used by companies to make investment decisions. Data that would allow for the same concepts of income and tax for U.S.-owned companies and for foreign-owned companies are not available. For further discussion of the methods that CBO used to derive estimates of average corporate tax rates, see Appendix A.

Exhibit 4.

Number of U.S.-Owned Foreign Corporations in Other G20 Countries, 2004 and 2012



Source: Congressional Budget Office, using data from the Internal Revenue Service.

The Internal Revenue Service's disclosure rules prevented the release of information for Saudi Arabia (not shown) in most years because of the small number of U.S.-owned companies incorporated there. For 2012, those disclosure rules also prevented the release of information for Indonesia and South Africa, so 2010 values are shown instead.

G20 = Group of 20.

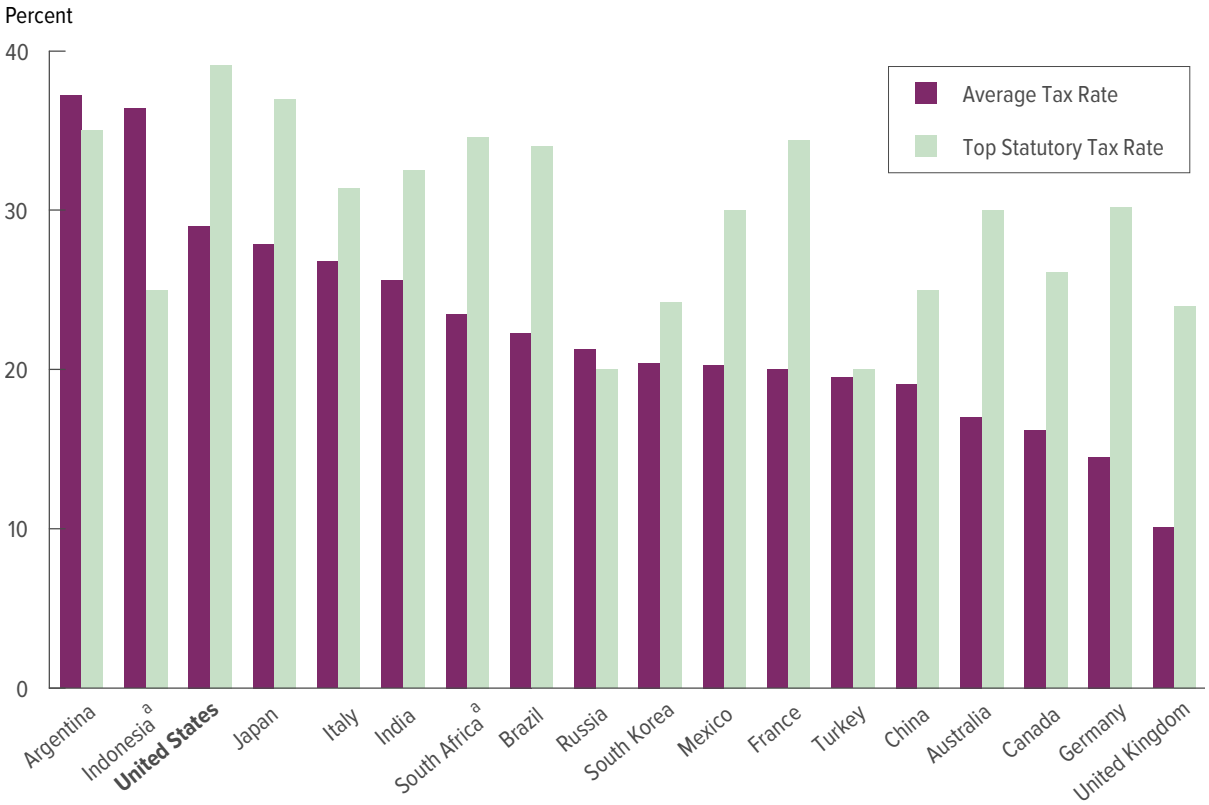
a. The 2012 bar shows the 2010 value.

CBO estimated average corporate tax rates specifically for U.S.-owned foreign corporations—companies that, although incorporated outside the United States, have the majority of their shares owned by a single U.S. taxpayer. In 2012, about half of the approximately 88,000 U.S.-owned foreign corporations were incorporated in 15 G20 countries—mostly either in the United Kingdom or in Canada. (The data necessary for the estimates were not available for 3 countries in the G20.)

The direction and magnitude of changes between 2004 and 2012 in the number of U.S.-owned foreign corporations varied across the G20. In five countries, the number fell, but it more than doubled in China and India. By 2012, China ranked third among G20 countries, with 5,988 U.S.-owned companies incorporated in that nation. ◆

Exhibit 5.

Average and Top Statutory Corporate Income Tax Rates in G20 Countries, 2012



Source: Congressional Budget Office, using data from the Internal Revenue Service, KPMG International, and the Organisation for Economic Co-operation and Development.

The U.S. average rate shown is for foreign-owned companies incorporated in the United States; it accounts for U.S. income and taxes. The average rate shown for other G20 countries is for U.S.-owned companies, by country of incorporation; it accounts for worldwide income and taxes.

The Internal Revenue Service's disclosure rules prevented the release of information for Saudi Arabia (not shown) in most years because of the small number of U.S.-owned companies incorporated there. For 2012, those disclosure rules also prevented the release of information for Indonesia and South Africa, so 2010 values are reported instead. In 2011, Indonesia introduced a provision that reduced taxes on new investment in specified sectors for a limited time; that provision might have lowered the 2012 average tax rate relative to the rate reported for 2010.

G20 = Group of 20.

a. 2010 values are shown for average and top statutory tax rates.

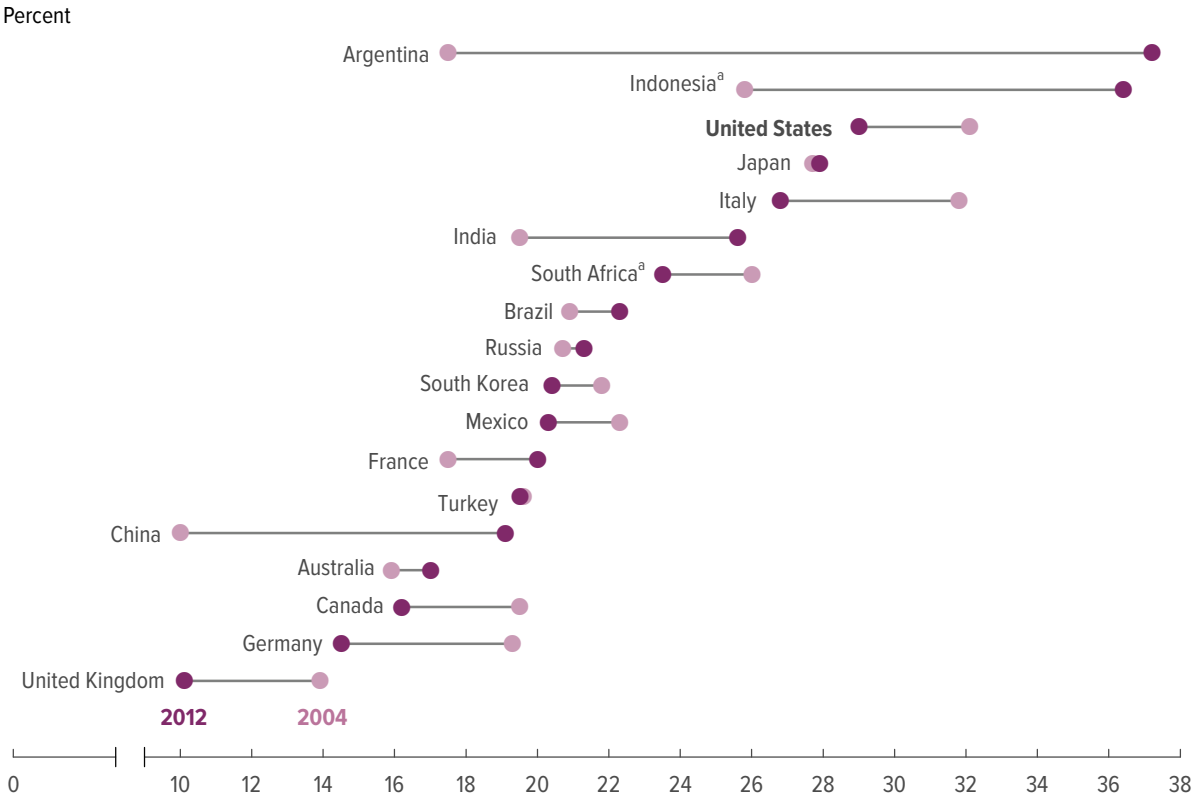
In 2012, according to CBO's estimates, the United States' *top statutory* corporate income tax rate—which averaged 39 percent—was the highest among all G20 countries. By contrast, the *average* corporate tax rate faced by foreign-owned companies incorporated in the United States was, at 29 percent, 10 percentage points lower. However, U.S.-owned foreign companies incorporated in most G20 countries also faced average corporate tax rates that were lower than those countries' top statutory corporate tax rates, CBO estimates. As a result, the U.S. average corporate tax rate was still higher than the rates that U.S.-owned foreign corporations faced in any of the G20 countries other than Argentina and Indonesia.

In particular, the average rate faced by U.S.-owned foreign corporations was at least 9 percentage points below the statutory rate in nine countries; in Germany, the difference, at 16 percentage points, was largest. By contrast, U.S.-owned foreign corporations in Turkey and Russia—the two countries with the lowest statutory rates in the G20—faced statutory and average rates that were almost equal. Despite having a higher statutory tax rate than either Turkey or Russia, the United Kingdom had the lowest average corporate tax rate of all G20 countries.

In contrast to other G20 countries, CBO estimates, Indonesia had an average corporate tax rate that was more than 11 percentage points higher than its top statutory rate, in part because of additional taxes not captured by the top statutory rate that were applied to income earned by corporations in Indonesia's oil and energy sector. ◆

Exhibit 6.

Average Corporate Tax Rates in G20 Countries, 2004 and 2012



Source: Congressional Budget Office, using data from the Internal Revenue Service.

The U.S. average rate shown is for foreign-owned companies incorporated in the United States; it accounts for U.S. income and taxes. The average rate shown for other G20 countries is for U.S.-owned companies, by country of incorporation; it accounts for worldwide income and taxes.

The Internal Revenue Service's disclosure rules prevented the release of information for Saudi Arabia (not shown) in most years because of the small number of U.S.-owned companies incorporated there. For 2012, those disclosure rules also prevented the release of information for Indonesia and South Africa, so 2010 values are reported instead. In 2011, Indonesia introduced a provision that reduced taxes on new investment in specified sectors for a limited time; that provision might have lowered the 2012 average tax rate relative to the rate reported for 2010.

G20 = Group of 20.

a. The 2012 dot shows the 2010 value.

Between 2004 and 2012, the average corporate tax rate faced by foreign companies incorporated in the United States fell by 3 percentage points, from 32 percent to 29 percent, CBO estimates, despite the lack of major changes to U.S. corporate tax law during that period. That decline was probably attributable to changes in economic and business conditions. Average corporate tax rates for U.S.-owned foreign corporations in eight G20 countries also declined, as did the top statutory rates in those countries. Italy's average rate declined the most—it fell by 5 percentage points. In contrast, the average rate rose significantly in Argentina, Indonesia, India, and China.

Average corporate tax rates generally did not change by the same amount as statutory corporate tax rates because of other changes in countries' tax laws and administration and because of changes in the composition of U.S.-owned companies incorporated abroad. In Italy, for example, the top statutory rate dropped by 7 percentage points, but an expansion of the tax base—that is, the amount of income subject to taxes—partially offset the effect of the lower statutory rate, CBO estimates. The largest increase in the average corporate tax rate occurred for U.S.-owned foreign corporations in Argentina, even though that country's statutory rates did not change. The nearly 20 percentage-point increase in the average corporate tax rate partially reflects Argentina's increased efforts to curb noncompliance among foreign-owned companies. ◆

Effective Corporate Tax Rates and Key Factors Affecting Those Rates

Effective corporate tax rates measure a company's corporate income tax burden on returns from a marginal investment (one that is expected to earn just enough, after taxes, to attract investors). Effective corporate tax rates differ from statutory corporate income tax rates in that they also account for other features of the tax code, such as the tax treatment of depreciation. The effective corporate tax rate that a company faces can influence its decisions about whether to expand existing projects in the countries in which those projects are already located.

Because CBO's estimates of effective corporate tax rates are derived from simulations based on hypothetical cases, they are less sensitive to economic conditions than are estimates of average tax rates. However, there is a limit to the specific aspects of the tax code and economic environment that can be incorporated into simulations, so the effective corporate tax rate misses some differences between countries that are captured by the average corporate tax rate.

For this analysis, CBO estimated effective corporate tax rates that would be faced by hypothetical companies operating in G20 countries. The study focused mainly on two kinds of tax provisions in each country: statutory corporate rates and cost recovery allowances (the deductions from taxable income for the loss in value that is attributable to an asset's depreciation). The estimates in this report do not account for other differences between countries in the tax treatment of corporate income. In particular, CBO did not consider some features of tax systems that affect cross-border investment—such as treaties between countries that determine the tax treatment of income earned by companies in foreign countries.

Two factors largely determine whether the effective corporate tax rate is higher or lower than the statutory corporate tax rate: the value of cost recovery allowances relative to economic (actual) depreciation and the method that a company uses to finance its investment. Returns on equity-financed investments are taxed at the statutory rate when the present value of economic depreciation and the present value of cost recovery allowances are equal. (A present value is a single number that expresses a flow of current and future income, or payments, in terms of an equivalent lump sum received, or paid, at a specific time.) Cost recovery allowances that have a smaller present value raise the effective corporate tax rate above the statutory tax rate, and allowances that have a greater present

value result in effective corporate tax rates that are below the statutory tax rate. Cost recovery allowances vary from country to country and by asset type. In most countries, such allowances are more advantageous for buildings than for equipment. However, under U.S. tax law, the reverse is true: In the United States, allowances are more advantageous for equipment than they are for buildings.

The method of financing that companies use for investment affects effective corporate tax rates because, in most countries, companies cannot deduct from taxable income the dividends they pay to shareholders or the capital gains they earn, but they can deduct interest paid to lenders. As a result of that deduction, effective corporate tax rates are lower for debt-financed investments than for equity-financed investments on the same depreciation schedule. The value of that deduction increases as statutory tax rates rise. Companies can deduct nominal (current dollar) interest payments. Inflation increases the size of those interest payments and causes effective corporate tax rates for debt-financed investments in all G20 countries to fall below zero. Those negative rates indicate that corporations received, on net, a government subsidy on marginal investments financed with debt.

Countries with statutory rates that are higher than others may still have lower effective corporate tax rates because of interest deductions and differences in cost recovery systems.

