Appendix 1. Recent Developments in Public Health Spending and Outlook for the Future

The growth of public health spending has slowed significantly in advanced economies over the past three years. Nearly all advanced economies, except Israel and Japan, recorded a slowdown in real health spending growth in 2010 and 2011, compared with the period 2000–09 (Figure A.1.1, panel 1; Morgan and Astolfi, 2013). The economies experiencing the largest declines have also seen sharp drops in output and undertaken large fiscal adjustments in this period (Greece, Iceland, Ireland, Portugal, and Spain). Available data for eight economies indicate continued slow growth of public health spending in 2012. Public health spending has also dropped as a share of actual and potential GDP, after rapid growth in 2007–09 (Figure A.1.1, panel 2). The slowdown has touched nearly all categories of health spending, including inpatient, outpatient, pharmaceutical, and even prevention and public health (Morgan and Astolfi, 2013).

These spending decreases appear largely to reflect policies that reduce the *level* of spending in the short term, but there is little evidence that they will have an impact on long-term spending growth. Reforms introduced in many countries were mainly focused on generating immediate savings rather than on improving the efficiency and quality of health spending (European Commission, 2013). Many reforms have focused on cuts in national health budgets (Greece, Ireland, Italy, Portugal, and Spain), cuts in prices for pharmaceuticals and other medical goods (Austria, Belgium, Greece, Ireland, the Netherlands, Portugal, and Spain), reduced payments to providers (the Czech Republic, Estonia, Ireland, and Spain), and containing wages and salaries (the Czech Republic, Denmark, Greece, Ireland, Portugal, Slovenia, Spain, and the United Kingdom) (Mladovsky and others, 2012; Morgan and Astolfi, 2013). While these macro-level instruments could help reduce the level of spending in the short term, they are typically less effective in containing spending growth in the long term without accompanying micro-level reforms to enhance efficiency (Clements, Coady, and Gupta, 2012). Although some countries raised user charges (the Czech Republic, Denmark, Estonia, France, Greece, Ireland, Italy, the Netherlands, Portugal, and Switzerland),[63] these increases were relatively small and unlikely to alter the long-term growth of health spending significantly. In most cases, only marginal changes were made to benefit packages and the breadth of population coverage.

[63] User charges were raised for private health insurance in the United States (Ryu and others, 2013).

Figure A.1.1. Evolution of Public Health Spending in Advanced Economies
(Percent)
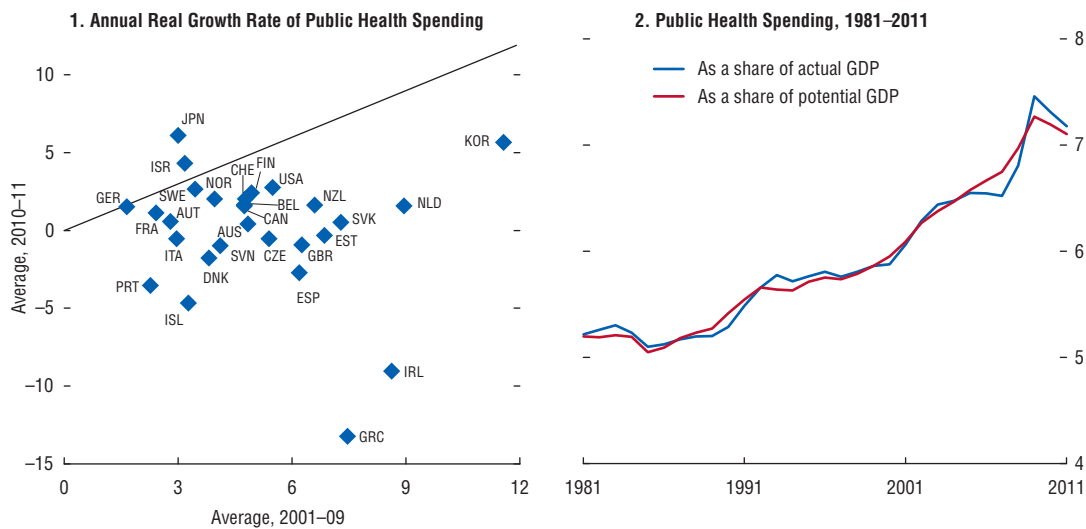
Sources: Organisation for Economic Co-operation and Development; and IMF staff estimates.

