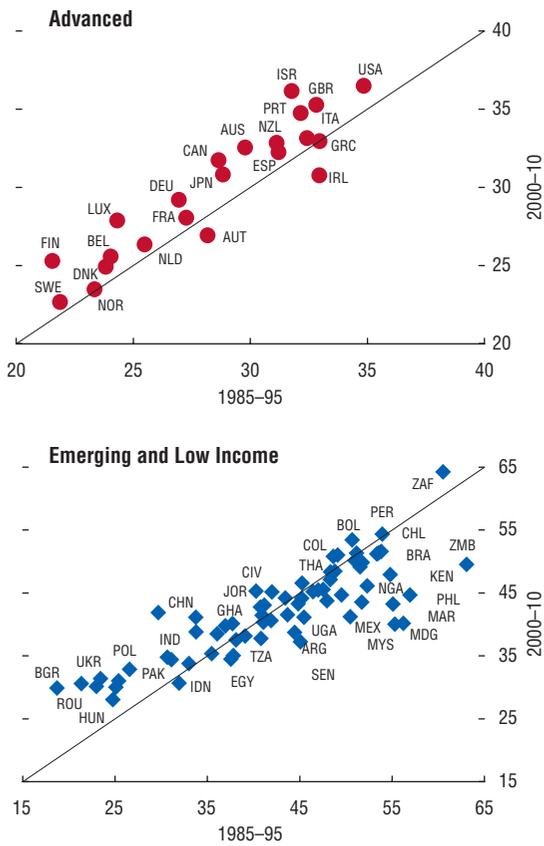


**Figure A1.1. Trends in Disposable Income Inequality: Gini Coefficient, 1985–2010**  
(Scale, 0–100)



Sources: Bova and others (2012); Eurostat; PovcalNet; World Income Inequality Database (WIID); and national sources.  
Note: A higher number indicates greater inequality.

the analysis builds on the empirical literature on income inequality.<sup>38</sup> That literature finds that the main determinants of cross-country variations in inequality are national per capita income, education, trade openness, and technological change (for example, De Gregorio and Lee, 2002; IMF, 2007; and Barro, 2008). With standard explanatory variables controlled for, fiscal consolidation and fiscal variables (tax structure, specific taxes, and expenditures) are assessed for their effects on inequality in disposable income.

<sup>38</sup>The analysis focuses on within-country income inequality; it does not consider other dimensions of inequality, such as inequalities of opportunities and poverty, or inequality among countries.

The following panel regression specification is used:

$$G_{it} = \mathbf{X}_{it-1}'\beta + \gamma\mathbf{Z}_{it-1} + v_i + \eta_t + \varepsilon_{it},$$

where  $G_{it}$  denotes the log of the Gini coefficient for disposable income (a measure of income distribution) for country  $i$  and year  $t$ ;  $v_i$  is the country-specific fixed effect;  $\eta_t$  is the time-fixed effect (to control for global factors);  $\varepsilon_{it}$  is an error term;  $\mathbf{X}_{it-1}$  is a vector of economic control variables; and  $\mathbf{Z}_{it-1}$  is the measure of fiscal consolidation or fiscal variables.<sup>39</sup>

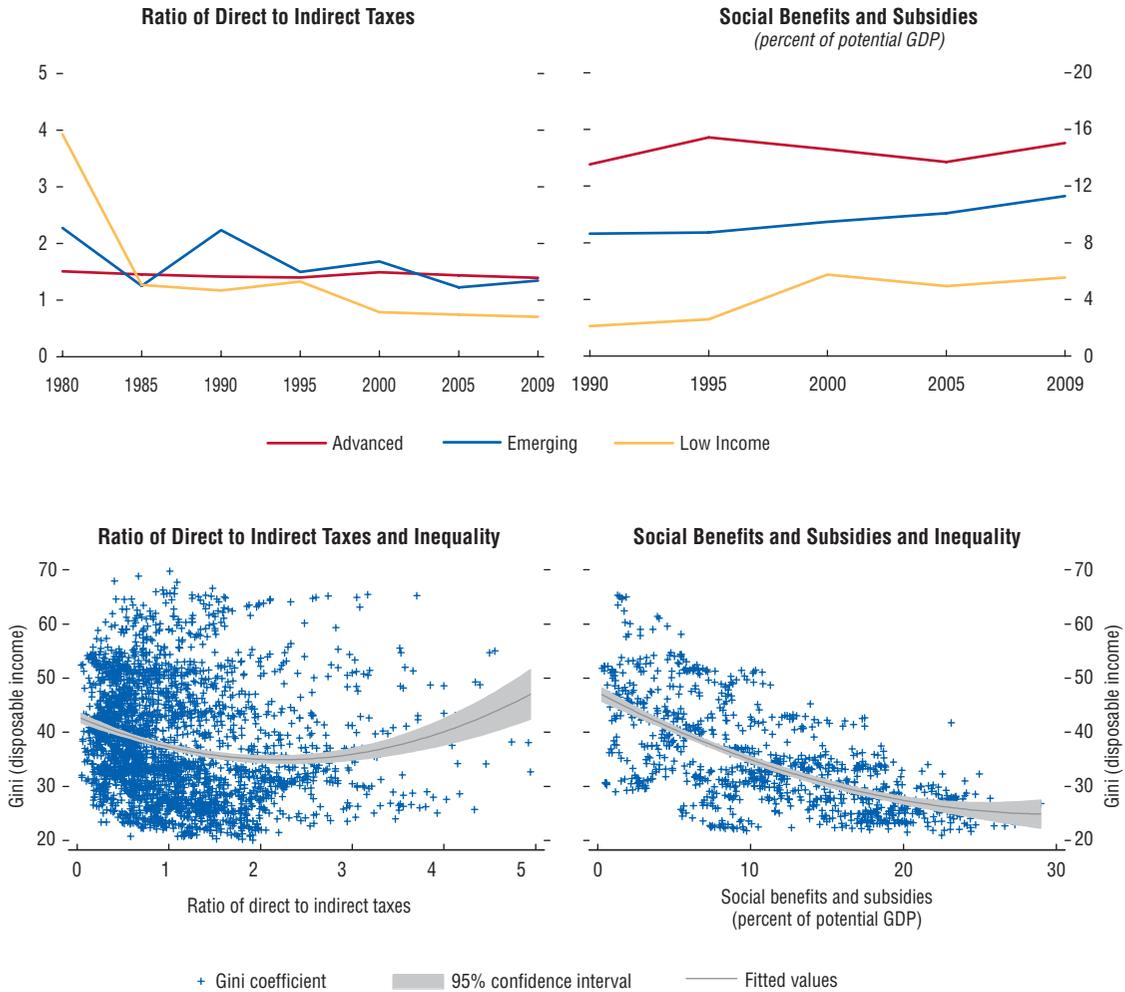
$\mathbf{X}_{it-1}$  includes the following:

- *Income per capita*: (1) log of income per capita and (2) square of log of income per capita to consider the Kuznets relationship (Barro, 2008; De Gregorio and Lee, 2002).<sup>40</sup>
- *Educational attainment*, as measured by the average number of years of secondary schooling of the population aged 15 and older. The literature emphasizes education as one of the major factors affecting income inequality, and policymakers consider spending on education to be a highly effective tool for reducing income inequality (see De Gregorio and Lee, 2002, and references therein). However, the relationship remains ambiguous because of two possible conflicting effects (Knight and Sabot, 1983): (1) the “composition” effect, which increases the relative size of the group with more education (it tends initially to raise income inequality but eventually lowers it), and (2) the “wage compression” effect, which decreases the premium on education as the relative supply of educated workers increases, thereby decreasing income inequality.

<sup>39</sup>Two econometric methods are employed to estimate the panel regression: (1) seemingly unrelated regression (SUR) estimates and (2) panel-corrected standard error (PCSE) estimates (Beck and Katz, 1995). The results from other estimation methods, including ordinary least squares and fixed-effects panel regressions, are broadly similar. Some of the results (e.g., the causal relationship between consolidation and inequality) may be subject to endogeneity and should be interpreted with caution.

<sup>40</sup>The Kuznets curve implies that inequality exhibits an inverted U-curve as the economy develops: economic development (including shifts from agriculture to industry and services, and adoption of new technologies) initially benefits a small segment of the population, which causes inequality to rise. Subsequently, inequality declines as the majority of people find employment in the high-income sector. However, the empirical evidence in support of Kuznets’ hypothesis is not robust (see Kanbur, 2000, and references therein).

**Figure A1.2. Ratio of Direct to Indirect Taxes and Social Benefits Spending, 1980–2009**



Sources: Bova and others (2012); Eurostat; IMF, *Government Finance Statistics*; IMF, *International Financial Statistics*; PovcalNet; World Income Inequality Database (WIID); national sources; and IMF staff estimates.

- *Information technology (IT) capital as a share of the total capital stock* as a proxy for skill-biased technological progress (data from Jorgenson and Vu, 2007, with a 2011 update). Skill-biased technological progress is found to have made the biggest contribution to rising income inequality over recent decades (Autor, Katz, and Krueger, 1998; Acemoglu, 2003; IMF, 2007).
- *Trade openness* to control for the impact on inequality of trade globalization. The standard theory of international trade suggests that trade openness will affect income distribution differently according to countries' relative factor endowments: advanced economies should experi-

ence a rise in the relative return to capital and greater income inequality, since they are relatively abundant in capital (and scarce in labor). The opposite should happen in emerging markets and low-income countries, since they are relatively abundant in labor. However, the effects of trade openness on income distribution have been found to be quite varied, making it difficult to predict their direction.<sup>41</sup> Whereas IMF (2007) finds that trade openness is associated with a reduction in

<sup>41</sup>For example, trade openness tends to exert downward pressure on the wages of low-skilled workers, worsening inequality. On the other hand, if openness has a positive effect on investment and growth, so that the real incomes of the poorer groups in soci-

inequality, others find the opposite.<sup>42</sup> Yet the evidence is not conclusive (Krugman, 2008; Meschi and Vivarelli, 2007; Asian Development Bank, 2007).

- *Unemployment rate*: Not surprisingly, a greater portion of unemployed (and inactive) workers are found to be in the bottom income quintile in the member countries of the Organisation for Economic Co-operation and Development (OECD) (Martinez, Ayals, and Ruiz-Huerta, 2001). Thus, higher unemployment may be associated with greater inequality.
- *Inflation*: Inflation tends to hurt the poor more than other income groups and worsen inequality (Easterly and Fischer, 2001; Bulir, 1998). This may be due in part to differences in wealth composition and transaction patterns (the fraction of household wealth held in liquid assets, such as currency, decreases with income and wealth) and differences in ability to protect earnings streams against inflation.<sup>43</sup>

$Z_{it-1}$  includes the measure of fiscal consolidation or fiscal variables, as follows:

- *Fiscal consolidation* (spending and tax measures, as a percentage of GDP) from the action-based fiscal consolidation data for 17 OECD countries (Devries and others, 2011).<sup>44</sup>
- *Ratio of direct to indirect tax*, a measure of the tax structure (from the IMF/Fiscal Affairs Department database), with a higher value indicating potentially greater progressivity of the tax system.
- *Cyclically adjusted individual and corporate income taxes and cyclically adjusted indirect tax* (all as percentages of potential GDP), to account for different country-specific and tax-specific elasticities.<sup>45</sup>
- *Wage bills, social benefits spending, subsidies, and capital spending* (all as percentages of potential GDP).

### *How do different fiscal consolidation measures affect income inequality?*

The analysis shows that income inequality tends to rise during periods of fiscal adjustment, especially when the adjustment is based on a retrenchment in spending.<sup>46</sup> Based on the results for 17 OECD countries, a consolidation amounting to 1 percentage point of GDP is associated with an increase of about 0.6 percent in inequality of disposable income (as measured by the Gini coefficient) in the following year (Table A1.1, column 1).<sup>47</sup> An alternative dynamic panel regression specification confirms the increase in income inequality following consolidations, with the cumulative effect peaking after five to six years and fading by the tenth year (Box A1.1). Large consolidations (greater than about 1.5 percent of GDP) significantly elevate inequality,

ety also rise, it may enable these groups to invest in human capital and entrepreneurial activities and improve income equality.

<sup>42</sup>Foreign direct investment (FDI) is found to be associated with an increase in inequality (IMF, 2007). FDI inflows in emerging markets and low-income countries tend to increase the demand, and thus the wage premium, for skilled labor, whereas outward FDI in advanced economies tends to reduce the demand, and hence the wages, for lower-skilled labor. A related consideration is that trade openness may facilitate technology diffusion from advanced economies to emerging markets and low-income countries through FDI as well as imports of capital equipment (such as for information technology) and the international production network. In the receiving emerging markets and low-income countries, the new technologies tend to be more skill intensive than those in use before the liberalization of trade and FDI, which increases the demand for skilled labor and thus worsens income inequality. The fact that the earnings of highly skilled and highly educated workers have increased at the fastest rate in so many countries is also consistent with the view that higher international integration has introduced skill-biased technologies to developing countries.