With some exceptions, CBO computed effective corporate tax rates holding four conditions the same for all countries:

First, the shares of total assets attributable to buildings, equipment, intangible assets (those that are not physical, such as patents or trademarks), and inventories were based on the allocation of those resources in the United States (48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories).

Second, in scenarios in which assets were financed both by debt and by equity, the mix was set to be the same in each country (35 percent and 65 percent, respectively, of total financing).

Third, expenditures on intangible assets were subtracted from taxable income immediately in the year of purchase, and no additional subsidies were provided for such investments.

Finally, inflation rates, interest rates, economic depreciation, and other economic conditions were held the same for all countries.

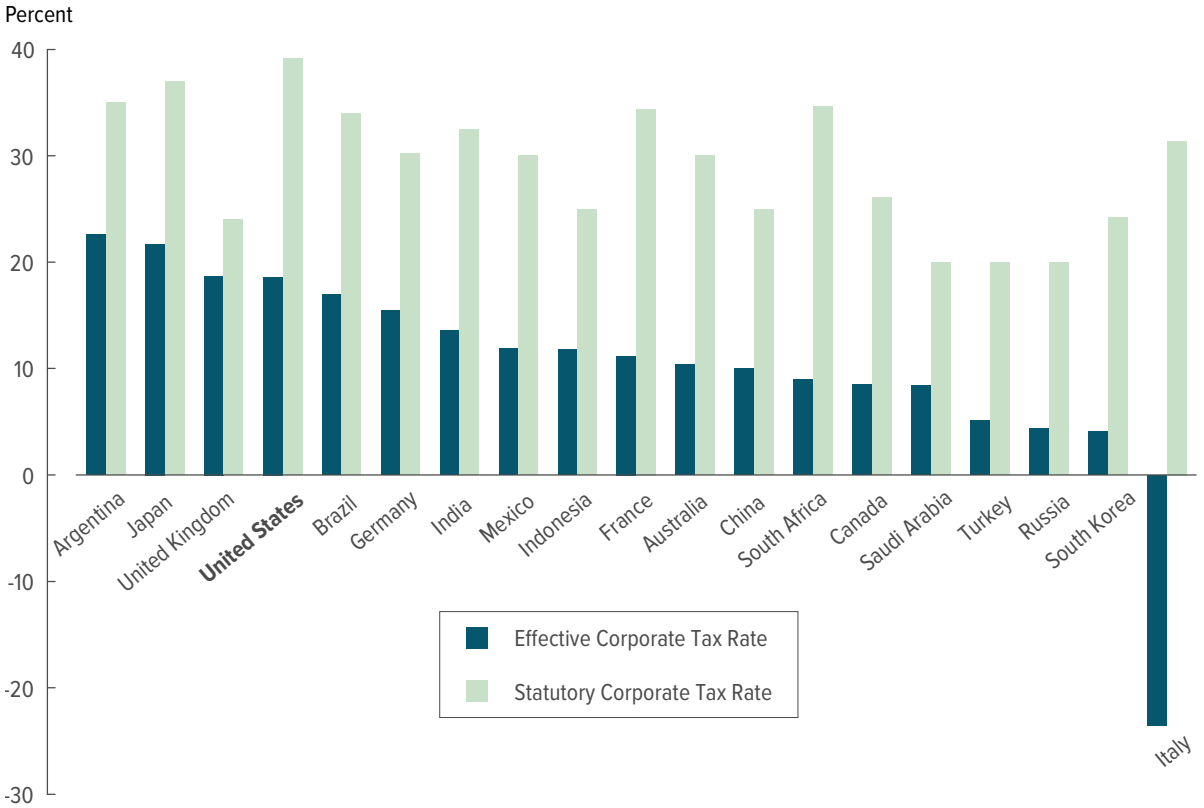
Since 2012, Italy's tax code has included an allowance intended to equalize its treatment of debt and equity.[1] For this report, CBO's estimates of Italy's 2012 effective tax rates are based on a scenario in which the return on equity-financed investment is treated as if it were a return on debt. Because of the deduction for the return on equity, Italy's 2012 estimated effective corporate tax was negative: Corporations received, on net, a government subsidy on marginal investments.[2]

Unlike average corporate tax rates, effective corporate tax rates as estimated by CBO are limited to income earned by a company in that country and the amount of taxes a company owes to that country. Additionally, the estimates of effective corporate tax rates are not based on the experiences of a specific sample of corporations. Instead, the estimates measure the tax burden on a marginal investment for a hypothetical corporation with asset and financing mixes as specified above. The rate faced by a corporation in a given country depends on corporation- and country-specific variables that are not included in CBO's estimates. (See Appendix A for a description of CBO's method and Appendix B for information on the sensitivity of CBO's estimates to inflation and other analytical choices described above.)

1. See Ernesto Zangari, *Addressing the Debt Bias: A Comparison Between the Belgian and the Italian ACE Systems*, Taxation Paper 44 (European Commission, June 2014), http://tinyurl.com/nfyds9h (PDF, 912 KB). Brazil also has an allowance for corporate equity but because of certain characteristics of that allowance, CBO estimated effective corporate tax rates for Brazil on the basis of the standard financing mix of 35 percent debt and 65 percent equity. See Appendix A for additional information on both Italy's and Brazil's allowances for corporate equity.
2. Between 1997 and 2003, Italy had a dual income tax that provided a reduced tax rate for the return on equity. The effective corporate tax rate is a forward-looking measure, and thus the dual income tax is not included in the estimate of the effective corporate tax rate for Italy in 2003 because the elimination of the dual income tax had already been announced.

Exhibit 7.

Effective Corporate Tax Rates and Top Statutory Corporate Income Tax Rates in G20 Countries, Inclusive of All Types of Assets and Financing Sources, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

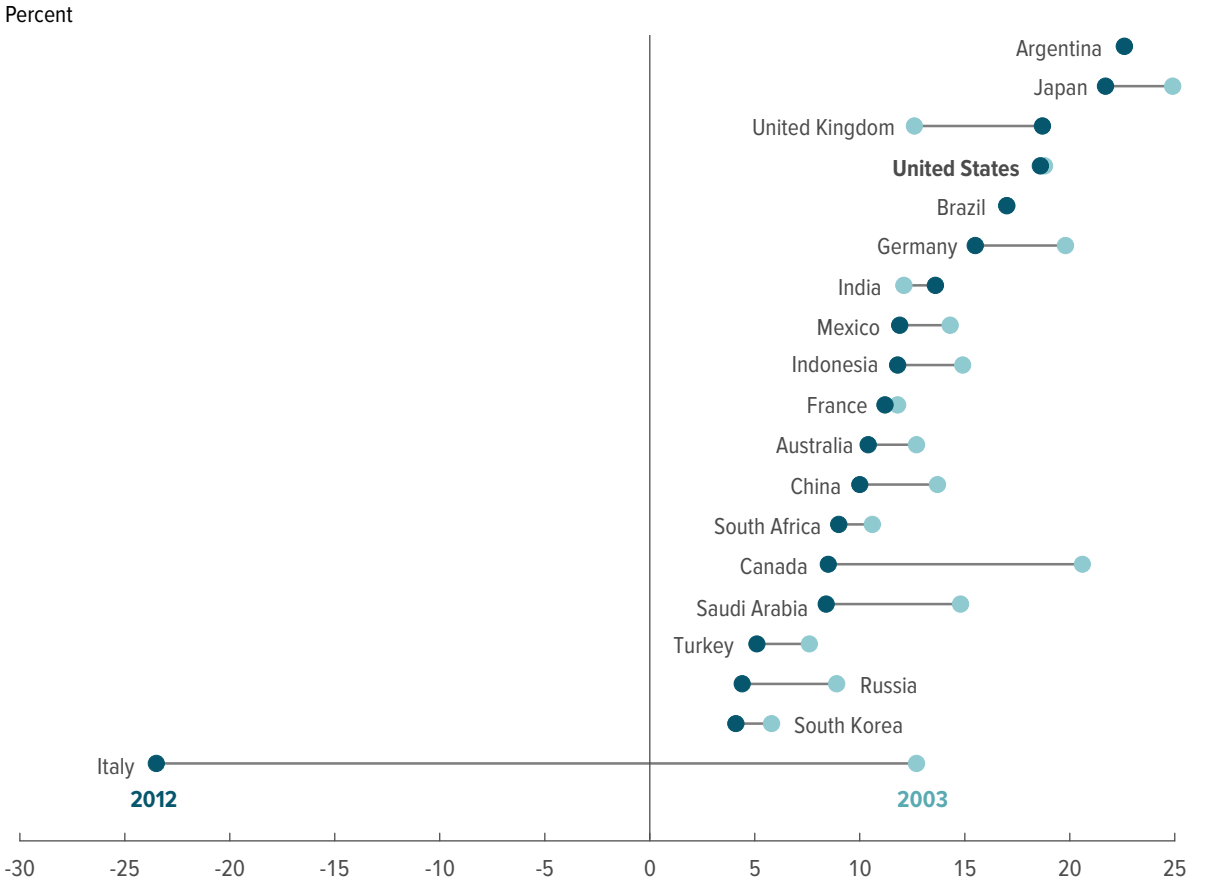
G20 = Group of 20.

In 2012, by CBO's estimates, the effective corporate tax rate was lower than the top statutory corporate income tax rate in every G20 country. On the basis of the two kinds of tax provisions considered for this analysis, CBO estimates that companies in the United States faced an effective rate of 18.6 percent, well below the top statutory rate of 39 percent but still the fourth highest in the G20. Although Japan cut its top statutory rate to 37 percent in 2012, its effective corporate tax rate was still above the U.S. rate. Argentina's statutory rate was lower in 2012 than the rates in Japan and the United States, but its effective corporate tax rate was the highest that year. (The estimate of Argentina's effective tax rate is substantially lower when its relatively high rate of inflation in 2012 is considered; see Appendix B.) The United Kingdom, despite having the fourth-lowest top statutory rate, had the third-highest effective corporate tax rate in 2012, in part because it had eliminated cost recovery allowances for buildings in 2011.

Many countries with low effective corporate tax rates also had relatively low statutory rates. Russia, Saudi Arabia, and Turkey had the lowest top statutory rates in 2012, and their effective corporate tax rates were, according to CBO's estimates, among the lowest in the G20. Italy, which had the lowest estimated effective corporate tax rate by far (in fact, it had a negative rate), had the eighth-highest top statutory rate in 2012. That negative effective rate resulted from the Italian tax code's allowance for corporate equity, and it amounted to a government subsidy for some corporate investments. ◆

Exhibit 8.

Effective Corporate Tax Rates in G20 Countries, Inclusive of All Types of Assets and Financing Sources, 2003 and 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

Rates in Argentina and Brazil were the same in 2003 and 2012.

G20 = Group of 20.

In most G20 countries, effective corporate tax rates declined from 2003 to 2012—mainly because of reductions in top statutory rates. The decline in the U.S. rate was relatively small. As a result of small reductions, on average, in state tax rates, it dropped by less than half a percentage point between 2003 and 2012. By 2012, the U.S. rate was the fourth-highest among G20 countries.

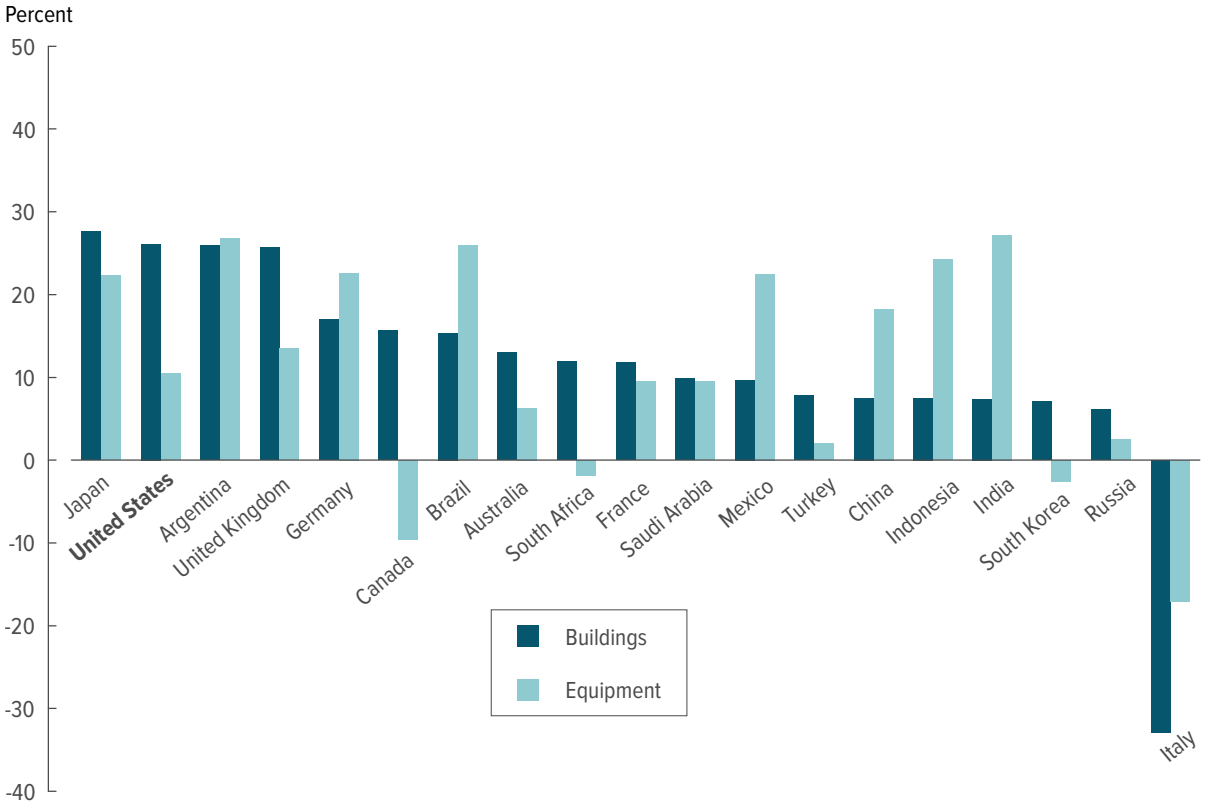
The largest declines were driven by a combination of changes. Italy's rate dropped by 36 percentage points because of a reduction in the top statutory rate and the introduction of a tax allowance for corporate equity. In Canada, the 12 percentage-point decline was caused by a reduction in the top statutory rate and an acceleration of cost recovery allowances for equipment.

Reductions in four countries' top statutory corporate tax rates were accompanied by a deceleration of cost recovery allowances. In Germany and Turkey, the effect of the reduction in the statutory rate was greater than the effect of the change in the allowances, leading to reductions in the effective corporate tax rates. The opposite was true in India and the United Kingdom, where effective corporate tax rates rose.