Figure A.1.2. Per Capita Public Health Spending, 1981–2011: Actual, Predicted, and Simulated Growth Rates
(Percent)
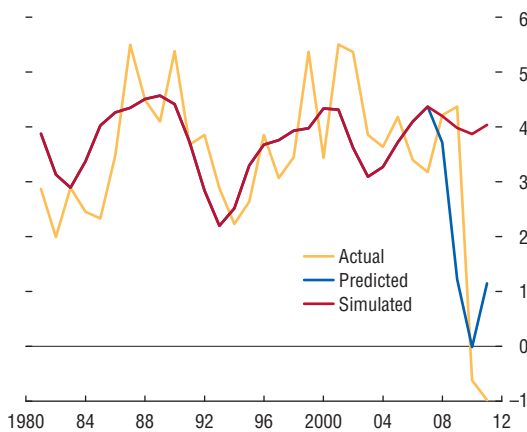
Sources: Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: "Predicted" denotes the predicted growth rates from an econometric model based on actual macroeconomic indicators. "Simulated" denotes the spending increase that would occur if health spending between 2008 and 2011 grew at rates that would be predicted using averages of macroeconomic indicators between 2000 and 2007.

Some measures attempted to improve efficiency, such as efforts to reduce administrative costs and restructure the hospital sector (Mladovsky and others, 2012). Their impact on long-term spending growth, however, is less clear. On the other hand, although they generated short-term savings, some of these measures could in fact raise public health spending in the long term because of deterioration in population health as essential health care services, such as health promotion and disease prevention, were cut (European Commission, 2013). Thus, there is a high degree of uncertainty regarding the impact of these reforms on the growth of public health spending in the long term.

Econometric analysis confirms that much of the recent slowdown in spending can be explained by deteriorating macroeconomic conditions and fiscal pressures. Such analysis also indicates that macroeconomic and fiscal indicators (including economic growth, unemployment, and gross government debt) are significant determinants of the growth in public health care spending.[64] Nearly the entire decline in the growth of spending between 2008 and 2010 can be explained by these factors (Figure A.1.2). Although the model does not predict the continued decline

[64] See IMF (2013a) for a similar model.

in spending growth in 2011 as well, half of the gap between the actual and predicted growth rate in 2011 can be attributed to four countries that have made large fiscal adjustments: Greece, Ireland, Portugal, and Spain.[65] Though far from conclusive, the findings suggest caution in assuming that the recent slowdown will translate into permanently lower long-term growth rates in the projections of future health care spending.

The slowdown could still have a persistent impact on public health spending in some countries over the medium term. This reflects two factors. First, when the historical growth rate of public health spending (in excess of GDP growth) resumes, the growth would apply to a lower base of public health spending as a percentage of GDP (because of the recent slowdown). Second, some of the macroeconomic and fiscal factors that dampen spending growth, such as high public debt ratios, may not return to precrisis levels in the near future and thus would put continued pressure on the growth of public health spending. IMF staff projections fully incorporate the lower spending levels due to recent reforms and assume that growth rates will only gradually return to their historical levels as economies recover.[66]

Rising public health spending–to–GDP ratios will, however, remain a key fiscal challenge in many advanced economies. On average (unweighted basis), public health spending is projected to increase by 1½ percentage points of GDP in 2013–30 (Figure A.1.3). This compares with earlier IMF staff projections of an increase of 2¼ percentage points of GDP in 2011–30 (Clements, Coady, and Gupta, 2012). The weighted averages are 2¾ and 3 percentage points, respectively. In the United States, public health spending is projected to increase by 4¾ percentage points of GDP, which is in line with the current projections of the U.S. Congressional Budget Office (2012, 2013) under the assumption that subnational spending grows at a similar rate as federal health spending.[67] Public health

[65] Two-thirds of the gap between actual and predicted growth rates in 2011 was driven by these four countries and Korea.