<sup>43</sup>In addition to the components included in  $X_{it-1}$ , banking crises can also worsen inequality, because the poor have few resources to protect themselves against adverse shocks and have very limited access to credit and insurance (Atkinson and Morelli, 2011; Glaeser, 2010). The indicator of banking crises was thus also used, but the outcome was insignificant and did not alter the main results.

<sup>44</sup>Data on consolidations from Alesina and Ardagna (2010) and the IMF's structural balance data are also used (Box A1.1).

<sup>45</sup>The cyclically adjusted components have been calculated from actual tax revenues adjusted according to the ratio of potential output to actual output and the tax-specific elasticities for each OECD country. For non-OECD countries, the new EU average elasticities were used (from Girouard and André, 2005).

<sup>46</sup>This is with respect to a baseline in which fiscal adjustment is not implemented and deficits continue to be financed without major disruptions. If the absence of fiscal adjustment leads to a fiscal crisis, with disruptive consequences for economic activity, income inequality could deteriorate even more.

<sup>47</sup>To put this in perspective, note that the average Gini coefficient for disposable income in the 17 OECD countries increased by about 2 percent between 1995 and 2005.

**Table A1.1. Impact of Fiscal Consolidation on Disposable Income Gini Coefficient: OECD Countries, 1978–2009**

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
	SUR <sup>1</sup>	SUR	SUR	SUR	PCSE	PCSE
Real GDP per capita (log), $t-1$	2.270*** (3.05)	2.316*** (3.11)	2.129*** (2.86)	2.387*** (3.25)	2.288*** (3.73)	2.394*** (3.91)
Real GDP per capita (log) squared, $t-1$	-0.116*** (-3.06)	-0.118*** (-3.12)	-0.108*** (-2.86)	-0.119*** (-3.18)	-0.117*** (-3.82)	-0.119*** (-4.01)
Years of schooling (log), $t-1$	0.041* (-1.85)	0.042* (-1.85)	0.041* (-1.83)	0.044** (-1.98)	0.041** (-2.58)	0.044** (-2.44)
Trade openness, $t-1$	0.001*** (-3.72)	0.001*** (-3.69)	0.001*** (-3.85)	0.002*** (-4.64)	0.001*** (-5.08)	0.002*** (-4.92)
Ratio of direct tax to indirect tax, $t-1$				0.034*** (-4.25)		0.029*** (-3.89)
Consolidation (percent of GDP), $t-1$	0.006* (1.79)				0.004 (0.96)	
Consolidation (percent of GDP)*Dum_Large, <sup>2</sup> $t-1$		0.007** (1.99)				
Consolidation (percent of GDP)*(1 - Dum_Large), $t-1$		0.000 (0.01)				
Tax consolidation measure (percent of GDP), $t-1$			0.007 (-1.16)	0.004 (-0.82)		0.005 (-0.77)
Spending consolidation measure (percent of GDP), $t-1$			0.016*** (3.11)	0.010** (2.50)		0.013* (1.80)
Number of observations	524	524	524	510	524	510
Number of countries	17	17	17	17	17	17
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Source: IMF staff estimates.

Note: Dependent variable is log of disposable income Gini coefficient, taken from the Standardized World Income Inequality Database (SWIID). Heteroskedasticity and country-specific autocorrelation-consistent z-statistics are shown in parentheses. Country fixed effects and time fixed effects are included in each regression but are not reported. OECD: Organisation for Economic Co-operation and Development; PCSE: panel-corrected standard error.

<sup>1</sup>Panel regression system that is estimated using seemingly unrelated regression (SUR) consists of two equations: one in which disposable-income-based Gini is the dependent variable, and another in which market-income-based Gini is the dependent variable. Regression results on the latter equation are not reported.

<sup>2</sup>The size of large consolidation is defined to be greater than 1.5 percent of GDP.

\*\*\*Statistically significant at the 1 percent level, \*\*at the 5 percent level, \*at the 10 percent level.

whereas small consolidations do not (Table A1.1, column 2).<sup>48</sup> Spending-based consolidations significantly worsen inequality, but tax-based consolidations do not (columns 3, 4, 6). The coefficients on measures of spending-based consolidations suggest that a spending cut of 1 percent of GDP is associated with an increase of 1–1.6 percent in the Gini coefficient. Also, the progressivity of taxation, as

<sup>48</sup>This seems to reflect the fact that large consolidations tend to be longer in duration and largely based on spending retrenchment. Spending-based fiscal adjustment has been found to have more pronounced effects on inequality than tax-based adjustment. This is confirmed in the case studies presented later in this appendix.

measured by the ratio of direct to indirect taxes, is significantly negatively associated with inequality.

The results for the sample consisting of 48 advanced and emerging market economies during 1980–2010 show that greater progressivity in taxation and higher social spending reduce inequality (Table A1.2). The progressivity of taxation (the ratio of direct to indirect taxes) is significantly and negatively associated with inequality in disposable income, so that a 1 percent increase in the ratio is associated with a reduction of about 1.5 percent in inequality (Table A1.2, columns 1 and 3) as captured by the Gini coefficient.

On the expenditure side, social benefits (including medical services, social security pensions, and