In Argentina and Brazil, two of the three countries whose top statutory tax rates were unchanged from 2003 to 2012, effective corporate tax rates remained the same. Australia's effective corporate tax rate declined because of an acceleration of its cost recovery allowances. ◆

Exhibit 9.

Effective Corporate Tax Rates for Buildings and Equipment in G20 Countries, Inclusive of All Types of Financing Sources, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

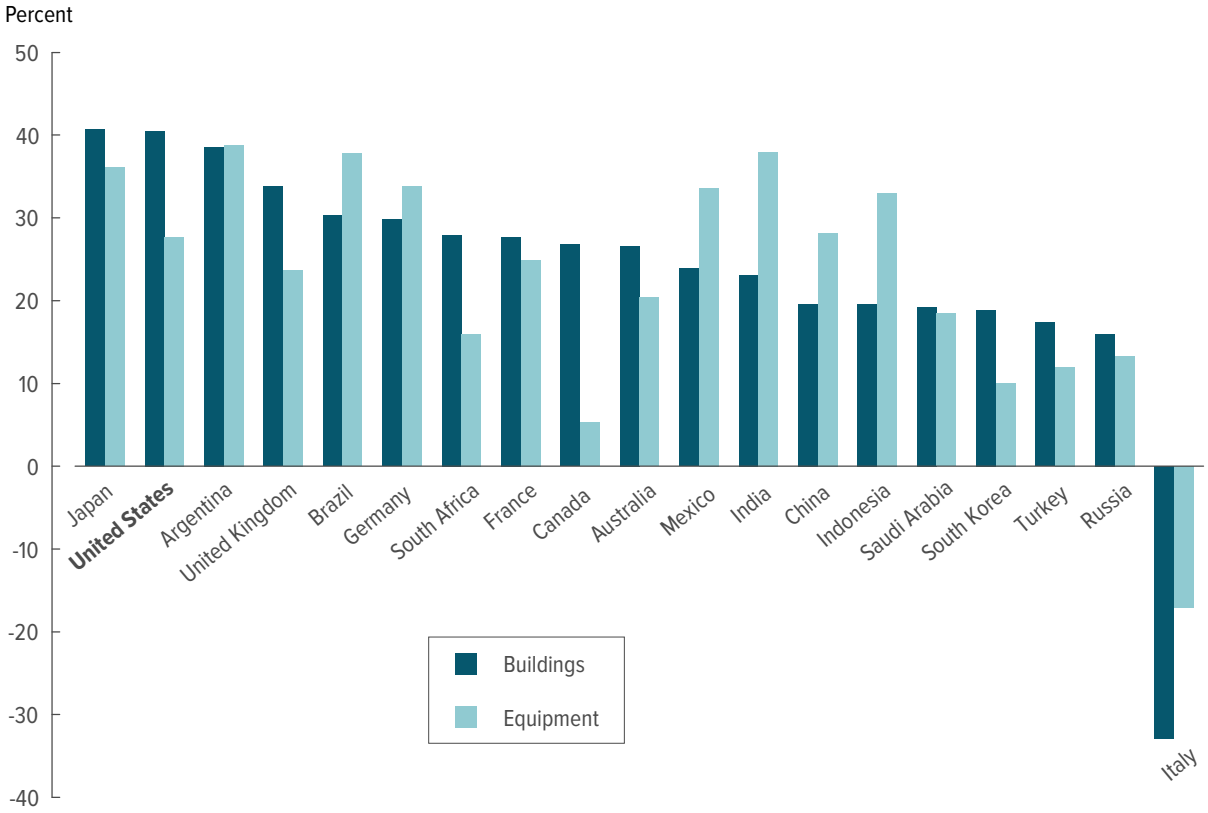
G20 = Group of 20.

In 2012, nearly all G20 countries' tax systems exhibited a substantial gap between the effective corporate tax rates for investments in buildings and for equipment, according to CBO's analysis. Eleven countries, including the United States, had higher effective corporate tax rates for buildings than for equipment. The United States was about average among the G20 countries in rates for equipment but second highest—after Japan—in rates for buildings. The gap between the rates was greatest in Canada; there, the rate for buildings was 25 percentage points higher than the rate for equipment. Saudi Arabia had the smallest gap; its effective rate for buildings was only slightly higher than its effective rate for equipment.

CBO estimates that the effective corporate rates for equipment were below zero in Italy, Canada, South Korea, and South Africa; those governments essentially were subsidizing companies' investments in equipment. India, Argentina, and Brazil had the highest rates for equipment; they were three of the eight countries that had higher effective corporate tax rates for equipment than for buildings. Italy, which had adopted an allowance for corporate equity, was the only G20 country with a negative effective corporate tax rate on income from investments in buildings. ◆

Exhibit 10.

Effective Corporate Tax Rates for Equity-Financed Buildings and Equipment in G20 Countries, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

Effective corporate tax rates for buildings and equipment were estimated under a scenario in which assets were financed entirely by equity in each country.

G20 = Group of 20.

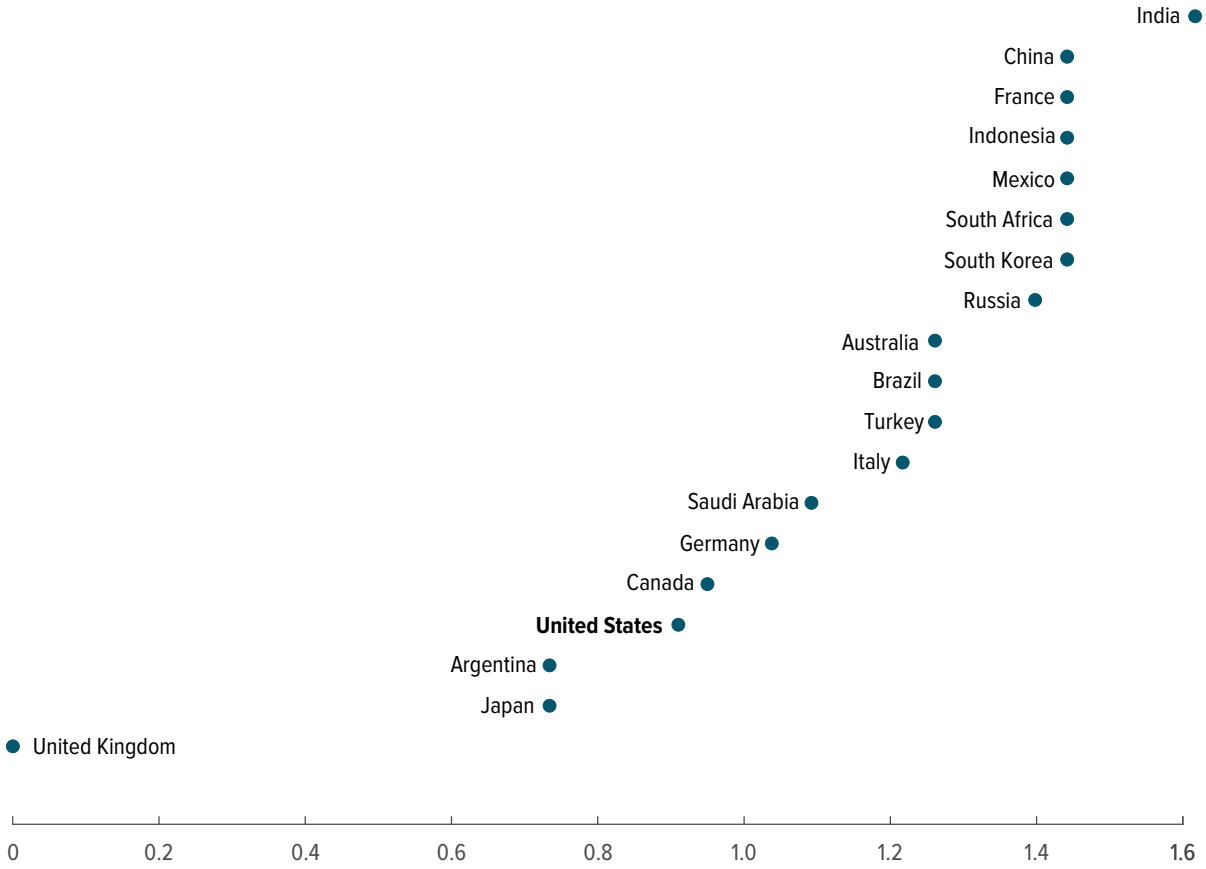
Effective corporate tax rates depend in part on the way investments are financed. Exhibit 9 illustrates rates as estimated on the basis of a financing mix of 35 percent debt and 65 percent equity. This exhibit considers a scenario in which investments were financed entirely by equity. Compared with Exhibit 9, effective corporate tax rates would be higher for buildings and equipment (except in Italy, because of its allowance for corporate equity) because they would not reflect interest payment deductions, which reduce the effective corporate tax rate for debt-financed investments.

CBO estimates that—at 40 percent—the 2012 U.S. effective corporate tax rate for equity-financed investments in buildings was 14 percentage points higher than the rate shown in Exhibit 9, still placing the United States second among G20 countries. For investments in equipment, which receive more favorable treatment, the estimated rate was 17 percentage points higher—at 28 percent—under the equity-only scenario. Thus, the gap between the rates for investments in buildings and equipment was slightly smaller if they were financed by equity alone.

Generally, the increase in the effective corporate tax rate with equity financing was larger for countries with higher statutory rates and, within a country, for more favorably treated assets. Therefore, the relative ordering of the effective corporate tax rates for countries within each asset category was different if investments were financed with equity alone than if a mix of debt and equity was used. ◆

Exhibit 11.

Ratio of the Present Value of Cost Recovery Allowances to the Present Value of Economic Depreciation for Buildings in G20 Countries, 2012



Source: Congressional Budget Office, using data from the Oxford University Centre for Business Taxation.

A present value is a single number that expresses a flow of current and future income (or payments) in terms of an equivalent lump sum received (or paid) at a specific time.

G20 = Group of 20.

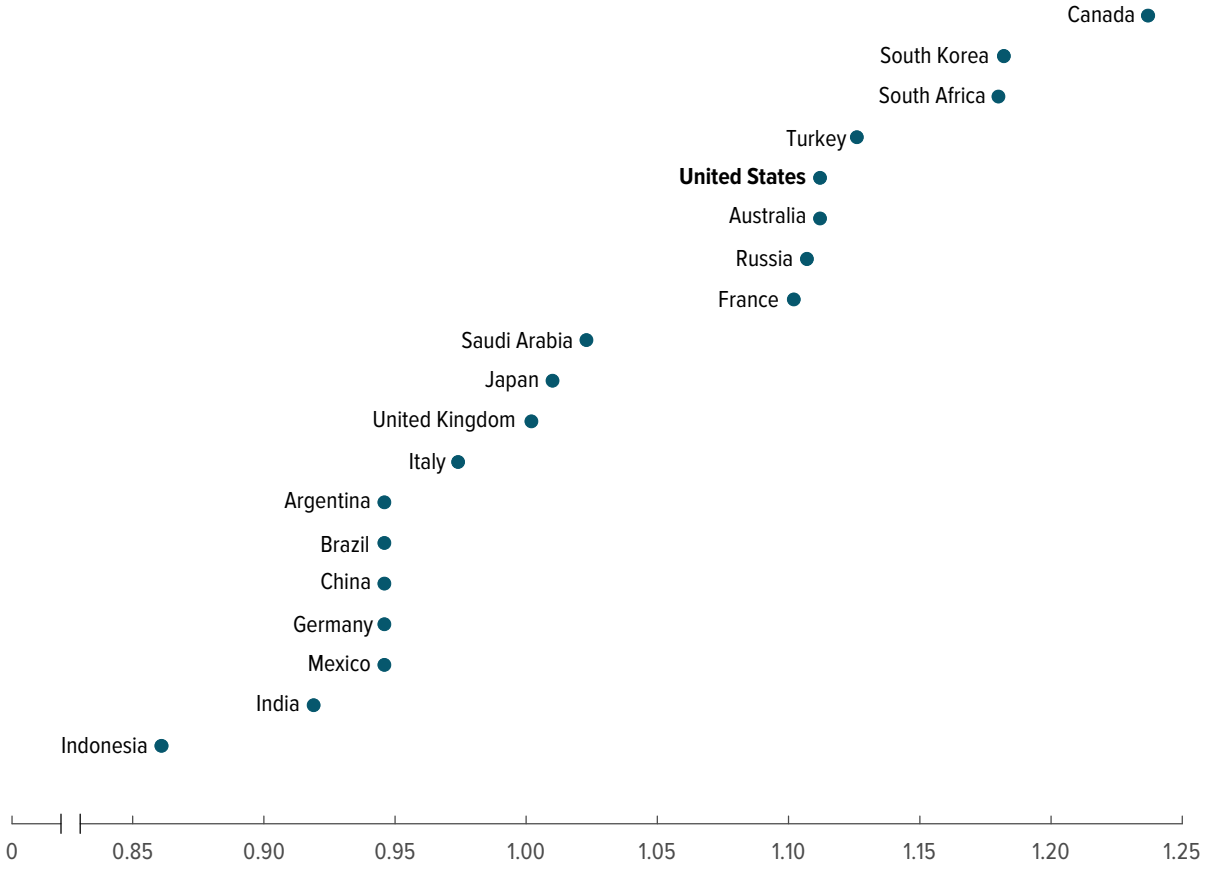
A country's cost recovery allowances are an important determinant of its effective corporate tax rate. One way to identify differences among various countries' cost recovery allowances is from the relationship between the present value of an allowance and the present value of the economic depreciation of an asset. (CBO based its estimates on a scenario in which economic depreciation was the same in all countries.)

Fourteen countries offered businesses cost recovery allowances for buildings that had a present value that was higher than the present value of economic depreciation. Under India's tax provisions, the present value of such allowances was more than 60 percent greater than the present value of economic depreciation, according to CBO's estimates; for seven other countries, that present value was about 40 percent greater.

The least advantageous treatment of depreciation was in the tax system of the United Kingdom, which eliminated cost recovery allowances for buildings in 2011. After the United Kingdom, Japan, Argentina, and the United States ranked in ascending order among the G20 countries in terms of the relative value of cost recovery allowances for buildings, according to CBO's estimates. Those three countries also had the highest statutory corporate income tax rates. ◆

Exhibit 12.

Ratio of the Present Value of Cost Recovery Allowances to the Present Value of Economic Depreciation for Equipment in G20 Countries, 2012



Source: Congressional Budget Office, using data from the Oxford University Centre for Business Taxation.

A present value is a single number that expresses a flow of current and future income (or payments) in terms of an equivalent lump sum received (or paid) at a specific time.

G20 = Group of 20.