[66] The projections up to 2018 are based on the macroeconomic projections from the *World Economic Outlook* (economic growth, general government public debt–to–GDP ratios, and unemployment rate). Beyond 2018, the projections assume that excess cost growth (the difference between the growth of real health spending and GDP growth, after the effect of aging is adjusted for) will gradually return to its historical average by 2030.

[67] Some studies argue that part of the recent slowdown in health spending in the United States could reflect structural changes in the health care system that affect long-term spending growth, including those happening under the ongoing implementation of the country's health care reform act (Cutler and Sahni, 2013).

Figure A.1.3. Projected Increase in Public Health Spending, 2013–30
(Percentage points of GDP)
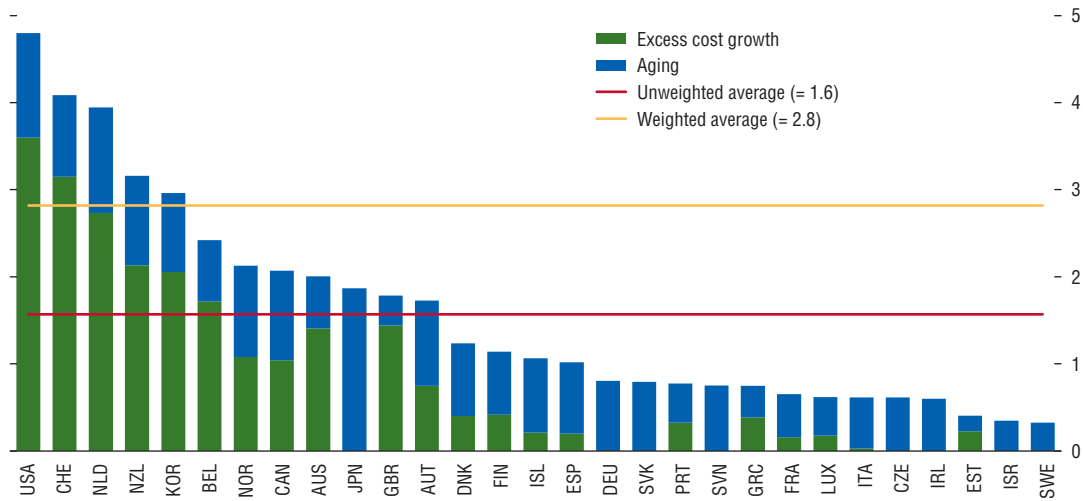
Sources: Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: *Excess cost growth* is defined as the growth of public health spending in excess of GDP growth after aging is controlled for.

spending in economies hit hard by the Great Recession (Greece, Iceland, Ireland, Portugal, and Spain) is projected to increase, on average, by only ¾ percent of GDP, about half the advanced economy average,

reflecting likely continued fiscal pressure and weak macroeconomic conditions over the medium term in these economies.

Appendix 2. Assessing Potential Revenue: Two Approaches

The main text reports on two rather different ways of assessing revenue potential, giving complementary perspectives on the scope to raise more.

Peer analysis

Peer analysis, the most traditional approach, models revenue r_i in country i (in percent of GDP) as a function[68]

$$r_i = \alpha + \beta' x_i + \varepsilon_i \tag{1}$$

[68] With obvious amendments when estimation is on panel data, which also has the advantage (among others) of providing fixed effects that could be interpreted as giving some indication of social preferences. Data limitations—the desire to apply both methods to the same data set—mean the analysis here is on a cross-section.

of observable characteristics x_i (such as income per capita, with a very wide range of other variables explored in the literature). The "potential" for additional revenue is then the fitted residual, ε_i, which, by construction, averages to zero over the sample.

Torres (2013) extends this method by applying it to subcategories of revenue. For a cross-section of 164 countries, using data constructed from IMF reports (*World Economic Outlook*, Article IV staff reports, and revisions to ongoing programs), revenues are divided into those from income taxes, payroll taxes, other taxes, taxes on goods and services, taxes on international trade, grants, and nontax revenues. To calculate the revenue gaps, taxes on international trade, grants, and nontax revenues are excluded, as these are somewhat less under the government's direct control. Control variables include per capita income, the old-age dependency ratio, and political participation, with revenues increasing in all three.