**Table A1.2. Determinants of Income Inequality, 1980–2010**

Explanatory variables	Sample: Advanced economies and emerging markets						Sample: OECD countries	
	(1) SUR <sup>1</sup>	(2) SUR	(3) PCSE	(4) SUR	(5) SUR	(6) PCSE	(7) SUR	(8) PCSE
Real GDP per capita (log), $t-1$	0.178*** (5.91)	0.203*** (6.62)	0.138*** (3.69)	0.178*** (5.79)	0.211*** (6.94)	0.152*** (4.03)	0.103** (2.50)	0.066 (1.42)
Years of schooling (log), $t-1$	-0.134*** (-4.02)	-0.151*** (-4.57)	-0.114*** (-3.01)	-0.143*** (-4.26)	-0.169*** (-5.18)	-0.142*** (-3.74)	-0.115*** (-3.06)	-0.110** (-2.47)
Trade openness, $t-1$	-0.001*** (-3.44)	-0.001*** (-3.79)	0.000* (-1.69)	-0.001*** (-3.38)	-0.001*** (-4.00)	-0.001** (-1.98)	-0.001*** (-2.60)	-0.001** (-2.32)
Ratio of direct tax to indirect tax, $t-1$	-0.015*** (-2.87)	-0.008 (-0.97)	-0.016* (-1.76)					
Cyclically adjusted individual income tax (percent of potential GDP), $t-1$				0.000 (-0.26)	0.002 (1.31)	0.004** (2.14)	0.006*** (3.33)	0.008*** (3.37)
Cyclically adjusted corporate income tax (percent of potential GDP), $t-1$				-0.002 (-1.36)	-0.001 (-0.42)	-0.003 (-1.48)	-0.001 (0.26)	-0.002 (-0.73)
Cyclically adjusted indirect tax (percent of potential GDP), $t-1$				0.004*** (3.24)	0.005*** (3.85)	0.004** (2.40)	0.003 (0.98)	0.004 (1.16)
Wage bill (percent of potential GDP), $t-1$	-0.002 (-1.13)	-0.002 (-0.96)	-0.001 (-0.85)	-0.002 (-1.32)	-0.002 (-1.31)	-0.002 (-1.24)	-0.004* (-1.76)	-0.002 (-0.82)
Social benefits (percent of potential GDP), $t-1$	-0.001 (-0.76)	-0.002* (-1.78)	-0.001 (-1.12)	-0.002 (-1.57)	-0.003*** (-2.85)	-0.002* (-1.80)	-0.005*** (-3.39)	-0.004** (-2.18)
Unemployment rate, $t-1$	0.003*** (2.91)	0.004*** (3.53)	0.002** (2.09)	0.003*** (2.63)	0.004*** (3.41)	0.003** (2.44)	0.007*** (5.40)	0.005*** (3.76)
Information technology capital share, $t-1$	0.009** (2.28)	0.008* (1.89)	0.004 (1.34)	0.008** (1.99)	0.006 (1.46)	0.004 (1.23)	0.016*** (2.96)	0.008* (1.68)
Subsidies (percent of potential GDP), $t-1$		-0.005*** (-2.53)	0.001 (0.42)		-0.006*** (-2.76)	0.001 (0.30)	-0.011** (-2.56)	-0.003 (-0.56)
Capital spending (percent of potential GDP), $t-1$		0.002 (1.16)	-0.002 (-1.27)		0.000 (-0.20)	-0.003* (-1.81)	-0.002 (-0.55)	-0.003 (-1.23)
Consumer price index inflation, $t-1$							0.004*** (5.16)	0.002*** (2.70)
Number of observations	663	635	635	639	620	620	471	471
Number of countries	48	48	48	46	46	46	31	31
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: IMF staff estimates.

Note: Dependent variable is log of disposable-income Gini coefficient, taken from Standardized World Income Inequality Database (SWIID). Heteroskedasticity and country-specific autocorrelation-consistent z-statistics are shown in parentheses. Country fixed effects and time fixed effects are included in each regression but are not reported. OECD: Organisation for Economic Co-operation and Development; PCSE: panel-corrected standard error.

<sup>1</sup>Panel regression system that is estimated using seemingly unrelated regression (SUR) consists of two equations: one in which disposable-income-based Gini is the dependent variable, and another in which market-income-based Gini is the dependent variable. Regression results on the latter equation are not reported.

\*\*\*Statistically significant at the 1 percent level, \*\*at the 5 percent level, \*at the 10 percent level.

unemployment compensation) reduce inequality, especially in advanced economies. The implied magnitude of the impact that social benefits spending has on inequality suggests that increasing such spending by 1 percent of potential GDP is associated with a 0.2–0.5 percent reduction in inequality.

The government wage bill, subsidies, and public capital spending also tend to be negatively associated with inequality, although the regression results are fragile. The negative coefficients of wage bills suggest that increases in government employee pay are associated with lower inequality, which seems to

imply that government employees occupy a below-average position in the income distribution of the population. In contrast, the opposite sign is obtained for the coefficient of wage bills in low-income countries (higher government wages widen inequality), which suggests that government employees may be better compensated than the average employee in those countries. Subsidies—including transfers to compensate public corporations for losses on the transportation, electricity, and other services they provide—tend to have a greater impact in reducing inequality. Although the statistical significance

of subsidies is sensitive to estimation methods, the seemingly unrelated regression estimates suggest that an increase in subsidies of 1 percent of potential GDP is associated with a 0.5–1.1 percent reduction in inequality. Of course, a policy to reduce inequality that targets these subsidies to low-income consumers would be even more effective and also less costly.

### *Impact of selected nonfiscal factors on income inequality*

Consistent with the literature, education and trade openness are found to lower inequality. Evidence of an inverse U-shaped relationship between income per capita and inequality is also found, with inequality starting to decrease when per capita income exceeds about \$17,700 in 2005 international dollars.<sup>49</sup>

Unemployment is found to be a significant determinant of income inequality. A 1 percentage point rise in the unemployment rate is associated with a 0.2–0.4 percent increase in inequality (0.5–0.7 percent for advanced economies). To gauge the impact of consolidation on inequality via unemployment, the model described in Box A1.1 to derive the dynamic impact of consolidation on unemployment is used. Consolidation seems to start affecting unemployment almost immediately: a consolidation of 1 percent of GDP leads to a 0.19 percentage point increase in the unemployment rate in the first year and a 1.7 percentage point increase cumulatively over five years.<sup>50</sup> A 1 percentage point increase in the unemployment rate is associated with an increase in inequality of about 0.2–0.3 percent, which suggests that about 15–20 percent of the increase in inequality due to fiscal consolidation might be occurring via unemployment (Table A1.2). Of course, in many cases a failure to consolidate fiscal accounts could lead to an economic crisis and an even larger rise in unemployment.

Skill-biased technological progress is also found to contribute significantly to rising income inequality:

<sup>49</sup>An international dollar is based on purchasing power parity exchange rates and has the same purchasing power as the U.S. dollar. Consumer price index inflation was also tried, but the resulting coefficients were nonsignificant.

<sup>50</sup>See Bova and others (2012) for details.

ity: a 1 percentage point gain in the IT share of total capital is associated with a 0.8–1.6 percent increase in inequality.<sup>51</sup> To put this in perspective, take the cases of Korea and the United States. In 2007, the IT capital share was 3.5 percent in Korea and 8.2 percent in the United States, and in 2008 the respective Gini coefficients for disposable income were 31.4 and 36.0, a gap of 4.6 Gini points. The difference in the IT capital share can account for more than 25 percent of this gap.