Differences in cost recovery allowances among countries are demonstrated in the relationship between a cost recovery allowance's present value and the present value of an asset's economic depreciation.

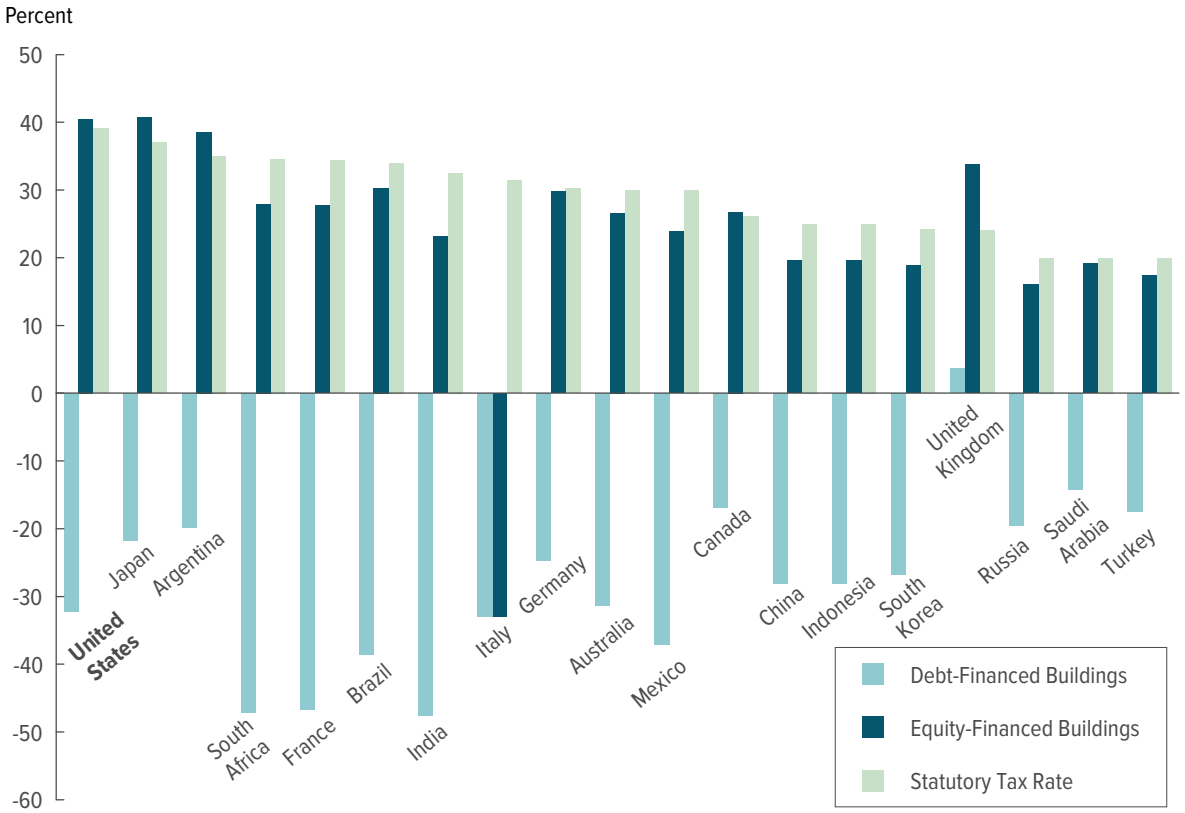
According to CBO's estimates, in 11 of the G20 countries in 2012, the present value of cost recovery allowances for equipment was greater than the present value of economic depreciation. The United States ranked fifth on that list. Canada's cost recovery allowances—which allowed businesses to deduct half of the cost of equipment in the year of its purchase—were the most advantageous to companies.

In eight G20 countries, by CBO's estimates, the present value of cost recovery allowances for equipment was less than economic depreciation. The two countries in which allowances had the lowest present value—Indonesia and India—were among those with the most advantageous cost recovery allowances for buildings (see Exhibit 11). Cost recovery allowances were below the present value of economic depreciation for buildings and for equipment in Argentina, the country with the highest overall effective corporate tax rate in 2012 (see Exhibit 8).

Although most G20 countries provided more advantageous cost recovery allowances for buildings than for equipment in 2012, according to CBO's estimates, the United States was one of the five countries in which the opposite was true. ◆

Exhibit 13.

Effective Corporate Tax Rates for Debt- or Equity-Financed Buildings in G20 Countries, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

Effective corporate tax rates for buildings were estimated under scenarios in which assets in each country were financed either entirely by debt or entirely by equity.

G20 = Group of 20.

Because the present value of U.S. cost recovery allowances for buildings in 2012 was less than the present value of economic depreciation, the effective corporate tax rate for equity-financed investments in buildings was slightly higher than the top U.S. statutory corporate income tax rate, CBO estimates. For investments financed solely with debt, the deductibility of interest along with the high statutory tax rate offset the low present value of cost recovery allowances and kept the effective corporate tax rate below zero (see Appendix A). The United States had the G20's fourth-lowest present value of cost recovery allowances for buildings, but it had the seventh-lowest effective corporate tax rate on debt-financed investments in buildings.

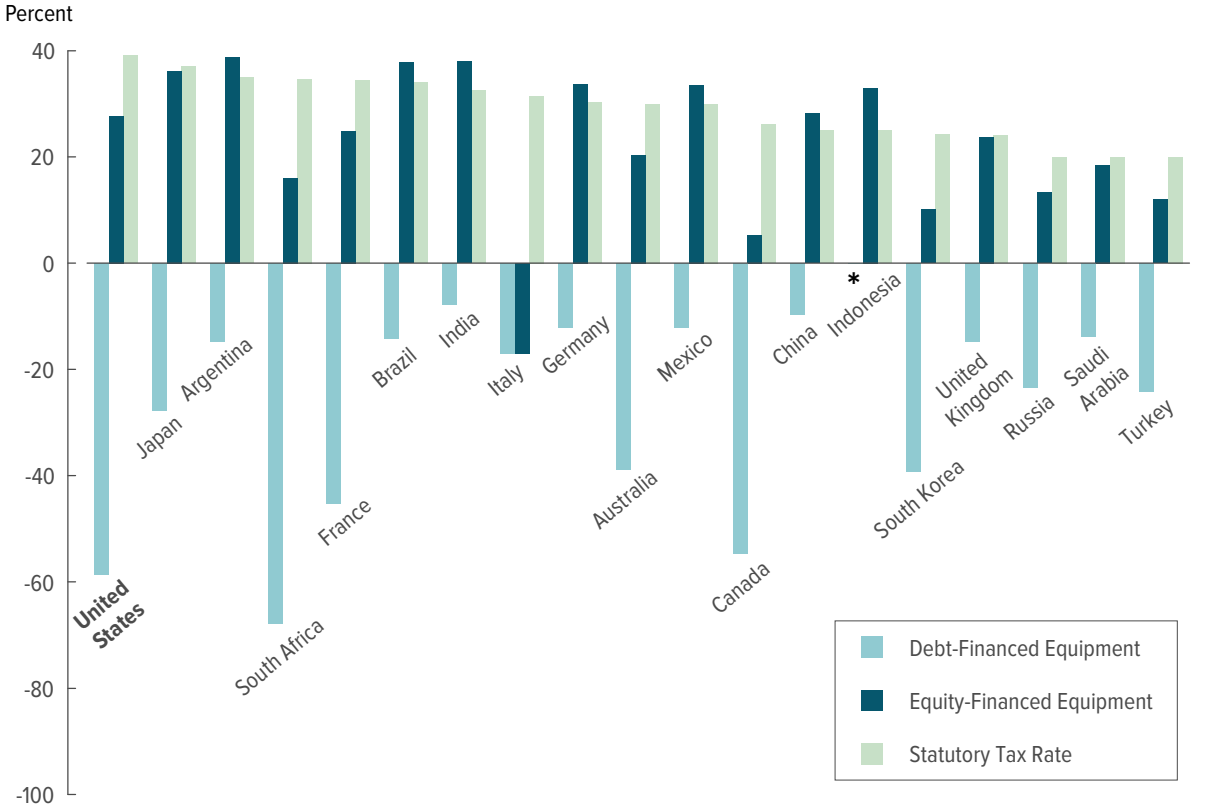
Italy's allowance for corporate equity resulted in a substantially negative effective corporate tax rate for equity-financed investments in buildings—by far the lowest among the G20 countries. Russia and Turkey had low statutory tax rates and a relatively high present value of cost recovery allowances, and thus they had the two lowest positive effective rates for equity-financed buildings.

For debt-financed buildings, effective corporate tax rates were negative in 2012 in all G20 countries other than the United Kingdom. India, South Africa, and France had high statutory rates and a high present value of cost recovery allowances, resulting in their having the lowest (most negative) rates, CBO estimates.

The United Kingdom's effective corporate tax rates for investments in buildings were among the highest in the G20, regardless of the method of financing, CBO estimates, because that country eliminated cost recovery allowances for buildings in 2011. ◆

Exhibit 14.

Effective Corporate Tax Rates for Debt- or Equity-Financed Equipment in G20 Countries, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

Effective corporate tax rates for equipment were estimated under scenarios in which assets in each country were financed either entirely by debt or entirely by equity.

G20 = Group of 20; * = between –1 percent and zero.

Because the United States offers relatively accelerated cost recovery allowances for investments in equipment, the effective corporate tax rate on such investments financed completely through equity was 11 percentage points lower than the country's top statutory corporate income tax rate in 2012, according to CBO's estimates, ranking it near the middle of the G20 countries. Seven G20 countries had effective rates for equity-financed investment in equipment that were above their top statutory tax rates. The United Kingdom's effective corporate tax rate and its top statutory rate were approximately the same.

For investments in equipment financed entirely by debt, effective corporate tax rates were negative in all G20 countries, according to CBO's estimates, because of the deductibility of interest. (For more information, see Appendix A.) The United States, with only the fifth most advantageous cost recovery allowances for equipment, had the second-lowest effective corporate tax rate on debt-financed investments in equipment because its higher statutory rate boosted the value of the interest deduction.

In Italy, there was no difference in the effective corporate tax rate that depended on the source of financing because it treated the costs of financing using debt and equity identically. ◆

Appendix A: Methodology and Data Sources

This document is an update and expansion of a 2005 report of the Congressional Budget Office that compared statutory and effective marginal corporate tax rates for the period from 1982 to 2003 in the United States with countries in the Organisation for Economic Co-operation and Development (OECD) or the Group of Seven (G7).[1] For this report, CBO compared statutory, average, and effective marginal corporate tax rates for the United States and the other countries in the Group of 20 (G20).[2]

Statutory Corporate Tax Rates

CBO's comparison of statutory corporate income tax rates for 2003 and 2012 was based on data from KPMG International and the OECD.[3] When those two sources differed in their assessment of a country's top statutory corporate tax rate, CBO selected the rate that best captured subnational taxes and the tax laws that were in effect for the relevant tax year.

Average Corporate Tax Rates

The average corporate tax rate on investment in a given country is the total amount of corporate income taxes that a company would pay to that country relative to the income it earns there:

$$\frac{\textit{Taxes paid to country of operation}}{\textit{Income in country of operation}} \qquad \text{(A-1)}$$

The ratio in Equation A-1 incorporates the effects of all provisions in a country's corporate income tax code.

Average corporate tax rates are sensitive to fluctuations in economic conditions. The ability to carry forward (that is, to defer) deductions of losses to a future year, for example, can result in low average tax rates for several years after an economic downturn. The average corporate tax rate also can depend on a company's recent rates of new investment because tax depreciation allowances are usually realized ahead of output gains from that investment. Those factors can create significant variations in average tax rates from year to year.

No comprehensive data sources provide enough data to use for estimating the average corporate tax rate that would be faced by a multinational corporation in a particular country if that business moved some or all of its operations to that jurisdiction. CBO developed two proxies to estimate those rates. For G20 countries other than the United States, it used data on the worldwide tax payments and worldwide income of U.S.-owned foreign corporations incorporated in each country to estimate the average corporate tax rate a multinational

1. See Congressional Budget Office, *Corporate Income Tax Rates: International Comparisons* (November 2005), www.cbo.gov/publication/17501. The OECD is an intergovernmental economic organization with 35 member countries. The G7 consists of Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

2. The G20 consists of Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, the United States, and the European Union (a group of 28 countries, including France, Germany, Italy, and the United Kingdom).

3. KPMG International, "Corporate Tax Rates Table" (accessed March 2, 2017), http://tinyurl.com/qbf9wmu; and Organisation for Economic Co-operation and Development, "OECD Tax Database: C. Corporate and Capital Income Taxes" (accessed March 2, 2017), Table II.1 (Corporate Income Tax Rates), http://tinyurl.com/pwnz24p.

corporation would face in that country. For the United States, CBO used data on the tax liabilities and income of foreign-owned U.S. corporations to estimate the average corporate tax rate a multinational corporation would face.

U.S.-Owned Foreign Corporations

CBO uses a specific type of business entity—the U.S.-owned foreign company—when it estimates average corporate tax rates for foreign countries. Because many U.S. companies channel their investments in foreign countries through such entities, the average corporate tax rates faced by those businesses are, in CBO's judgment, useful proxies for the incentives faced by companies that are deciding whether and where to undertake large or long-term investments.

This report defines U.S.-owned foreign companies as those that are incorporated in a country other than the United States but that have more than half of their stock owned by a single U.S. taxpayer; that group includes all foreign companies that are controlled by U.S. corporations.[4] For those companies, CBO used earnings and profits as a measure of income. For each country, CBO calculated average corporate tax rates by dividing total taxes paid by all U.S.-owned companies incorporated in that country by their current earnings and profits before income taxes.

$$\frac{\begin{array}{c}\textit{Taxes paid to country of incorporation} + \\ \textit{Taxes paid to other countries}\end{array}}{\begin{array}{c}\textit{Before-tax earnings and profits in country of incorporation} + \\ \textit{Before-tax earnings and profits in other countries}\end{array}} \quad \text{(A-2)}$$

Earnings and profits are a financial accounting measure used to gauge a company's economic ability to pay out distributions. That measure is similar to financial measures of net income but differs from taxable income in several ways. Earnings and profits include nontaxable and tax-exempt income but exclude certain items that cannot be deducted from taxable income. Additionally, certain types of income and deductions are treated differently by the generally accepted standards of financial accounting and by the tax code. Economic depreciation, for example, is deducted to calculate earnings and profits (depreciation is the decline in an asset's value as a result of wear and tear). Those deductions for economic depreciation may differ from the cost recovery allowances for depreciation specified by the tax code that are deducted to calculate taxable income.

For the current work, CBO estimated average corporate tax rates faced by U.S.-owned foreign corporations in 2004 and 2012 (the most recent year for which complete data were available at the time of this analysis).[5] Estimates were derived from data samples compiled by the Internal Revenue Service (IRS) from Form 5471, which U.S. taxpayers who are shareholders in such companies must attach to their income tax returns.[6] Changes in the composition of that sample probably contributed to the differences in the estimated average tax rates from 2004 to 2012.