Table A.2.1 reports the estimated potential for additional revenue for selected advanced and emerg-

Table A.2.1. Revenue Gaps
(Percent of GDP)

	Total	Consumption Taxes	Income Taxes	Payroll Taxes	Other Taxes
Advanced economies					
Japan	17.8	9.0	3.2	5.8	−0.1
Switzerland	9.5	2.6	3.1	4.0	−0.2
Korea	7.4	3.9	2.7	1.1	−0.3
United States	6.1	3.7	1.2	1.3	−0.1
Singapore	5.4	4.1	−0.3	2.9	−1.3
Greece	4.5	2.0	2.8	1.0	−1.3
New Zealand	4.2	−1.0	−4.6	8.1	1.7
Canada	3.3	2.9	−1.6	3.6	−1.6
Germany	3.1	2.5	0.9	−1.4	1.0
Spain	2.7	4.4	0.0	−1.5	−0.2
Portugal	2.1	−0.6	−0.2	0.9	1.9
Estonia	1.7	0.4	1.1	−0.3	0.4
Ireland	1.5	0.1	−0.1	0.1	1.5
United Kingdom	0.7	0.7	−2.1	4.7	−2.5
Italy	0.7	4.9	−4.7	2.0	−1.5
Emerging market economies					
Latvia	10.1	3.8	1.2	4.6	0.5
Bulgaria	8.9	−0.1	3.0	6.1	−0.2
Kazakhstan	5.9	4.3	1.1	0.6	−0.1
Mexico	5.9	3.1	2.6	−1.0	1.2
Lithuania	5.1	2.1	2.9	−1.1	1.2
Indonesia	5.0	3.0	0.4	1.6	0.1
Saudi Arabia	4.5	1.3	2.3	0.3	0.6
Thailand	3.9	1.2	−0.3	3.0	0.0
Jordan	1.9	−1.9	2.8	0.9	0.2
Egypt	1.0	1.7	−0.5	−1.0	0.9
Low-income countries					
Sudan	8.5	2.6	4.2	0.7	1.1
Madagascar	8.5	3.7	3.7	0.7	0.4
Haiti	5.2	3.6	1.6	1.0	−0.9
Yemen	4.6	1.6	2.3	0.4	0.3
Nepal	4.3	1.3	2.4	0.8	−0.3
Armenia	4.2	2.8	−0.4	2.4	−0.6
Cambodia	4.1	0.9	2.0	0.6	0.6
Georgia	3.6	−1.3	−3.9	8.4	0.4
Côte d'Ivoire	3.5	3.9	2.2	−1.0	−1.6
Chad	3.3	1.9	1.4	0.4	−0.4
Uganda	3.2	−0.4	2.3	0.5	0.8
Ghana	1.0	1.5	−1.7	0.7	0.6
Congo, Rep. of	1.0	−0.7	1.1	0.5	0.0

Source: IMF staff estimates.

ing market economies and low-income countries; negative values indicate that observed revenues exceed predicted ones. There is quite a wide variation within each income group, with substantial implied scope to increase total revenue in some countries but little in others. The breakdown by tax category provides useful pointers as to where the most evident potential lies— generally consistent with the views in IMF (2010a). For example, in Germany and Mexico, VAT revenues could be enhanced by eliminating reduced VAT rates, and in Japan by increasing (as planned) the consumption tax rate. Along with Korea, Japan also raises less from the personal income tax than do its peers.