### **Case study of fiscal consolidation episodes**

Upon examination of twelve large fiscal consolidation episodes (six spending based and six tax based),<sup>52</sup> the impact on income distribution is found to vary with the composition of the consolidation package, a country's position in the business cycle, and labor market conditions.<sup>53</sup>

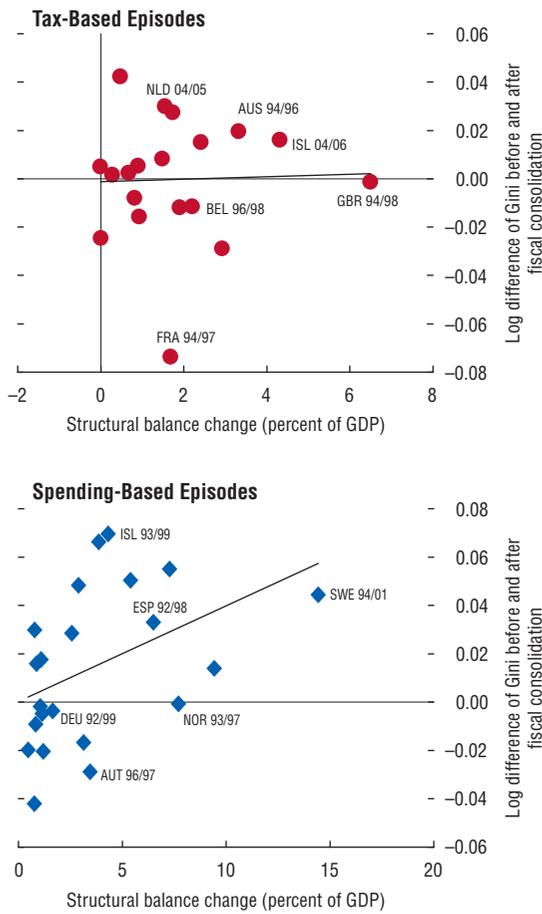
Spending-based consolidations (as in Iceland, 1993–99, and Spain, 1992–98), or tax-based consolidations with a significant portion of expenditure measures (as in the United Kingdom, 1994–98), tend to be larger and longer in duration, with more-pronounced effects on inequality, than tax-based consolidations (Figure A1.3). Regarding the composition of austerity measures, cuts in social benefits tend to worsen inequality more than other spending reductions (as in Germany, 1992–99, and Norway, 1993–97); tax-based consolidations that rely more on indirect taxes or are mixed with expenditure cuts tend to worsen inequality (e.g., that in Iceland, 2004–06). In some of the episodes that ended with lower inequality (for example, those in Australia, 1994–96; Belgium, 1996–98; and France, 1994–97), indirect tax increases were combined with

<sup>51</sup>The results are robust to using alternative dynamic panel regression specification and alternative data sets using World Income Inequality Data, the Luxembourg Income Study, and the World Bank's PovcalNet or alternative measures of inequality (ratios of top-to-bottom quintiles and labor income share).

<sup>52</sup>The spending-based consolidation episodes were Australia, 1994–96; Belgium, 1996–98; France, 1994–97; Iceland, 1993–99; the Netherlands, 2004–05; and the United Kingdom, 1994–98. The tax-based consolidation episodes were Austria, 1996–97; Germany, 1992–99; Iceland, 2004–06; Norway, 1993–97; Spain, 1992–98; and Sweden, 1994–2001 (see Figure A1.3).

<sup>53</sup>See Bastagli, Coady, and Gupta (2012) and IMF (2010a) for more discussion on inequality and fiscal policy.

**Figure A1.3. Changes in Income Inequality: Spending-Based versus Tax-Based Consolidation Episodes**



Sources: Bova and others (2012); Eurostat; PovcalNet; national sources; World Income Inequality Database (WIID); and IMF staff estimates.  
 Note: Episodes drawn from World Economic Outlook action-based consolidation database, and size of fiscal consolidation calculated as the change in structural balances. Episodes absent from the database but with large structural changes (annual increase > 0.5 percent of GDP) are also included.

offsetting measures such as direct measures targeted at poor households.

Unemployment appears to be an important factor behind the increases in inequality, and hence, fiscal consolidations undertaken during recessions could have a greater impact on inequality. Social benefit cuts and tax increases amid rising unemployment (as, for example, in Spain, 1992–98, and Sweden, 1994–2001) seem to have led to higher inequality than those undertaken during nonrecession periods (such as those in Austria, 1996–97, and Belgium, 1996–98).

**Concluding remarks**

In many countries, large fiscal adjustments are expected to be required for a long time in order to reduce debt-to-GDP ratios. Fiscal consolidation will inevitably have a negative impact on incomes in the short run, but it is an open question how the cost of consolidation will be distributed. For reasons of equity and also of political economy—fiscal adjustments that are seen as being unfair are unlikely to be sustainable—it is critical that the costs associated with fiscal consolidations and weaker growth be shared equitably throughout the economy. To the greatest extent possible, therefore, adjustment packages should be carefully designed to ensure that the burden of adjustment does not fall disproportionately on the poor. For example, progressive taxation and targeted social benefits and subsidies introduced in the context of a broader decline in spending can help offset some of the distributional impact of consolidation. More generally, fiscal policy can address both inequality and growth by promoting education and training among low- and middle-income workers.

### Box A1.1. The Dynamic Effects of Fiscal Consolidation on Inequality of Disposable Income

To examine the dynamic impact of fiscal consolidation on inequality, a univariate autoregressive model is extended to include the current and lagged impacts of the shock in an unbalanced annual panel for 1978–2009:<sup>1</sup>

$$g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{k=0}^2 \delta_k F_{i,t-k} + v_i + \mu_t + e_{it}$$

where  $i$  is a country;  $t$  is a year;  $g_{it}$  denotes the Gini coefficient for disposable income;  $v_i$  are country-specific fixed effects;  $\mu_t$  are time-fixed effects; and  $F_{it}$  is a measure of fiscal consolidation (as a percentage of GDP) for 17 member countries of the Organisation for Economic Co-operation and Development (OECD) (from Devries and others, 2011). The number of lags has been restricted to two, but the presence of additional lags is rejected by the data.<sup>2</sup>