Although the estimates are categorized by the country of incorporation, the estimates of average tax rates—based on the available data—reflect total income earned in all the countries in which businesses operate and the sum of the income taxes, including U.S. taxes, paid to those countries. The larger the scope of a U.S.-owned foreign company's operations in its country of incorporation relative to its business dealings in other countries, the more closely the estimates of average tax rates approximate the conceptual measure. Because CBO used those worldwide measures in this report, foreign average tax rate estimates to some extent also capture the effects of profit shifting—the movement of income from high-tax to lower-tax countries. If a corporation can reduce its corporate tax payments through profit shifting, that movement will result in a lower average corporate tax rate because the taxes paid will fall even though worldwide

4. The Internal Revenue Service's Statistics of Income Division compiles data on U.S.-owned foreign companies. The information published is available only for controlled foreign corporations that have more than half of their stock owned by a single U.S. taxpayer. For income tax purposes, however, the definition of a controlled foreign corporation is broader. U.S. taxpayers include citizens, residents (who are permitted to live and work permanently in the United States or who meet other residency requirements), domestic partnerships, corporations, trusts, and estates.

5. Although this report includes comparisons of the statutory rates and effective corporate tax rates in 2012 with those in 2003 (a year included in the 2005 CBO report), the data needed to compute *average* tax rates were not available for 2003. Also, for two countries, Indonesia and South Africa, the Internal Revenue Service's disclosure rules prevented the release of information for 2012, so 2010 values are reported for that year instead.

6. Information from the sample of Forms 5471 is publicly available for 2004, 2010, and 2012 at Internal Revenue Service, "SOI Tax Stats—Controlled Foreign Corporations" (2004 and 2010 data accessed May 23, 2014; 2012 data accessed March 10, 2016), http://go.usa.gov/x897D. The data used include national and subnational tax payments.

earnings and profits are relatively unaffected. The opportunities for tax avoidance may contribute to a country's appeal as an investment location.

Foreign-Owned U.S. Corporations

CBO's estimates of average tax rates in foreign countries were made on the basis of data about the foreign affiliates of U.S. multinational corporations. Had the necessary data been available to more fully evaluate companies' decisions about where to locate, CBO would have estimated the U.S. average tax rate for the U.S. affiliates of U.S. multinational corporations. However, such data were not available, so CBO instead measured the U.S. average tax rate on the basis of income and tax data for foreign-owned companies incorporated in the United States.

Tax returns filed by foreign-owned U.S. corporations contain information on taxable income and income taxes.[7] Unlike the information available on U.S.-owned foreign corporations, however, U.S. tax returns identify income earned in the United States and taxes paid to the U.S. federal government. The estimate of the U.S. average tax rate is, therefore, less affected by profit shifting than are the estimates of the average tax rates faced by U.S.-owned foreign companies. The U.S. average tax rate probably would be lower if it also had been estimated using worldwide income and taxes.

The ratio of U.S. federal tax payments to income that can be calculated directly from the IRS data would not be comparable to CBO's measure of the U.S. top statutory corporate tax rate because the top statutory corporate tax rate used in this report includes state taxes. In CBO's judgment, the inclusion of state taxes would increase the average corporate tax rate by the same percentage that those taxes increase the statutory corporate tax rate. CBO's estimates of the U.S. average corporate tax rate include such an adjustment for state tax payments.

Effective Marginal Corporate Tax Rates

An effective marginal corporate tax rate (in this report, an *effective corporate tax rate*) summarizes in a single number the features of the tax code that apply to the return generated from an investment in an asset over that asset's life span. An effective corporate tax rate measures the effect of taxes on the return from a marginal investment—that is, a prospective investment that earns just enough to yield the after-tax market rate of return (roughly the equivalent of the return on an index fund of corporate bonds or equities, depending on the source of financing).

In this report, CBO estimates effective corporate tax rates for the G20 countries, focusing on the way two features of tax systems—the statutory corporate tax rate and the treatment of depreciation—affect those rates. The approach for this report thus differs from earlier work in 2014 in which CBO's estimates of the effective tax rates on capital income in the United States reflected both individual and corporate taxation.[8] The 2014 report compared effective tax rates on capital income for different types of business entities, some of which—sole proprietorships and partnerships, for example—are not subject to corporate income tax, although their owners pay individual income taxes on their profits. The earlier report also gave estimates of effective tax rates for various assets and industries (as well as sources of financing, as in the current report). That study also examined some of the incentives for investing in a variety of assets and sectors in the United States.

This report examines a different question: What are the important tax considerations for corporations that are deciding on the best places to locate their foreign investments? CBO's answer is that the corporate tax rate for each country is the most relevant information to use in addressing that question. Individual tax rates in an investor's home country can affect the after-tax return on an investment because a corporation's income is taxed again at the individual level when that income is paid to investors as dividends and capital gains. However, individual-level taxes do not depend on an investment's location, and they are excluded from this study because they do not strongly influence corporations' decisionmaking about where to locate foreign investments.

The estimates of effective corporate tax rates do not account for all factors that influence companies' decisions about location. For example, CBO's computations did not account for the effects of tax treaties that might have consequences for decisionmaking about cross-border investment. Additionally, CBO's estimates focus on permanent

7. Taxable income consists of income from any source that is not specifically excluded by the tax code and is net of the costs of doing business, depreciation, and interest payments. Dividend payments, however, are not subtracted from total income before taxable income is calculated.

8. See Congressional Budget Office, *Taxing Capital Income: Effective Marginal Tax Rates Under 2014 Law and Selected Policy Options* (December 2014), www.cbo.gov/publication/49817.

provisions in the tax code and do not include temporary features, such as bonus depreciation in the United States.

Effective corporate tax rates are measured for a hypothetical company by calculating the difference between the return on the marginal investment before and after imposition of the corporate tax. That resulting difference is divided by the before-tax return to give the effective corporate rate of tax on a marginal investment:

$$ETR = \frac{r_p - R}{r_p} \qquad \text{(A-3)}$$

where ETR is the effective corporate tax rate, r_p is the before-tax real return on investment (that is, the before-tax return as adjusted for inflation), and R is the after-tax real return. Thus, if the before-tax return on an investment is 5 percent and corporate taxes reduce the return to 4 percent, the effective corporate tax rate is 20 percent.

The before-tax return (r_p) for equity-financed investment is computed as follows:

$$r_p = \frac{(R + \delta)(1 - \tau_c z)}{1 - \tau_c} - \delta \qquad \text{(A-4)}$$

where R is also the company's discount rate, δ is the economic depreciation rate, τ_c is the corporate tax rate, and z is the present value of cost recovery allowances.[9] The expression $R + \delta$ is the cost of paying investors' returns and recovering the value of capital lost through depreciation. The expression $1 - \tau_c z$ adjusts those costs for the value of the tax system's cost recovery allowance—the adjustment to taxable income that accounts for depreciation—for an asset over time. The product of those values, divided by $1 - \tau_c$, is the before-tax profit that must be earned to cover taxes, investors' returns, and depreciation. Subtracting δ limits the profit to just that needed to cover investors' returns and corporate taxes.

In deciding whether to invest another dollar in a project, a company compares the present value of the after-tax return on that investment with the amount it would earn from lending those funds to another investor. In that respect, R represents both the discounting factor that the company used to make the decision and the resulting after-tax real return in the effective corporate tax rate formula. The company is indifferent between investing in the project and saving that amount if the after-tax returns from the two choices are equal.

The source of a company's financing affects estimates of effective corporate tax rates. The formula in Equation A-4 is used to measure the effective corporate tax rate of a company that finances an investment with its own equity. If the company instead uses debt to finance the investment, in most G20 countries the nominal return (that is, without accounting for inflation) is deducted. Therefore, the company's discount rate must account for the deduction of nominal interest, and the before-tax return includes the inflation rate (i):

$$r_p = \frac{((R + i)(1 - \tau_c) - i + \delta)(1 - \tau_c z)}{(1 - \tau_c)} - \delta \qquad \text{(A-5)}$$

Two G20 countries, Brazil and Italy, are among those nations that have moved toward equalizing the tax treatment of debt and equity by introducing a deduction for the return on equity.[10] Since 1995, Brazil has allowed corporations to pay shareholders interest on net equity. Such payments can be deducted from taxable income and so provide a partial deduction for the return on equity. There is no deduction, however, for any portion of the return on equity that is retained or paid out as standard dividends. Although companies could pay out the full return on equity and then issue new shares to finance investment, many corporations do not pay out the full return on equity.[11] Tax preferences in the individual income tax system make it advantageous for shareholders to receive dividends instead of interest on net equity. Although individual-level taxes are not included in CBO's estimates of effective corporate tax rates, those preferences probably would cause investors to require a higher before-tax return if they expected to receive the return on their investment as interest on net equity. For companies, that higher return

9. See Robert E. Hall and Dale W. Jorgenson, "Tax Policy and Investment Behavior," *American Economic Review*, vol. 57, no. 3 (June 1967), pp. 39–414, www.jstor.org/stable/1812110. A present value is a single number that expresses a flow of current and future income or payments in terms of an equivalent lump sum received or paid at a specific time. The present value depends on the rate of interest—the discount rate—that is used to translate future cash flows into current dollars. For example, if $1,000 is invested on January 1 at an annual interest rate of 5 percent, it will increase to $1,050 by January 1 of the following year. At an annual 5 percent discount rate, the present value of $1,050 payable a year from today is $1,000.

10. Another way to equalize the treatment of debt and equity is to disallow the deduction for interest payments, an approach usually referred to as a comprehensive business income tax. See Department of the Treasury, *Report of the Department of the Treasury on Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once* (1992), http://go.usa.gov/x8yJ9 (PDF, 2.6 MB).

11. See Alexander Klemm, *Allowances for Corporate Equity in Practice*, Working Paper 06/259 (International Monetary Fund, 2006), http://tinyurl.com/jgkgxzu (PDF, 455 KB).

would offset the benefit of the deduction. Because of those offsetting factors, in CBO's judgment, the tax treatment of the return on equity in Brazil was less generous than the treatment of the return on debt and thus comparable to that in nearly every other G20 country. If companies in Brazil could benefit from the deduction for interest on net equity, the estimated effective corporate tax rate would be lower.

Over the past two decades, Italy has moved toward equalizing the treatment of debt and equity. Between 1997 and 2003, Italy applied a lower tax rate to the return on equity. CBO excluded that lower rate from its computations of Italy's 2003 effective corporate tax rate because that measure was forward looking and the deduction was already being phased out in 2003. In 2012, Italy adopted an allowance for corporate equity that was intended to equalize the treatment of debt and equity by allowing companies to deduct the "notional return" on new equity. The rate on such a return is based on the average returns on Italian treasury bonds and initially was set at 3 percent, then at 4 percent in 2014, and at 4.5 percent in 2015. The rate does not equal the nominal return of 7.5 percent that CBO used to estimate effective corporate tax rates. However, to capture the intended effect of the legislation, the estimate for Italy allows for the full deduction of the nominal return. CBO used the same formula to determine the before-tax return for investments financed by debt or by equity. The resulting effective corporate tax rates for debt-financed and equity-financed investments are thus the same—a negative estimated rate (–23.5 percent) for Italy in 2012. That estimate would be less negative if the actual rate of return in Italy was greater than the notional rate of return.

Key Parameters for Calculating Effective Corporate Tax Rates

For this analysis, CBO estimated effective corporate tax rates in 2003 and 2012 for each of the G20 countries. Because of changes in some parameters, such as the after-tax real return and the rate of inflation, the estimates for 2003 differ somewhat from those reported by CBO in 2005.[12]

To estimate effective corporate tax rates, CBO varied just two features of the tax systems from country to country: the top statutory tax rate under a country's tax system and its cost recovery allowances.[13] Interest rates, inflation, and economic depreciation were set to be the same for all countries, and changing the value of each of those parameters—either by making that value the same for all countries or by incorporating the economic conditions in each country—affected both the level of each country's effective corporate tax rate and the ranking of the countries examined. (For more information, see Appendix B.)

After-Tax Real Return (R). The after-tax real return was set at 5 percent and held constant for all countries. The after-tax real return on a company's marginal investment is equal to the amount that the company would earn from lending the funds to another investor. That rate probably would be similar to the real lending interest rate. Among the G20 countries for which it was available, that interest rate had a median of 3.2 percent in 2012—ranging from –3.4 percent in Argentina to 30 percent in Brazil.[14] The same after-tax real return was used for both debt and equity.

Inflation Rate (i). CBO set the inflation rate at 2.5 percent and held it constant for all countries. Actual inflation rates in the G20 countries for 2012 ranged from –0.9 percent in Japan to 18.7 percent in Argentina.[15] The median rate was 2.4 percent for all G20 countries that year.

12. Congressional Budget Office, *Corporate Income Tax Rates: International Comparisons* (November 2005), www.cbo.gov/publication/17501.

13. CBO derived most of the information on cost recovery allowances from work by other researchers. See Katarzyna Bilicka and Michael Devereux, *CBT Corporate Tax Ranking 2012* (Oxford University Centre for Business Taxation, June 2012), http://tinyurl.com/j9dlyjl (PDF, 529 KB); and Katarzyna Bilicka, Michael Devereux, and Clemens Fuest, *G20 Corporate Tax Ranking 2011* (Oxford University Centre for Business Taxation, July 2011), http://eureka.sbs.ox.ac.uk/3512. Details on the cost recovery allowances are found in the appendixes to those reports. The particulars of the tax treatment of depreciating assets in each of the G20 countries are described in a database maintained by the Oxford University Centre for Business Taxation, "CBT Tax Database" (accessed March 2, 2017), http://tinyurl.com/h9xassb; and in a separate Appendix C for Bilicka, Devereux, and Fuest, see Oxford University Centre for Business Taxation, "Reports, G20 Corporate Tax Ranking 2011" (accessed March 2, 2017), http://tinyurl.com/zwqja3r.

14. The interest rate is the real lending interest rate, which is not available for all G20 countries. See World Bank Economic Indicators, "Real Interest Rate (%)" (accessed September 17, 2014), http://data.worldbank.org/indicator/FR.INR.RINR

15. See World Bank Economic Indicators, "Inflation, GDP Deflator (Annual %)," (accessed August 14, 2015), http://tinyurl.com/2dym8p9.

Table A-1.

Tax Treatment of Depreciation for Selected Types of Assets

Asset	Treatment
Buildings	Cost Recovery Allowance
Equipment	Cost Recovery Allowance
Intangible	Expensing
Inventories	None

Source: Congressional Budget Office.