Stochastic frontier analysis

Stochastic frontier analysis[69] instead models revenue potential explicitly, taking revenue to be a function

$$R_i = U(z_i)M(x_i)e^{v_i}, \qquad (2)$$

where M denotes maximum revenue, dependent on observables exogenous to policy, and U denotes "effort," lying between 0 and 1 and depending on variables z_i that are, to at least some degree, choice variables, as well as on wider social preferences. Put most simply, peer analysis finds the best fit to the observations, whereas stochastic frontier analysis aims to put a frontier around them (Figure A.2.1).[70] The stochastic frontier analysis approach has the considerable advantage of not inherently implying that some countries are raising more than their "potential" and fits neatly into the conceptual framework for gap assessment in "Finding, and Minding, the Gap" in Section 2 (with effort reflecting rate choices, policy gaps, and compliance gaps). A weakness in applications so far is that relatively little attention has been paid to the determinants of effort.

Results using the same data set and controls as Torres (2013) and—in the absence of good measures of, for instance, the breadth of tax bases—treating z_i as

Figure A.2.1. Peer and Stochastic Frontier Analysis Estimation of Tax Potential
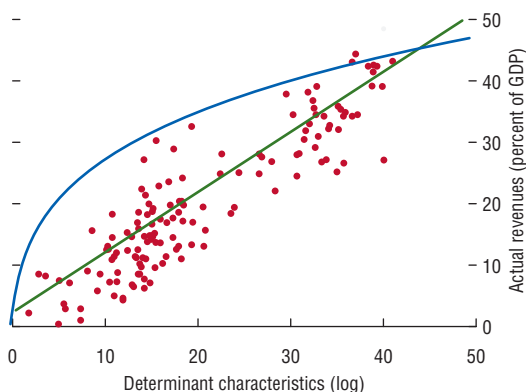
Source: IMF staff estimates.

unobserved[71] are presented in Table A.2.2. With a few notable exceptions (such as Greece), results are in line with priors and previous estimates (IMF, 2011).[72] They are highly positively correlated to the peer analysis gap estimates presented previously (as in Cyan, Martinez-Vasquez, and Vulovic, 2013). These results show that

• Countries with similar revenue levels can have very different levels of effort. This is the case for Ireland and Switzerland, for example, and for Armenia, Nicaragua, and Mozambique.

• There are wide variations across countries, but average effort is fairly similar across advanced and emerging market economies and low-income countries.

• Estimated tax efforts are consistent with priors on social preferences: Denmark and Norway, for instance, figure among those with the highest effort. What these results do not shed light on, however, is precisely how effort can be increased. The results in Torres (2013) are somewhat more informative on this point, but would require considering country specifics of both design and implementation.

[69] See for instance, Pessino and Fenochietto (2010), including on the econometrics involved. Note that equation (2) implies a bias in ordinary least squares estimation of equation (1) if, as one might expect, policy choices are correlated with the x_i.

[70] Though the presence of the error v_i means that actual revenue may exceed the estimated maximum.

[71] Estimation is by maximum likelihood, with $U(z_i)$ assumed to have a half-normal distribution and v_i to be normally distributed. See Grigoli and Muthoora (2013).

[72] Cross-section estimation techniques, whether in the context of the peer analysis or of stochastic frontier analysis, cannot fully capture the effects of country-specific circumstances and may bias estimates of the revenue gaps or tax effort. Given these and other data limitations, results should be interpreted with caution.