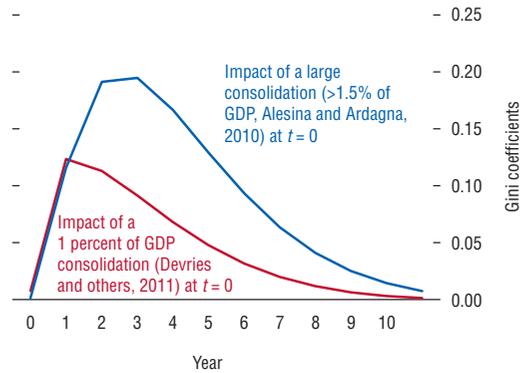
Overall, the Gini coefficient for disposable income tends to start rising about one year after the consolidation. A consolidation of 1 percent of GDP raises the Gini coefficient by 0.13 in the first two years and by 0.52 cumulatively over five to six years (subsequently the impact gets smaller, and disappears by the tenth year, as shown in Figure A1.1.1).<sup>3</sup> On average, the 0.13 and 0.52 increases in the

<sup>1</sup>The methodology closely follows Cerra and Saxena (2008) and IMF (2010c). Country fixed effects are correlated with the lagged dependent variables in the autoregressive model, causing a dynamic panel bias. However, the order of bias is  $1/T$  (Nickell, 1981), so the bias is small in this data set, with  $T = 32$  and  $N = 17$  (see Judson and Owen, 1999). As robustness checks, a system generalized method of moments as well as a bias-corrected least-squares dummy variable estimator (Bruno, 2005) is tried. The results are very similar.

<sup>2</sup>Coefficients of the two lagged terms of the fiscal consolidation are jointly significant at the conventional level.

<sup>3</sup>Results are closely similar when the Gini coefficient or its log is used in the dynamic panel regression. The Gini coefficient is employed here to facilitate interpretation of the chart.

**Figure A1.1.1. Dynamic Effects of Fiscal Consolidation on Inequality**



Source: Bova and others (2012).

Gini are equivalent to increases in inequality of 0.4 percent and 1.8 percent, respectively (the OECD average of the Gini coefficient for disposable income is 30.02). The order of magnitude of the impact (a 0.4 percent rise in the first two years) is comparable to a 0.5–0.6 percent increase suggested by the baseline regression (Table A1.1). Also, an alternative measure of fiscal consolidation from Alesina and Ardagna (2010) is used.<sup>4</sup> The result is qualitatively similar, suggesting that a consolidation raises the Gini coefficient by 0.12 in the first two years and by 1.0 cumulatively over five to six years.

<sup>4</sup>The measure is a dummy variable taking a value of 1 in the year of a large consolidation and 0 otherwise, where a large fiscal consolidation is defined by Alesina and Ardagna (2010) to be larger than 1.5 percent of GDP. Thus, the result is not directly comparable to that based on the consolidation measure from Devries and others (2011).

## Appendix 2. Fiscal Policies to Address Weak Employment

The global financial crisis has driven up unemployment in much of the world since 2007. But in many advanced and emerging market economies, the employment situation was weak even before the crisis hit, reflecting underlying structural weaknesses. In 2007, for example, unemployment in advanced and emerging economies averaged 6½ percent, compared to 8½ percent in 2011. This suggests that unemployment will remain a challenge as the global economy recovers and cyclical conditions improve. This appendix discusses tax and expenditure measures that could boost employment, focusing on incentives to increase labor demand and supply, rather than on the impact of fiscal policy on employment through aggregate demand effects.<sup>54</sup>

### The links between fiscal policy and employment

Low employment rates—low proportions of the working-age population with jobs—can be the result of high unemployment, low participation in the labor force, or both. Involuntary unemployment creates an unambiguous social loss, both in direct human terms and by reducing output (Dao and Loungani, 2010). Low participation in the labor force is also suboptimal to the extent that it reflects a high share of “discouraged workers”—those who withdraw from the labor market because of weak job prospects—or indicates strong disincentives to work because of taxes and social benefits. Raising participation in the labor force over the medium term can help spur economic growth as well as contribute to fiscal consolidation by expanding the tax base and offsetting some of the effects of population aging.

Empirical studies confirm that taxes on labor (personal income and social security taxes) matter significantly for employment. First, these taxes reduce labor demand by driving up labor costs. Cross-country panel studies indeed find that in OECD countries, an increase of 10 percentage points in the labor tax wedge raises structural unemployment by

2.8 percentage points (Bassanini and Duval, 2006).<sup>55</sup> Likewise, the labor tax wedge depresses labor supply by lowering employees’ net compensation. For example, with an elasticity of labor supply of 0.5 (as in Chetty and others, 2011), a reduction of 10 percentage points in the labor tax wedge would raise total labor supply by 8 percent.

Social benefits affect labor markets in much the same way as taxes, by weakening the link between labor supply and incomes. Microeconomic studies find that high levels of unemployment benefits and long duration periods increase spells of unemployment and reduce rates of reemployment. Cross-country evidence suggests that an increase of 10 percentage points in the benefit replacement rate (unemployment benefits as a share of the worker’s net wage) raises the structural unemployment rate by 1 percentage point (Bassanini and Duval, 2006).

Some government programs can help reduce unemployment by improving the matching of workers seeking jobs and job vacancies. Some ALMPs, such as job search assistance and training programs, are effective in reducing unemployment (Card, Kluge, and Weber, 2010). Public sector employment programs, however, are ineffective in boosting jobs over the longer term.

### Fiscal policy reforms to boost employment

There are large differences across economies with respect to both unemployment and labor force participation rates (Figure A2.1). Behind these aggregates are more specific labor market weaknesses (Table A2.1), both for unemployment (total, for youth, for the unskilled, and long term) and labor force participation (total, by gender, and by age group). Given the wide divergence in labor market challenges, country-specific strategies are likely to be the most effective.

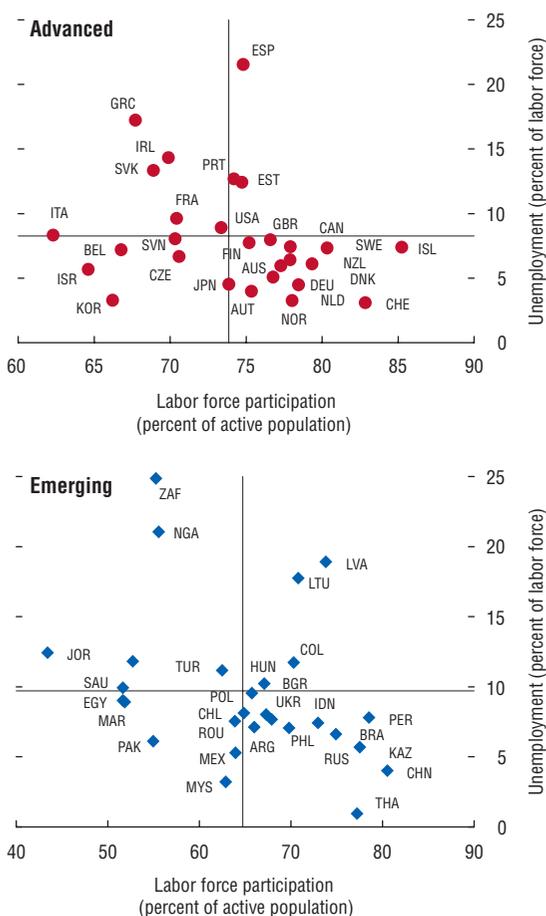
The following criteria and constraints should be taken into account in designing country strategies:

- *Short- and medium-term objectives.* For economies in which unemployment has risen sharply

<sup>55</sup>The labor tax wedge is defined as the difference between the labor costs paid by employers and the net compensation received by workers owing to income taxes and social insurance contributions.