A cost recovery allowance is a deduction from taxable income for the loss in value that is attributable to an asset's depreciation. Expensing permits a company to deduct the full cost of an asset from taxable income in the year the asset is purchased. Because inventories are treated as unfinished goods until they are sold, there is no tax allowance for depreciation.

Economic Depreciation (δ). Different assets can depreciate at different rates. For this analysis, CBO measured economic depreciation on the basis of studies of effective corporate tax rates in G20 countries from the Oxford University Centre for Business Taxation (CBT), which used annual economic depreciation rates of 3.1 percent for buildings, 17.5 percent for equipment, and 15.3 percent for intangible assets (assets that are not physical, such as patents or trademarks).[16]

Corporate Tax Rate (τ_c). For this analysis, CBO followed the practice it outlined in 2005 of using each country's top combined (national and local) corporate tax rate.[17] The top national rate was the statutory rate on income in the highest tax bracket. In 2012, most G20 countries had a flat tax rate that applied to all taxable corporate income. The local rate was the average of the highest rates set by subnational governments in a given country. Only in Canada, Germany, Japan, South Korea, and the United States among the G20 countries were corporations taxed at the subnational level.

Present Value of Cost Recovery Allowances (z). In all G20 countries, companies generally can claim cost recovery allowances to cover the loss in value of buildings and equipment over time (see Table A-1). Each country's tax code sets a fixed time span over which those allowances can be claimed, and the periods may differ by investment type. Thus, the present value of any future tax deductions for recovering the cost of the asset is included in determining the return a company must earn on its investment to cover taxes. Information on cost recovery allowances, by type of investment, in each G20 country for 2003 and 2012 was available from a data set compiled by CBT.[18] The researchers attempted to identify each country's tax treatment of buildings (deemed to have a useful life of 25 years) and equipment (deemed to have a useful life of 7 years).

Some countries use other methods to address the depreciation of assets. In some cases, taxpayers can expense the full cost of an asset by means of a deduction in the year of purchase. For a marginal investment, expensing eliminates any tax liability because all of the expected returns on that investment are offset by that onetime deduction. To simplify the calculations underlying the analysis presented in the exhibits in this report, all intangible

16. See Katarzyna Bilicka and Michael Devereux, *CBT Corporate Tax Ranking 2012* (Oxford University Centre for Business Taxation, June 2012), http://tinyurl.com/j9dlyjl (PDF, 529 KB); and Katarzyna Bilicka, Michael Devereux, and Clemens Fuest, *G20 Corporate Tax Ranking 2011* (Oxford University Centre for Business Taxation, July 2011), http://eureka.sbs.ox.ac.uk/3512. Those depreciation rates for buildings and equipment are slightly higher than the rates CBO used to estimate effective tax rates on capital income in the United States. See Congressional Budget Office, *Taxing Capital Income: Effective Marginal Tax Rates Under 2014 Law and Selected Policy Options* (December 2014), www.cbo.gov/publication/49817. In a 2006 study, the Bureau of Economic Analysis used a 15 percent rate for economic depreciation for intangible assets. That agency has recently undertaken research to refine its estimates of the depreciation of intangible property. Although its initial findings display a wider range of rates for various categories of intangible assets, the research continues and includes categories with depreciation rates within 5 percentage points of CBO's rate. See Wendy C.Y. Li, *Depreciation of Business R&D Capital* (Bureau of Economic Analysis, October 2012), http://tinyurl.com/jkmbr22 (PDF, 550 KB).

17. See Congressional Budget Office, *Corporate Income Tax Rates: International Comparisons* (November 2005), Chapter 2, www.cbo.gov/publication/17501. For the data used in the present analysis, see KPMG International, "Corporate Tax Rates Table" (accessed March 2, 2017), http://tinyurl.com/qbf9wmu; and Organisation for Economic Co-operation and Development, "OECD Tax Database: C. Corporate and Capital Income Taxes" (accessed March 2, 2017), Table II.1 (Corporate Income Tax Rates), http://tinyurl.com/pwnz24p.

18. See Katarzyna Bilicka and Michael Devereux, *CBT Corporate Tax Ranking 2012* (Oxford University Centre for Business Taxation, June 2012), http://tinyurl.com/j9dlyjl (PDF, 529 KB).

assets are treated as though they are subject to expensing. Because inventories are viewed as unfinished goods until they are sold, tax codes do not offer any adjustment for wear and tear on those assets.

Method of Financing. In the current work, CBO follows CBT's assessment that 35 percent of an investment in buildings, equipment, and intangible assets was financed by debt and that the rest was financed by equity. Inventories were financed entirely by equity.

Total Effective Corporate Tax Rate

To compute the overall effective corporate tax rate, CBO first calculated the rates for four categories: buildings, equipment, intangible assets, and inventories. Except as otherwise noted, the estimates of effective corporate tax rates in this report were based on the allocation of assets in the United States and weighted as follows to represent the share of total capital: 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories. The value of tangible assets was based on an average of data gathered from the Federal Reserve's Financial Accounts of the United States (a comprehensive set of accounts that includes detail on the assets and liabilities of households, businesses, and governments) for 2000 through 2012.[19] CBO obtained the value of intangible assets in 2003 from an earlier Federal Reserve study.[20] The value of intangible assets was added to the value of nonfinancial assets of corporate businesses to determine total allocable assets.

The share of intangible assets is based on data that are older than those used to determine the value of tangible assets, and, because companies are spending more money now on intangible assets than they did in 2003, more recent data would probably indicate a larger share of capital investments in intangible assets today. Because investments in intangible assets were considered to be expensed for this analysis, an increase in the share of such assets would have resulted in lower effective corporate tax rates than those shown in this report.

CBO gave greater weight than did CBT to the share of capital associated with intangible assets and less to the share attributed to inventories. Those researchers used shares of 8.7 percent for intangible assets and 41.7 percent for inventories.[21] That higher share allocated to inventories is inconsistent with OECD data on assets and inventories, which showed inventories' accounting for between 5 percent and 15 percent of the nonfinancial assets of corporate businesses in 2012.[22] (Appendix B gives estimates of effective corporate tax rates using CBT's allocation.)

Measuring Effective Corporate Tax Rates for Intangible Assets and Inventories

The tax treatment for intangible assets and inventories differs from that for buildings and equipment. The methodology for estimating effective corporate tax rates therefore was modified to account for the special provisions that apply to those two asset types.

Intangible Assets. Intangible assets include copyrights, patents, and goodwill (the value of a company's brand name, customer base, and its relationships with its employees). Because intangible assets are not physical, their value is more difficult to determine than is the value of any other type of asset.

In the United States, the tax system treats various types of investments in intangible assets differently. Some costs—such as those for advertising to create or maintain a brand—are expensed immediately. Other tax preferences, including the research and experimentation credit in the United States, can be used to offset the costs of some investments.

For this report, CBO applied the same treatment of intangible assets for all G20 countries: All such investments were expensed, and no additional subsidies were provided. (Appendix B gives

19. See Federal Reserve Board, *Financial Accounts of the United States-Z.1*, Data Download Program, Table B.103 (A) Balance Sheet of Nonfinancial Corporate Business, http://go.usa.gov/x9grh.

20. Carol Corrado, Charles Hulten, and Daniel Sichel, *Intangible Capital and Economic Growth*, Finance and Economics Discussion Series 2006-24 (Federal Reserve Board, April 2006), Table 3, http://go.usa.gov/x9gYq.

21. See Katarzyna Bilicka and Michael Devereux, *CBT Corporate Tax Ranking 2012* (Oxford University Centre for Business Taxation, June 2012), http://tinyurl.com/j9dlyjl (PDF, 529 KB).

22. See Organisation for International Co-operation and Development, "Detailed National Accounts: Balance Sheets for Non-Financial Assets" (accessed September 17, 2014), http://dx.doi.org/10.1787/data-00368-en.

estimates of effective corporate tax rates that more fully reflect the tax treatment of expenditures on research and experimentation in the G20 countries.)

Inventories. Inventories are inputs—steel purchased by an automaker to manufacture cars or stock held by retailers, for example—that are purchased and stored for later use. In all G20 countries, inventories are considered unfinished goods that are not taxed until sold. When inventories or the products made from them are sold, the costs of the inputs used in their production are deductible against the income from the sale. As a result, the before-tax return on inventories is calculated differently from that on other assets because their holders are not permitted to take cost recovery allowances for any loss in value for the purpose of determining taxable income.

The marginal investment in inventories by a profit-maximizing company was anticipated to cover the amount that a company must pay to the lenders who financed the original purchase and the taxes it must pay on the value of sales attributable to the inventories. More specifically, a corporation's marginal investment of $1 held for some fixed number of years must appreciate by enough to earn the amount needed to pay taxes on the increase in value and still leave enough to cover the company's cost of funds (r).

CBO judged the typical holding period for inventories to be about 20 weeks on the basis of the observed ratio of 39 percent for the total end-of-year inventories to final sales per year in the United States from 2000 through 2012.[23] A briefer holding period would cause CBO's estimates of effective corporate tax rates on inventories to decline.

Because Italy's allowance for corporate equity applied to new equity alone, CBO's estimate of Italy's effective corporate tax rate on inventories does not incorporate a deduction for the return on equity; doing so would result in an overall effective corporate tax rate that was even more negative.

23. Council of Economic Advisers, *Economic Report of the President*, Tables B-8, B-22 (March 2013), http://tinyurl.com/hlnz3do.

Appendix B: The Sensitivity of Estimates of Effective Marginal Corporate Tax Rates to Certain Analytical Choices

The estimates of effective marginal corporate tax rates (in this document, *effective corporate tax rates*) that the Congressional Budget Office developed for this report were particularly sensitive to a set of analytical choices incorporated into the agency's methodology. The scenarios developed for this portion of CBO's analysis encompassed the following conditions:

- Nearly half of all assets consisted of buildings, with smaller shares attributable to equipment, intangible assets, and inventories;
- The rate of inflation was 2.5 percent for all countries;
- The split for financing of investments was 35 percent for debt and 65 percent for equity; and
- No investment subsidies other than cost recovery allowances were provided under any country's tax system.

The figures in this appendix illustrate the differences in estimated effective corporate tax rates that would result from changing some element of each of those analytical choices.

Asset Allocation

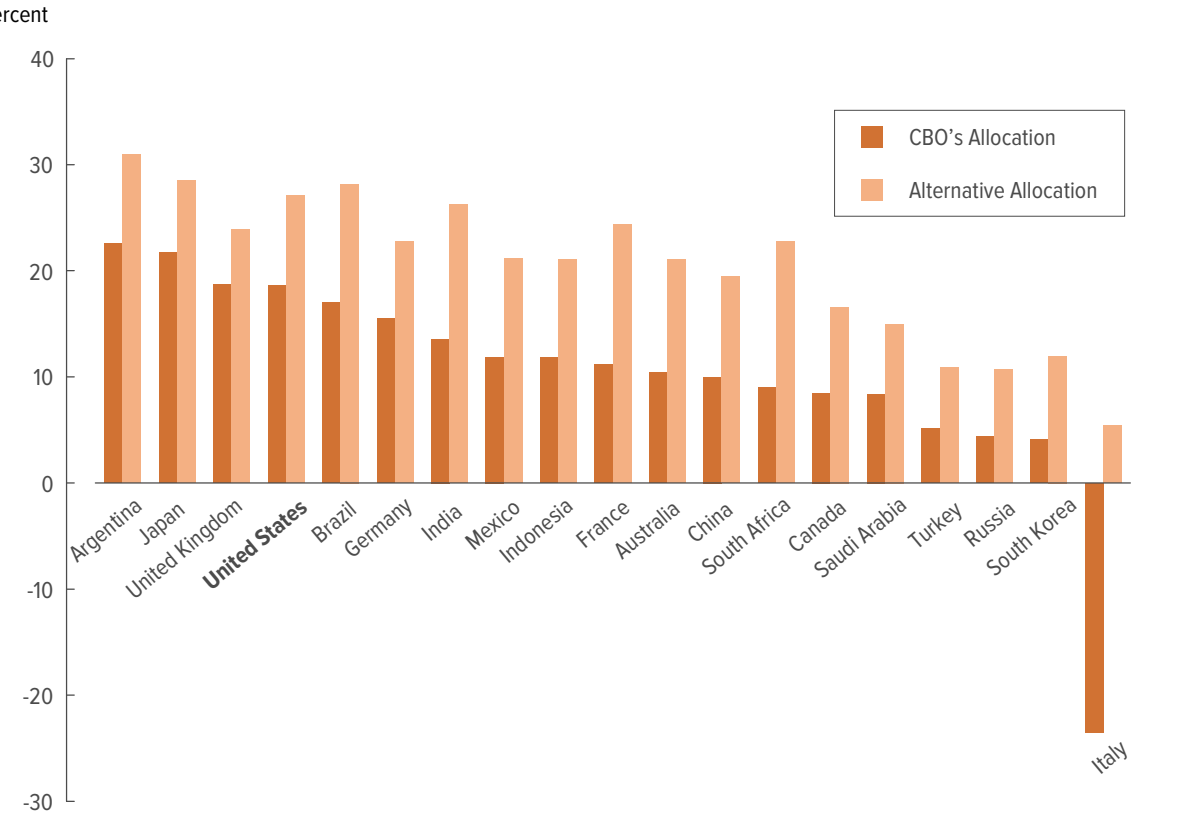
The actual allocation of investments in capital assets varies from one country to another for several reasons. Specific factors—for example, the educational attainment of the population or the abundance or scarcity of natural resources—influence businesses' decisionmaking about investing in particular types of assets. A country's tax code also influences such choices. Many tax systems give preferential treatment to investments in intangible assets, such as patents or trademarks, typically in one of two ways: Either they allow full expensing by, for example, allowing businesses to subtract the cost of advertising from their taxable income for the same year in which the expenses are incurred, or they offer large subsidies in the form of research and experimentation tax credits, for example. Tax preferences for intangible assets can result in a very low, or even negative, effective corporate tax rate on the return from an investment in intangible assets. The return on an investment in inventories, by contrast, is generally taxed at or close to the statutory corporate tax rate.

Drawing on data from the Federal Reserve for U.S. companies (see Appendix A), CBO determined the shares of total assets for this analysis as follows: 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories.[1] Other researchers have used an alternative allocation, with a much smaller percentage for buildings and a much larger percentage for inventories: 24.0 percent for buildings, 25.6 percent for equipment, 8.7 percent for intangible assets, and 41.7 percent for inventories.[2] Those weights are based on data from European companies' financial reports. However, the larger share allocated to inventories is inconsistent with

1. See Federal Reserve Board, *Financial Accounts of the United States-Z.1*, Data Download Program, Table B.103 (A) Balance Sheet of Nonfinancial Corporate Business, http://go.usa.gov/x9grh.
2. See Katarzyna Bilicka and Michael Devereux, *CBT Corporate Tax Ranking 2012* (Oxford University Centre for Business Taxation, June 2012), http://tinyurl.com/j9dlyjl (PDF, 529 KB).