Table A.2.2. Estimated Tax Effort, 2012

	Tax Revenue[1]	Tax Effort[2]		Tax Revenue[1]	Tax Effort[2]		Tax Revenue[1]	Tax Effort[2]
Advanced economies			**Emerging market economies**			**Low-income countries**		
Switzerland	28.5	0.52	Saudi Arabia	1.1	0.05	Madagascar	10.9	0.33
Korea	19.3	0.48	Kazakhstan	12.4	0.39	Sudan	6.1	0.34
Estonia	32.8	0.55	Latvia	25.5	0.43	Cambodia	11.0	0.39
Singapore	13.9	0.55	Bulgaria	26.8	0.47	Chad	5.5	0.40
Germany	40.0	0.57	Lithuania	27.9	0.51	Haiti	12.7	0.40
Sweden	44.2	0.62	Mexico	15.7	0.50	Ghana	17.1	0.46
Ireland	27.8	0.74	Peru	18.0	0.63	Nepal	13.1	0.49
Japan	30.0	0.43	Jordan	15.0	0.64	Moldova	31.9	0.66
Israel	34.0	0.75	Philippines	15.3	0.69	Uganda	12.2	0.57
Slovak Republic	29.0	0.78	Thailand	17.9	0.63	Armenia	20.5	0.53
Netherlands	39.2	0.75	Malaysia	16.1	0.72	Tanzania	16.1	0.64
United States	25.1	0.61	Romania	28.3	0.72	Georgia	25.2	0.53
Austria	44.1	0.73	Poland	33.2	0.77	Cameroon	13.8	0.71
Iceland	36.3	0.80	Turkey	26.7	0.90	Nicaragua	21.4	0.72
Spain	33.1	0.71	Ukraine	40.0	0.76	Congo, Rep. of	8.7	0.70
Finland	43.8	0.75	Chile	21.6	0.69	Bolivia	20.6	0.71
New Zealand	29.5	0.62	Egypt	15.8	0.72	Zambia	17.8	0.74
Slovenia	36.6	0.75	Russia	35.0	0.85	Lao P.D.R.	16.2	0.78
United Kingdom	35.5	0.75	Hungary	38.4	0.79	Yemen	6.8	0.73
Czech Republic	35.0	0.79	South Africa	24.2	0.89	Congo, Dem. Rep. of the	16.7	0.77
Italy	44.2	0.68	Colombia	22.2	0.91	Honduras	17.6	0.76
Canada	30.2	0.67	Argentina	36.2	0.87	Côte d'Ivoire	17.6	0.75
Portugal	34.9	0.74	Morocco	24.1	0.93	Mozambique	21.0	0.78
Norway	43.2	0.91	Nigeria	16.4	0.94	Burkina Faso	14.9	0.81
Denmark	49.7	0.86	Brazil	29.6	0.96	Mali	17.3	0.88
France	44.7	0.85				Senegal	19.7	0.88
Belgium	46.2	0.85						
Greece	35.5	0.80						
Average	35.2	0.70		23.3	0.69		15.9	0.63

Source: IMF staff estimates.

[1] In percent of GDP. Tax ratios are estimates for 2012 based on the October 2012 *World Economic Outlook,* complemented in some cases with countries' Article IV staff reports. Tax ratios include social security contributions but exclude grants and nontax revenue.

[2] Defined as ratio of actual tax collection to potential tax revenue.

Appendix 3. Increasing Revenue from Real Property Taxes

Recent years have seen a dramatic increase in interest in boosting revenue from property taxes—the term being shorthand here for the recurrent taxation of immovable property—in places as diverse as Cambodia, China, Croatia, Egypt, Greece, Ireland, Liberia, and Namibia.[73] How much more revenue can property taxes contribute in the longer term? Why has there been this upsurge of interest? And what are the key challenges for reform?

Revenue potential

Recurrent taxes on immovable property now yield fairly modest amounts in most countries: the average revenue from recurrent property taxes in high-income countries is about 1.1 percent of GDP (5.5 percent of total taxes), and that is more than 2½ times the amount in middle-income countries (0.4 percent of GDP, 2.1 percent of total taxes). But there are huge variations in revenue raised within the two groups (Figure A.3.1).

These large disparities in tax yield doubtless reflect differing degrees of popular opposition to the use of such taxes and technical constraints in their administration—but they also signal a large potential for enhanced utilization. The highest level of revenue found in middle-income countries, which could be taken as an ambitious general revenue target for these countries, is about 1 percent of GDP, or 2½ times the current average. Among high-income countries, a number raise more than 2 percent of GDP from recurrent taxes on property (Canada, France, Israel, Japan, New Zealand, the United Kingdom, and the United States) and a few of these (Canada, the United Kingdom, and the United States) raise even more than 3 percent of GDP. For high-income countries, a target of 2–3 percent of GDP is a realistic long-term goal.

The rationale for increased use of property taxes

The impetus to reform is country specific, but in most cases reflects revenue needs as well as efficiency and fairness considerations. (A few countries, particularly in Asia, have recently increased property taxes[74]

[73] This appendix is based on Norregaard (2013).
[74] And sometimes transaction and/or capital gains taxes too.