<sup>54</sup>This appendix is based on IMF (2012b).

**Figure A2.1. Advanced Economies and Emerging Markets: Unemployment and Labor Force Participation Rates**



Sources: International Labour Organization, Key Indicators of the Labour Market (KILM); Eurostat, EU Labor Force Surveys; Organisation for Economic Co-operation and Development; and IMF staff estimates and projections. Note: Data for advanced economies refer to 2011, those for emerging markets to 2010.

in the wake of the crisis, an immediate priority is to restore labor demand. This puts a particular premium on implementing fiscal consolidation in the most growth-friendly manner possible. Beginning or strengthening ALMPs that help match supply and demand are also an immediate priority to reduce high rates of natural unemployment. Measures to promote labor force participation will likely have little impact on employment in the short run and may even increase recorded unemployment. This has important implications for the timing of these measures.

- *Financing constraints.* Economies with tight financing constraints should prioritize reform options that are budget neutral or can provide budgetary savings. Countries may also need to seek financial support from external sources, such as the Structural Funds of the European Union or multilateral development banks.
- *Cost-effectiveness.* This will vary across economies in light of the differing nature of employment problems, labor market institutions, and the scale of reforms. For example, some programs (such as hiring subsidies) can lose effectiveness as they expand beyond target groups with high rates of long-term unemployment. A country’s administrative capacity is an important consideration for determining its ability to implement employment-enhancing measures, such as ALMPs, in an efficient manner.
- *Scope for complementary labor market reforms.* Measures to increase the supply of labor will lead to more employment only when the extra supply gets absorbed by rising labor demand. The effectiveness of fiscal policies can therefore be enhanced by labor market reforms that increase wage flexibility and by reforms in product and capital markets to encourage job growth.
- *Equity goals.* Reforms should help mitigate trade-offs between employment and equity, including through greater use of ALMPs and in-work tax credits and benefits.

**Cutting unemployment**

Reductions in employer social security contribution rates can boost labor demand in the short term by lowering nonwage labor costs. If fiscal constraints do not permit lower revenues, the lower contributions could be accompanied by higher consumption taxes (or higher property taxes) as part of a revenue-neutral reform. The effects of such tax shifts have been subject to extensive analysis for closed economies, but they have recently received more attention in open economies with a fixed exchange rate, where they might induce a “fiscal devaluation.” Indeed, fiscal devaluations could speed up convergence to the long-run equilibrium by reducing real labor costs and improving competitiveness, thus raising employment above that in the initial situation (see

**Table A2.1. Key Labor Market Challenges for Different Country Groups**  
(Percent)

	Advanced Europe				Other Advanced		Emerging				
	South	East	North	Other	US-CAN	Other	Europe	MENA	Latin America	Asia	Africa
<b>Unemployment rate</b>											
Total	15	10	6	7	8	5	11	11	7	5	24
Youth	31	25	17	16	17	12	21	26	17	11	...
Long-term	47	44	17	38	20	17	39	...	...	...	...
Low-skilled	12	23	8	11	14	7	16	...	5	...	...
<b>Labor force participation rate</b>											
Total	70	71	80	75	76	72	67	50	70	68	59
Males, age 25–54	92	93	92	93	90	91	88	93	95	97	83
Males, age 55–64	58	58	76	71	69	78	54	60	79	79	75
Females, age 25–54	75	83	85	81	78	72	74	27	64	62	65
Females, age 55–64	37	40	70	47	58	56	35	11	41	42	56

Sources: International Labour Organization, Key Indicators of the Labour Market (KILM); Eurostat, EU Labor Force Surveys; Organisation for Economic Co-operation and Development; and IMF staff estimates and projections.

Note: Data for unemployment rates and labor force participation rates for advanced economies are for 2011; other data are for 2010. Grey signifies good performance with limited room for improvement (unemployment: total < 5, youth < 15, long-term < 20, low-skilled < 10; participation: total > 75, males age 25 to 54 > 90, males age 55 to 64 > 70, females age 25 to 54 > 75, females age 55 to 64 > 55). Yellow signifies intermediate-level performance with some room for improvement. Red signifies relatively weak performance with substantial room for improvement (unemployment: total > 10, youth > 20, long-term > 40, low-skilled > 20; participation: total < 55, males age 25 to 54 < 80, males age 55 to 64 < 60, females age 25 to 54 < 60, females age 55 to 64 < 40). Country groups: Advanced Europe: South = Greece, Italy, Portugal, Spain; East = Czech Republic, Estonia, Slovak Republic, Slovenia; North = Denmark, Finland, Iceland, Norway, Sweden; Other = Austria, Belgium, France, Germany, Ireland, Netherlands, Switzerland, United Kingdom. Other advanced: US-CAN = United States and Canada; Other = Australia, Israel, Japan, Korea, New Zealand. Emerging: Europe = Bulgaria, Hungary, Latvia, Lithuania, Poland, Romania, Russian Federation, Turkey, Ukraine; Middle East and North Africa (MENA) = Egypt, Jordan, Morocco, Saudi Arabia; Latin America = Argentina, Brazil, Chile, Colombia, Mexico, Peru; Asia = China, India, Indonesia, Kazakhstan, Malaysia, Pakistan, Philippines, Thailand; Africa = Kenya, Nigeria, South Africa.

the September 2011 *Fiscal Monitor*; and De Mooij and Keen, 2012).

The long-term employment effects of tax shifts depend on the extent to which the tax burden is moving from labor income toward other incomes. Price adjustments will eventually drive up wage costs for employers. Therefore, the impact of a tax shift on employment is expected to gradually disappear, thereby leaving the long-run equilibrium under full wage flexibility undisturbed. The adjustment, however, can take quite some time (De Mooij and Keen, 2012). Moreover, there may be more subtle effects that render the long-term effects of a tax shift positive for growth and employment. For instance, consumption taxes, which affect all incomes that support consumption, including income from economic rents and social transfers, have a broader base than social contributions.

