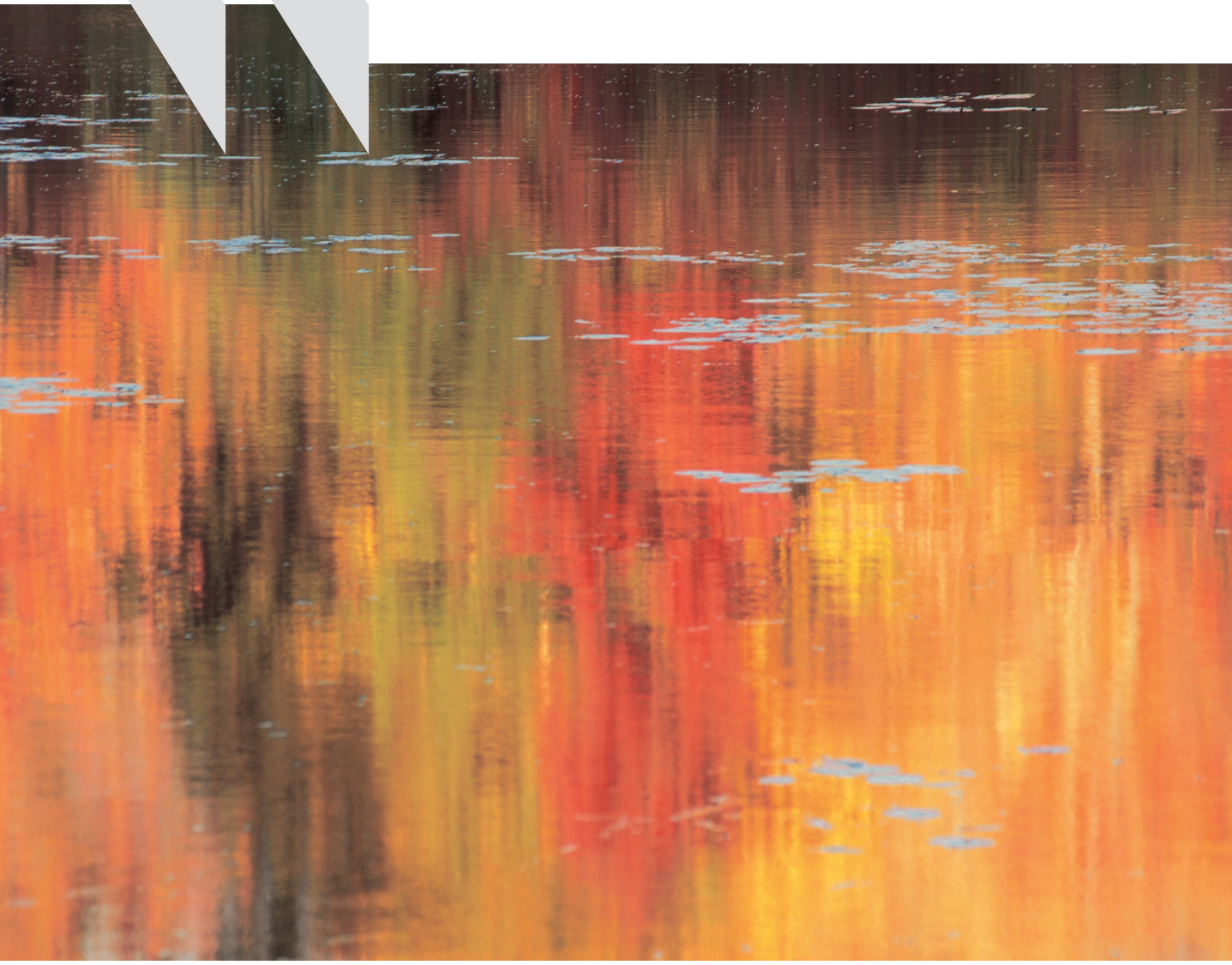
OECD Economic Surveys

UNITED STATES



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OECD Economic Surveys: United States 2010

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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This Survey is published on the responsibility of the Economic and Development Review Committee of the OECD, which is charged with the examination of the economic situation of member countries.

The economic situation and policies of the United States were reviewed by the Committee on 28 June 2010. The draft report was then revised in the light of the discussions and given final approval as the agreed report of the whole Committee on 26 July 2010.

The Secretariat's draft report was prepared for the Committee by David Carey, Alan Detmeister and Robert Hagemann, with research input from Joseph Chien and statistical assistance from Jérôme Brezillon, under the supervision of Patrick Lenain.

The previous Survey of the United States was issued in December 2008.