Figure B-1.

Effective Corporate Tax Rates With Alternative Allocations of Asset Shares in G20 Countries, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

CBO estimated effective corporate tax rates under one of two distributions of investment in various asset types. In the first case, CBO used the U.S. allocation: 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories. For the alternative allocation, the shares were 24.0 percent for buildings, 25.6 percent for equipment, 8.7 percent for intangible assets, and 41.7 percent for inventories. Other factors were held the same for all countries: All assets were financed 35 percent by debt and 65 percent by equity, expenditures on intangible assets were subtracted from taxable income immediately in the year of purchase with no additional subsidies provided for such investments, and the rate of inflation was 2.5 percent.

G20 = Group of 20.

data from the Organisation for Economic Co-operation and Development on assets and inventories, which showed that inventories accounted for between 5 percent and 15 percent of the nonfinancial assets of corporate businesses in 2012. The divergence between the two allocations results in calculated effective corporate tax rates that differ by as much as 29 percentage points (see Figure B-1). Effective corporate tax rates for all countries in the Group of 20 (G20) are higher under the alternative allocation, which gives greater weight to inventories, which typically are subject to effective corporate tax rates that are close to the statutory rates.[3] The increase differs from one country to another because of differences in statutory tax rates and cost recovery allowances.

Inflation

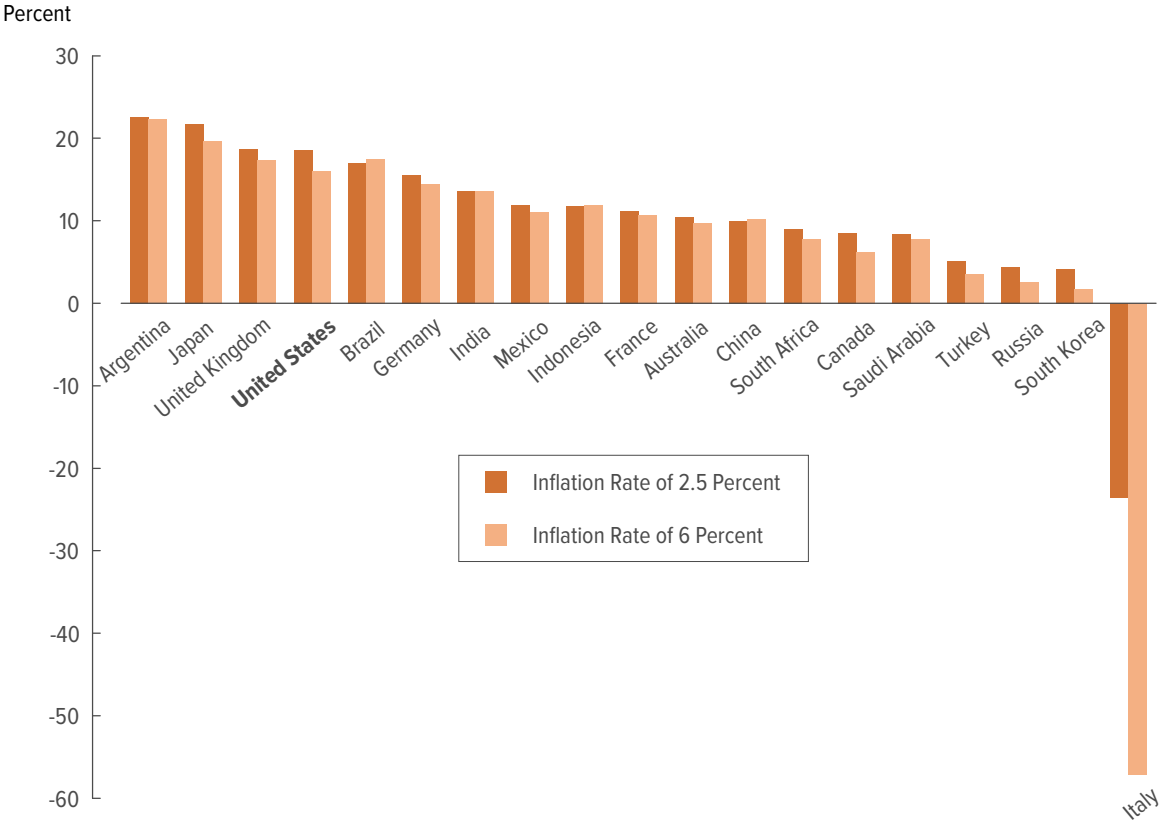
CBO's estimates of effective corporate tax rates are sensitive to the choice of an inflation rate because of the divergent effects of inflation on the value of interest deductions and cost recovery allowances. Depending on which provision dominates, a higher rate of inflation causes effective corporate tax rates either to fall or to rise.

First, inflation boosts interest rates and thereby increases the nominal value of interest payments. When companies can subtract interest payments

3. The G20's members include Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, and the United States. The European Union—which consists of 28 countries, including France, Germany, Italy, and the United Kingdom—is a member of the G20 as well.

Figure B-2.

Effective Corporate Tax Rates With Alternative Rates of Inflation in G20 Countries, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

CBO estimated effective corporate tax rates for conditions under which the rate of inflation in all countries was either 2.5 percent or 6 percent. Three factors were held the same for all countries: All assets were financed 35 percent by debt and 65 percent by equity; the allocation of total assets was 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories; and expenditures on intangible assets were subtracted from taxable income immediately in the year of purchase with no additional subsidies provided for such investments.

G20 = Group of 20.

from taxable income, their tax liabilities and effective corporate tax rates fall when there is a general increase in prices. Because the value of deductions rises with the statutory rate, effective corporate tax rates for debt-financed investments drop more steeply in high-tax countries than in countries with lower statutory rates when inflation is higher.

Inflation also reduces the value of cost recovery allowances, which are based on an asset's purchase price, not on its current price. When inflation increases, the value of the cost recovery allowance declines, causing effective corporate tax rates to rise.

The estimates provided in this report were based on a fixed inflation rate of 2.5 percent in all G20 countries. That rate is the approximate median for those countries in 2012. Actual rates for the year, however, ranged from –0.9 percent in Japan to 18.7 percent in Argentina. Excluding those two outliers, the range was 1.0 percent to 7.6 percent.

To examine the influence of inflation, CBO also estimated effective corporate tax rates in the G20 countries, using a rate of inflation of 6 percent (see Figure B-2). The higher rate resulted in lower effective corporate tax rates in most countries, suggesting that the increase in nominal interest deductions in those countries at least offset the loss in the value of cost recovery allowances. The changes in effective corporate tax rates generally were small, but the higher inflation rate had some effect on the overall ranking of countries. For example, at an inflation rate of 2.5 percent, the United States had the fourth-highest effective corporate tax rate. With an assumed inflation rate of 6 percent, that ranking dropped to fifth because the high U.S. statutory rate made the increased nominal interest deductions relatively more valuable.

CBO based its estimates of effective corporate tax rates on a scenario in which economic and other nontax factors were the same for all G20 countries. Companies' investment decisions, however, typically account for a variety of characteristics that are specific to the country. Actual inflation rates vary from country to country, and each country's decisions about tax policy reflect specific expectations, including those concerning domestic inflation. Therefore, accounting for differences in inflation that would be expected for various countries could be a better way to capture policymakers' targets for their country's effective corporate tax rates. International variations in inflation, however, have effects that cannot be captured by the simplified model that CBO and some other researchers have used.[4] At higher rates of inflation, the demand for loans in lieu of equity increases because of the deductibility of interest payments. A more comprehensive model would allow adjustments to the mix of debt and equity used to finance investments and would include the effect on real (inflation-adjusted) interest rates of that increased demand for debt.

That relationship between inflation and the demand for loans suggests that if country-specific inflation rates were included in estimates of effective corporate tax rates, the scenarios should reflect the debt-and-equity mix in each country. For most G20 countries, however, information on the financing mix is not available. Moreover, investments in countries with high inflation rates may carry higher risk that cannot be captured in a simplified model that does not include some measure for risk. If investors require a higher real rate of return in exchange for risk, then including variation in inflation rates among countries in the model also would require reevaluating whether the real rate of return is the same for all countries.

To examine the effects of variation in expected inflation rates from one country to another, CBO used its simplified model to estimate effective corporate tax rates using each country's actual inflation rate in 2012 as a proxy for expected inflation (see Figure B-3).[5] For most countries, including the United States, that change had little effect on the effective corporate tax rate. Using each country's actual inflation rate did, however, cause some changes in the relative rankings of the countries because of the effect of inflation on after-tax nominal returns on investments in each country. Argentina's extremely high inflation rate of 18.7 percent in 2012, for example, led to a dramatic reduction in the estimate of that country's effective corporate tax rate. With inflation set at 2.5 percent, Argentina had the highest effective corporate tax rate, but it fell to ninth among the G20 countries using the actual inflation rate for 2012. Although Japan rose to first among the G20 countries when the rate of inflation was changed from the G20's median rate of 2.5 percent to its actual rate for 2012 of –0.9 percent (the lowest among all G20 countries in that year), Japan's effective corporate tax rate actually dropped by 1.2 percentage points, from 21.7 percent to 20.5 percent.

Financing

Companies' financing choices are influenced by the tax treatment of debt and equity because the interest payments they make to lenders generally are deductible, whereas dividends paid to stockholders are not. However, a country's capital markets and its social attitudes toward leveraging also influence decisions about how to finance investment. Largely because of those factors, companies in different countries vary notably in their reliance on debt. Among the European Union countries, debt-to-asset ratios (that is, the share of assets financed by debt) in 2007 ranged from 40 percent for Luxembourg to 68 percent for Italy.[6] (Data on

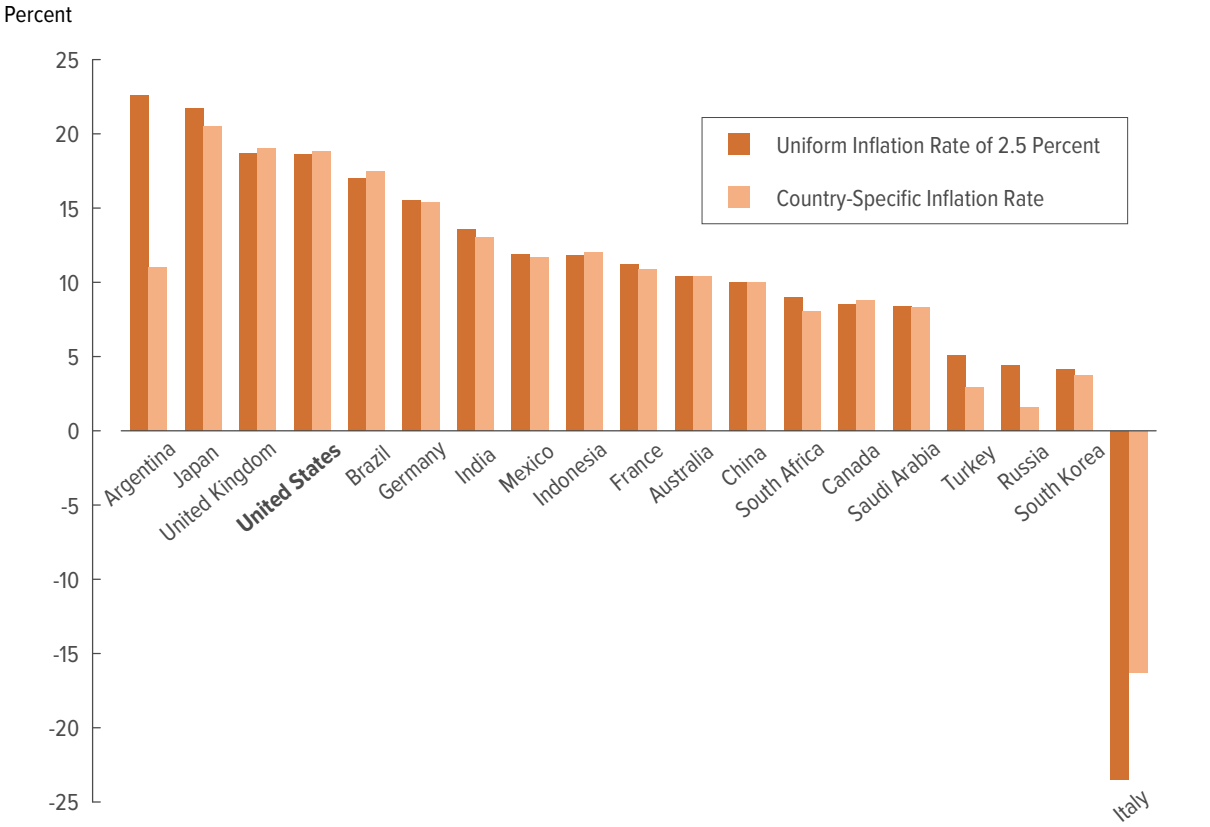
4. CBO follows an approach that uses cost-of-capital equations to determine effective tax rates on investments. See Mervyn A. King and Don Fullerton, "The Theoretical Framework," in King and Fullerton, eds., *The Taxation of Income From Capital: A Comparative Study of the United States, the United Kingdom, Sweden, and West Germany* (University of Chicago Press, 1984), pp. 7–30, http://tinyurl.com/gum5hn6. Although those researchers allowed inflation rates to vary in one set of estimates, their model did not account for the effects on capital markets. Other work has allowed inflation rates to vary but has not accounted for the effects on capital markets. See, for example, Duanjie Chen and Jack Mintz, *2013 Annual Global Tax Competitiveness Ranking: Corporate Tax Policy at a Crossroads,* SPP Research Papers 6-35 (University of Calgary, November 2013), http://tinyurl.com/hnlb36m; and Michael P. Devereux and others, "Corporate Income Tax Reforms and International Tax Competition" *Economic Policy*, vol. 17, no. 35 (October 2002), pp. 449–495, http://www.jstor.org/stable/1344772.

5. Each country's actual inflation rate is set to be equal to the 2012 value as shown in World Bank, "Inflation, GDP Deflator (Annual %)" (accessed August 14, 2015), http://tinyurl.com/2dym8p9.

6. See Ruud A. de Mooij and Michael P. Devereux, *Alternative Systems of Business Tax in Europe: An Applied Analysis of ACE and CBIT Reforms*, Taxation Paper 17 (European Commission, 2009), Figure 3.2, http://tinyurl.com/h79rkk3.

Figure B-3.

Effective Corporate Tax Rates With Uniform and Country-Specific Rates of Inflation in G20 Countries, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, the Oxford University Centre for Business Taxation, and the World Bank.