Figure A.3.1. Distribution of Yields from Real Property Taxes, 2009
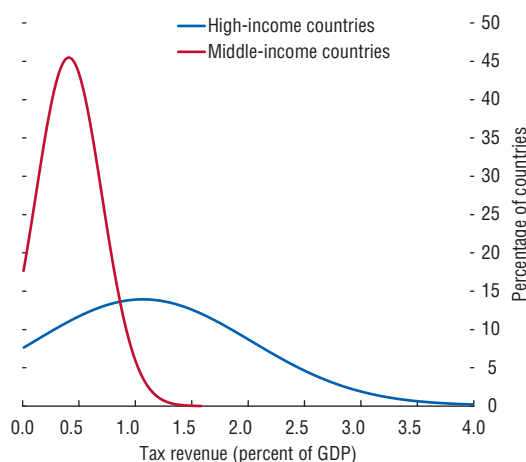
Sources: IMF, *Government Finance Statistics*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

substantially in an attempt to quell strong property price appreciation).

Property taxes, in the form of recurrent taxes levied on land and buildings, are generally considered to be more efficient than most other taxes, primarily because of the immobility of the location-specific attributes reflected in property prices: a pleasant summer house by the lake is hard to put in an offshore bank account. Studies of the growth hierarchy, discussed in Section 2, have indeed generally found taxation of immovable property to be more benign for economic growth than other forms of taxation, in particular compared with direct taxes (OECD, 2010b). Importantly, however, the efficiency case is stronger for taxing residential property than that for taxing business property—consistent with the general principle of avoiding taxes on intermediate inputs—except insofar as this serves to correct externalities or as a rough form of payment for services. In all cases, of course, the timing of any property tax reform should take into account market conditions.

Intergovernmental issues commonly loom large in reforming property taxes. To the extent that the quality of publicly provided local services is reflected in property values, allocating the revenue and design of the tax to a subnational level of government—as is common and is widely recommended—can improve accountability and the effectiveness of political institutions. This may also call for some adjustment of intergovernmental transfers, as well perhaps as agreeing on

minimum and maximum rates to limit tax competition (undercutting others) and tax exporting (shifting an undue part of the burden to nonresidents).

The incidence of the property tax—who bears the real burden—has been intensively debated, with a growing consensus that the tax burden is borne predominantly by those with middle and high incomes. The progressivity of the tax can be enhanced by a variety of measures intended to reduce or eliminate tax liabilities for low-income owners of property (for example, by taxing only properties valued at or above some threshold amount). To the extent that the property tax is truly a benefit tax, however, with the amount paid an accurate reflection of the value of services received, it would have no distributional impact.

Implementation challenges

Implementing a modern market-value-based recurrent tax on land and buildings is a challenging task, requiring substantial up-front investment in administrative infrastructure. Key requirements include establishing a comprehensive cadastre (fiscal property register) and recording physical coordinates in addition to ownership and property value data. This is a data-intensive exercise that typically requires extensive cooperation and exchange of information among a number of entities (including tax authorities, local governments, courts, and geodetic agencies). To ensure the buoyancy and fairness of the tax, an effective valuation system is required that accurately tracks market values through regular updates.[75] Although the development of effective computer-aided mass appraisal systems has facilitated the valuation process considerably, many practical issues remain, including lack of well-qualified property assessors in many countries. Finally, effective enforcement of the property tax is lacking in many countries, partly because the tax may be politically unpopular, but also because of historically low yields and the adverse incentive effects that may result from a mismatch between who is assigned the responsibility for tax collection and who ultimately receives the revenue.

Although there are strong economic arguments for strengthened immovable property taxation, careful planning and execution, combined with improvements to the basic administrative infrastructure—and, in many cases, strong political will—are essential for successful property tax reform.

[75] Theorists have shown interest in self-assessment schemes (an idea attributed to Sun Yat-sen) under which taxpayers declare a value but are then required to accept bids for some specified amount in excess. Practical experience is limited, however, though such a scheme has been used in Bogotá, Colombia.