Temporary measures can help mitigate large increases in unemployment during downturns and avoid structural increases due to hysteresis effects. For

instance, employment support schemes—which allow employers to reduce hours worked while the government compensates workers for the resulting loss of income—can reduce job layoffs (Cahuc and Carcillo, 2011). The scope and duration of these measures should be limited to avoid adverse long-term economic effects. Public works programs—which create temporary jobs in the public sector—can be effective in increasing employment in the short run. But they should be phased out as economic activity recovers and should not lead to permanent increases in the size of the public sector. Indeed, under permanent public works schemes, private employment tends to get crowded out, the government incurs large costs, and public sector employees gain skills that are often not transferable to the private sector (Kluve, 2010).

A strengthening of ALMPs can also help tackle unemployment. To be most effective, hiring subsidies and job training should be targeted to specific groups—in particular, young workers, the unskilled,

and the long-term unemployed (Box A.2.1). These programs should focus on providing on-the-job training and intensive contact with employers to facilitate the transition to paid employment.

### Boosting labor force participation

Many economies could benefit from revenue-neutral tax reforms that mitigate the labor supply distortions of the labor tax wedge. For instance, policies to broaden the tax base while reducing rates may improve labor supply incentives, and they may have only modest distributional implications if the tax deductions that are eliminated or reduced primarily affect higher-income groups. Moreover, progressive income tax schedules—that is, those that increase the tax burden (in percent of income) as income rises—can reduce labor tax wedges in the market for low-skilled workers, where distortions are the largest.

Empirical studies point to significant differences in labor supply elasticities among groups. Tax and spending reforms should thus be targeted to groups that are most responsive to financial incentives:

- *Low-skilled workers.* The withdrawal of social benefits as labor market earnings rise operates like a tax on earned income and can generate very large disincentives for low-wage earners to seek paid employment. To mitigate this effect and encourage low-skilled employment, more than half of advanced economies have introduced “in-work” tax credits targeted to low labor incomes. Evaluation studies consistently report beneficial net employment effects from these policies (Immer-voll and Pearson, 2009).
- *Women and secondary earners.* The scope for increasing female labor force participation is significant, as female labor participation rates remain on average almost 20 percentage points below those of men. The supply of female workers is found to be more responsive to taxes than that of males. Thus, tax relief targeted to women would likely elicit a positive net supply response, even when financed by higher taxes on men. In countries that currently apply family taxation, such as France, Portugal, and the United States, moving to individual taxation would help reduce high marginal tax rates for the secondary earner

in couples. Family benefit systems could also be reformed to increase female labor force participation rates. Publicly financed parental leave schemes, with a guarantee for young mothers to return to the jobs they held prior to taking leave, can help keep such mothers connected to the labor market. Still, very long durations for paid leave provide incentives for mothers to take lengthy spells out of the labor market, which can result in a deterioration of their work skills and damage their future employment opportunities. High child allowances also reduce incentives for women to enter the labor market, especially those with low earning capacity. Reducing benefit levels for older school-aged children and linking benefits to labor force participation can increase incentives to rejoin the labor market. Since child care generally needs to be available to support the labor force participation of parents, child care subsidies may also be effective. Indeed, Gong, Breunig, and King (2010) and Kalb (2009) review a total of 31 studies in 10 countries and find that the elasticity of female labor supply with respect to the price of child care is usually between 0.13 and  $-0.20$ . Hence, if subsidies reduce the price of child care by 50 percent, labor supply of young mothers will rise by 6.5–10 percent.

- *Older workers.* In many countries, it is often financially beneficial to retire as early as possible, which puts the actual retirement age well below the statutory retirement age. Making pensions actuarially neutral can reduce distortions and result in a significant increase in employment rates among older age groups (Gruber and Wise, 2004).

### Details matter

Designing appropriate fiscal policies to boost employment does not always require cutting benefits and tax rates. Reforms in program design (for example, changes in the incentive structure and better targeting) can often mitigate the adverse impact on employment that comes from high unemployment benefits and high tax wedges. For example, Scandinavian countries have achieved high employment ratios in spite of high social benefits by imposing strict eligibility requirements, rigorous job

search requirements, and mandatory participation in ALMPs. Moreover, despite high tax wedges, labor force participation rates are high in Scandinavia because of extensive child care support for working parents and because benefits are closely tied to work (in-work benefits and actuarially fair pensions). This illustrates that interactions between policies matter and that details of policy design are important.

### Conclusions

Better tax and expenditure policies can significantly boost employment. The appropriate reform mix will differ across countries and needs to be

adapted to each country's employment challenges, labor market institutions, and fiscal constraints. To reduce unemployment, countries could examine the scope for reducing labor taxes and expanding temporary employment support schemes, although the latter should be phased out as economic activity recovers. ALMPs that focus on the long-term unemployed and groups with chronically high unemployment rates, such as the young, can also help reduce unemployment. Over the medium term, a promising approach to raising labor supply is to target groups that are most responsive to employment-enhancing policy initiatives: low-skilled workers, women, and older workers.

### Box A2.1. Options for Addressing Specific Unemployment Problems

#### *Youth unemployment*

Tackling high youth unemployment calls for comprehensive policy packages that improve both training and job matching. Nonfiscal measures may be necessary to address skill mismatches; to facilitate access to on-the-job training; and, for youth, to tackle stringent regulations controlling hiring and firing and high minimum wages. Fiscal policies can complement these efforts through effective job search assistance, targeted study-and-work programs, and well-tailored wage subsidies, such as those for apprenticeship contracts targeted at those who have difficulty entering or staying attached to the labor market. Benefits for unemployed youth should be conditional on participation in these programs.

#### *Low-skilled unemployment*

Empirical evidence suggests that the demand for low-skilled labor is relatively elastic and therefore

reacts more strongly to policy measures (Hammermesh, 1996). Such measures could include targeted reductions in nonwage costs, such as establishing a threshold below which social contributions are reduced or eliminated, or hiring subsidies focused on low-skilled workers.

#### *Long-term unemployment*

To mitigate the disincentives to choose employment over “passive” benefits such as unemployment and disability benefits, many countries have strengthened the “activation requirements” attached to the receipt of these benefits. These include mandatory job search and training programs. The monitoring and enforcement of these conditions, however, make benefit schemes more complex and administratively demanding.