CBO estimated effective corporate tax rates for conditions under which the rate of inflation in all countries was either 2.5 percent or the country's actual rate of inflation for 2012. Three factors were held the same for all countries: All assets were financed 35 percent by debt and 65 percent by equity; the allocation of total assets was 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories; and expenditures on intangible assets were subtracted from taxable income immediately in the year of purchase with no additional subsidies provided for such investments.

G20 = Group of 20.

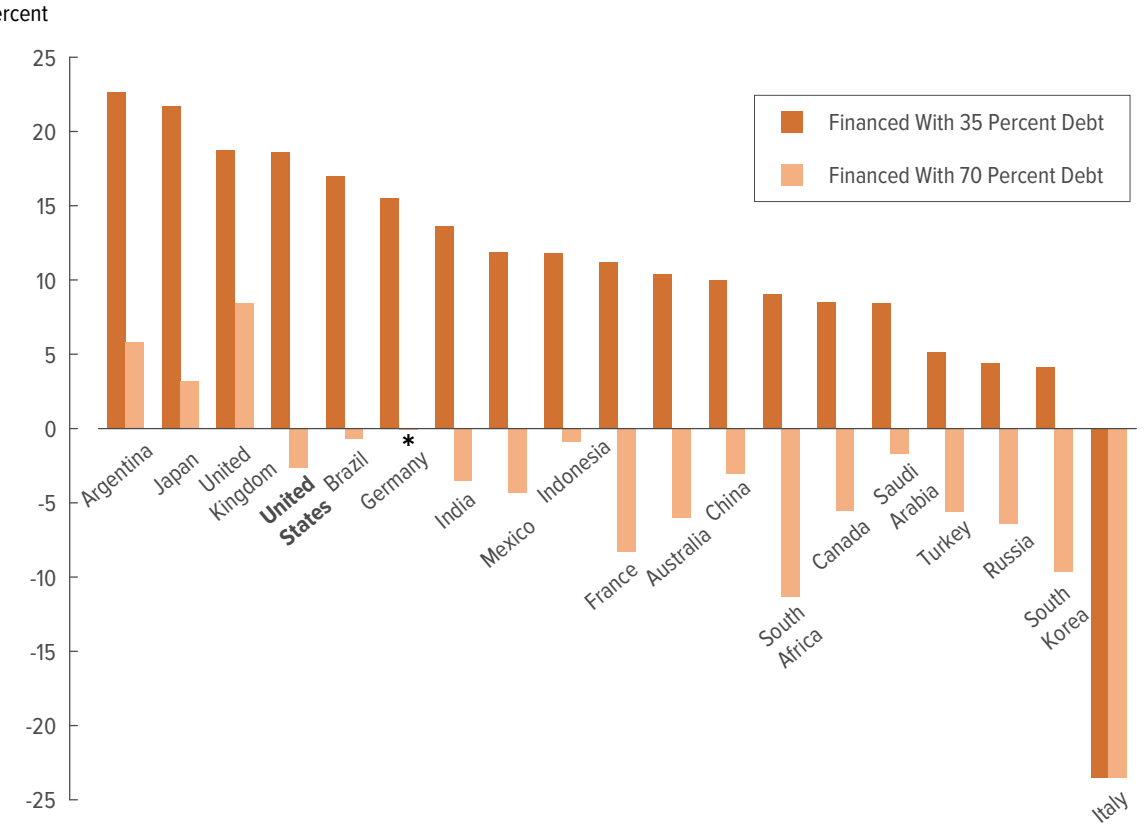
those ratios were not readily available for more recent years or for countries outside the European Union.) For the countries in both the European Union and the G20—Italy, Germany, France, and the United Kingdom—debt-to-asset ratios were higher (68 percent, 63 percent, 58 percent, and 66 percent, respectively) than the 35 percent used in CBO's main analysis.[7]

CBO also estimated effective corporate tax rates under a scenario with a much higher share—70 percent—of financing derived from debt. This alternative scenario resulted in much greater differences from the basic analysis than did the variations in asset mix and inflation rates. Increasing the debt-to-asset ratio by 35 percentage points caused effective corporate tax rates to fall by more than 10 percentage points in all G20 countries except Italy; the largest reduction—21 percentage points—occurred in the rate for the United States (see Figure B-4). Italy's allowance for corporate equity, which equalizes the treatment of debt and equity, rendered its effective corporate tax rate the same, regardless of the financing mix. The largest differences in effective corporate tax rates occurred for countries with the highest statutory tax rates, illustrating the benefit of the ability to deduct nominal interest at higher tax rates. At the 70 percent ratio, effective corporate tax rates were negative for most G20 countries, including the United States.

7. See Katarzyna Bilicka and Michael Devereux, *CBT Corporate Tax Ranking 2012* (Oxford University Centre for Business Taxation, June 2012), http://tinyurl.com/j9dlyjl (PDF, 529 KB).

Figure B-4.

Effective Corporate Tax Rates in G20 Countries With Alternative Financing Mixes, 2012



Source: Congressional Budget Office, using data from KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

CBO estimated effective corporate tax rates according to the mix of financing for assets. In one case, assets were financed by a mix of 35 percent debt and 65 percent equity; in the other, the mix was 70 percent debt and 30 percent equity. Three factors were held the same for all countries: The allocation of total assets was 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories; expenditures on intangible assets were subtracted from taxable income immediately in the year of purchase with no additional subsidies provided for such investments; and the rate of inflation was 2.5 percent.

G20 = Group of 20; * = between –0.5 percent and zero.

Support for Research and Experimentation

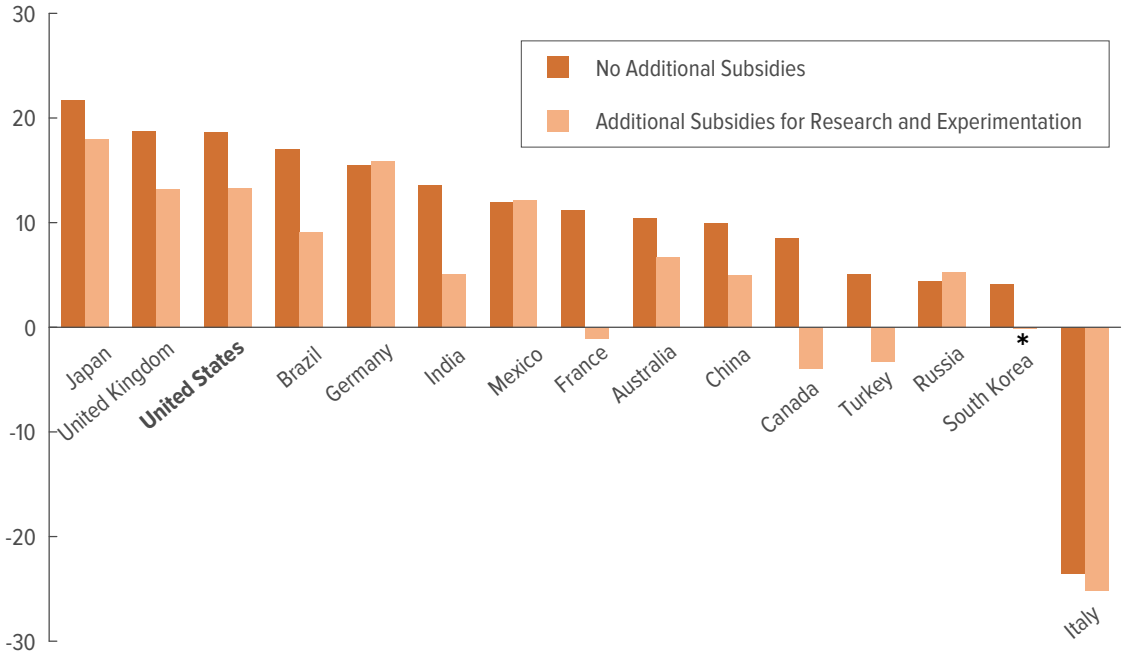
For this analysis, CBO considered that investments in all intangible assets, such as research and experimentation, were expensed immediately—that is, the entire cost of the investment was deducted in the year of purchase. However, the tax treatment of intangible assets varies from one country to another and by the type of asset, the method of production, and the manner of acquisition. Consequently, as an alternative, CBO also estimated effective corporate tax rates to more accurately reflect the actual treatment of research and experimentation in G20 countries on the basis of information concerning expensing, tax credits, and related subsidies in 15 countries, as reported by Canada's Department of Finance.[8]

Of the 15 G20 countries reviewed for that report, only South Korea and Russia did not allow full expensing of current investments in research and experimentation. Four countries also permitted full expensing of equipment related to research and experimentation. Five provided cost recovery allowances beyond expensing (and of those, two extended that subsidized cost recovery to equipment for research and experimentation). Five countries provided tax credits in addition to expensing of current expenses; South Korea disallowed full expensing and provided only a

8. Department of Finance Canada, "An International Comparison of Tax Assistance for Investment in Research and Development," in *Tax Expenditures and Evaluations* (December 2009), pp. 33–58, http://tinyurl.com/zj3wywu.

Figure B-5.

Effective Corporate Tax Rates in Certain G20 Countries With Alternative Tax Treatments for Investments in Intangible Assets, 2012



Source: Congressional Budget Office, using data from Department of Finance Canada, KPMG International, the Organisation for Economic Co-operation and Development, and the Oxford University Centre for Business Taxation.

Effective corporate tax rates were estimated for two forms of treatment of investments in research and experimentation. In the first, expenditures on intangible assets were subtracted from taxable income immediately in the year of purchase and no additional subsidies were provided for those investments. In the second, half of the amount invested in intangible assets was assumed to be eligible for research-and-experimentation subsidies and the remaining portion was treated as it was in the first case. In both cases, three factors were held the same for all countries: The allocation of total assets was 48.1 percent for buildings, 22.9 percent for equipment, 18.6 percent for intangible assets, and 10.5 percent for inventories; all assets were financed 35 percent by debt and 65 percent by equity; and the rate of inflation was 2.5 percent.

Data were unavailable for Argentina, Indonesia, Saudi Arabia, and South Africa.

G20 = Group of 20; * = between –0.5 percent and zero.

credit. The treatment of research and experimentation was less generous than full expensing in Germany and Mexico, which allowed expensing of current expenses but did not extend it to equipment and provided no credit. Russia neither allowed expensing nor provided a credit.

In the Canadian report, the estimates of before-tax return (r_p) on investments in research and experimentation did not distinguish between expensing, tax credits, or other types of tax subsidies and instead combined all the subsidy rates into a single variable:

$$r_p = (R + \delta)(1 - s) - \delta \qquad \text{(B-1)}$$

where s is the subsidy value for investment in research and experimentation, R is the after-tax discount rate, and δ is the economic depreciation rate (see Appendix A for a discussion of the before-tax return).

CBO converted those subsidy rates into a combination of cost recovery allowances (which could be more generous than expensing) and credits. The formula for computing the before-tax rate of return for equity-financed investment in Equation A-4 (see Appendix A) was then adjusted to reflect investment tax credits and subsidized cost recovery allowances:

$$r_p = \frac{(R + \delta)(1 - \tau_c v - k)}{1 - \tau_c} - \delta \qquad \text{(B-2)}$$

where v is the value of the subsidized cost recovery rate for investment in assets related to research and experimentation, k is an investment credit, and τ_c is the corporate tax rate. For the main analysis in this report, there were no investment credits (k was

set equal to zero) and there was full expensing (v was equal to 1).

In this alternative analysis, the estimates of the effective corporate tax rates more accurately reflect the tax treatment of research and experimentation in the 15 G20 countries for which data were available (see Figure B-5 on page 39). Half of the amount invested in intangible assets was assumed to be related to research and experimentation. For countries that provided a credit for that investment, v was set equal to 1 (except for South Korea, for which v was less than 1), and the value of the investment credit, k, was included in the calculation of the before-tax return on investment in research and experimentation. Nine countries had no investment credits for research and experimentation. For those countries, v was calculated using the subsidy rate, with k set equal to zero. The resulting value for v was greater than 1 in all countries except Germany, Mexico, and Russia. The other half of the amount invested in intangible assets was assumed to be subject to full expensing in each country (regardless of the country's tax code) and did not benefit from any other subsidies.

The alternative tax treatment of research and experimentation yielded lower tax rates for 12 of the 15 countries for which data were available. The effective corporate tax rate in the United States was 13.3 percent—more than 5 percentage points lower than it would be had the credit not existed. In contrast, the smallest subsidy for research and experimentation was that in Russia, which did not allow expensing for such expenditures. After taking into consideration the actual treatment of investments in research and experimentation, CBO estimated that Russia's effective corporate tax rate was 5.3 percent in 2012—nearly 1 percentage point higher than under the scenario in which the costs of research and experimentation were expensed.

Canada, France, and Turkey were among the countries with the largest subsidies for research and experimentation. Their subsidies were generous to the extent that—when combined with the tax benefits from debt financing and cost recovery allowances—the overall effective corporate tax rates became negative, according to CBO's estimates.

Other Provisions of Tax Codes That Favor Investment

The tax codes of the G20 countries in some cases include special provisions that favor investments other than those in research and experimentation. The availability and generosity of such provisions vary from country to country, and they therefore affect both the absolute and the relative effective corporate tax rates.

The United States, for example, allows businesses to deduct from their taxable income a percentage of what they earn from certain domestic production activities. Adjusting the statutory tax rate for that provision reduced the U.S. effective corporate tax rate in 2012 from 18.6 percent to 17.1 percent, according to CBO's analysis. In 2012, eligible companies also were permitted to use "bonus depreciation," a feature of the tax code that allowed the immediate deduction of expenses from some types of investment. If half of the equipment purchased had been eligible for expensing, the U.S. effective corporate tax rate would have fallen from 18.6 percent to 16.1 percent for that year.

About This Document

This report was prepared at the request of the Ranking Member of the Senate Finance Committee. In keeping with the Congressional Budget Office's mandate to provide objective, impartial analysis, the report makes no recommendations.

Molly Saunders-Scott and Jennifer Gravelle (formerly of CBO) wrote the report with guidance from Janet Holtzblatt and from Frank Sammartino and David Weiner (both formerly of CBO). Mark Lasky of CBO, Rosanne Altshuler of Rutgers University, Alan Auerbach of the University of California–Berkeley, Don Fullerton of the University of Illinois, Jack Mintz of the University of Calgary, and William Randolph (formerly of CBO) provided comments. (The assistance of external reviewers implies no responsibility for the final product, which rests solely with CBO.)

Jeffrey Kling, John Skeen, and Robert Sunshine reviewed the report; Kate Kelly edited it; and Jorge Salazar and Gabe Waggoner, along with Jeanine Rees and Maureen Costantino (both formerly of CBO), prepared it for publication. Maureen Costantino produced the cover. The report is available on CBO's website (www.cbo.gov/publication/52419).

Keith Hall
Director

March 2017