BASIC STATISTICS OF THE UNITED STATES

THE LAND

Area (1 000 sq. km)	9 826

Population of major cities, including their metropolitan areas, 2009 (thousands):

New York-Northern New Jersey-Long Island	19 070
Los Angeles-Long Beach-Santa Ana	12 875
Chicago-Naperville-Joliet	9 581

THE PEOPLE

Resident population, 1 July 2008 (est.)	302 786 000
Number of inhabitants per sq. km	30.8
Annual net natural increase (average 2001-2008)	2 682 875
Natural increase rate per 1000 inhabitants (average 2001-2008)	3.3
Civilian labour force, Q1 2010 (thousands)	153 531
of which :	
Unemployed Q1 2010 (thousands)	14 904
Net immigration (2008) thousands	883

PRODUCTION

Gross domestic product in 2009 (billions of USD)	14 256
GDP per head in 2009 (USD)	47 495
Gross fixed capital formation	
Per cent of GDP in 2009	15.9
Per head in 2008	8 772

Origin of national income in 2009 (per cent of national income)[1]:

Manufacturing	9.7
Finance, Insurance and real estate	18.2
Services	30.8
Government and government enterprises	13.0
Other	28.2

THE GOVERNMENT

Head of State: President Barack OBAMA (Democrat)

Government consumption 2009 (per cent of GDP)	17.0
Government current receipts, 2009 (per cent of GDP)	30.2
Federal government debt held by the public (per cent of GDP), end of year 2009	52.9

Composition of the Congress as of November 2008:	House of Representatives[2]	Senate
Democrats	253	57
Republicans	178	41
Independents	0	2
Undecided	4	0
Total	435	100

FOREIGN TRADE

Exports:

Exports of goods and services as per cent of GDP in 2009	11.0
Main exports, 2009 (per cent of merchandise exports):	
Foods, feeds, beverages	9.0
Industrial supplies	27.2
Capital goods	37.6
Automotive vehicles, parts	7.9
Consumer goods	14.5

Imports:

Imports of goods and services as per cent of GDP in 2009	13.7
Main imports, 2009 (per cent of merchandise imports):	
Foods, feeds, beverages	6.9
Industrial supplies	16.3
Petroleum	21.2
Capital goods	31.0
Automotive vehicles, parts	13.4
Consumer goods	13.4

1. Without capital consumption adjustment.
2. Voting members.

Executive summary

Rebalancing the economy after the crisis

Buoyed by substantial policy support and improving financial conditions, the economic recovery is progressing. Monetary policy should remain accommodative to support the economy as fiscal policy tightens, but the ground work for eventual interest rate increases is already being laid, a task that should continue. In the labour market, additional support for job training and enhanced education may be required to reintegrate workers whose skills will become degraded from long periods of unemployment or whose skills will no longer match up with the needs of employers. The reform effort should focus on policies that contributed to the imbalances. In particular, as the housing market recovers and home prices rise, public support to homeownership should be decreased to curb incentives for overinvestment in housing. Implementation of financial reform needs to better address problems of incentives in the banking sector and tackle problems of moral hazard. Higher public and private saving and stronger exports would limit the extent that large current account imbalances re-emerge and would support matching efforts that should be taken in surplus countries.

Restoring fiscal sustainability

As other OECD countries, the United States is exiting the recession with a large budget deficit and a rising public debt. This could eventually raise concerns among bond-market participants, though they have thus far shown no concern with the ability of the United States Government to fund its debt. The Administration has proposed to reduce the federal deficit from about 10½ per cent of GDP in 2010 to 3% in 2015, which would stabilize the debt-GDP ratio. Measures have been identified to cover most of the fiscal effort and a bi-partisan commission was mandated to suggest complementary actions. While this is welcome, it would stabilize the debt-GDP ratio at almost twice the pre-crisis level, leaving little freedom to deal with contingencies and complicating further the long-term problem of population ageing. Further consolidation measures should be taken post 2015 to put the debt-GDP ratio on a downtrend during the second half of the decade. To achieve this goal, spending restraint is unlikely to suffice, so taxes will also have to increase. In order to limit the negative impact on economic incentives, base-broadening by phasing out distorting tax exemptions should be the first priority. In the long term, it will be necessary to restrain the growth in entitlement spending, notably for Medicare and Medicaid.

Implementing cost-effective policies to mitigate climate change

Emissions of greenhouse gas (GHG) by human activities are causing potentially very costly climate change. As a major emitter of carbon, the United States has a pivotal role to play in an agreement to reduce emissions. The cost-effective way to reduce these emissions is to price them and to support the development and deployment of emission-reducing technologies, which will reduce future abatement costs. These are the approaches that the current Administration is following as it endeavours to put in place a comprehensive climate-change policy. The House of Representatives passed legislation along these lines in 2009 but the Senate has not done so. If such legislation is not passed, the US Environmental Protection Agency (EPA) will progressively extend regulation to reduce emissions from motor vehicles to all other sectors. This would be a less cost-effective approach to reducing emissions and is unlikely to deliver emission reductions compatible with likely US commitments in any global agreement.

Assessment and recommendations

1. Rebalancing the economy after the crisis

The recovery from the worst peacetime recession is underway

The economic recovery in the United States from arguably the most significant recession since the Great Depression of the 1930s is underway amid substantial economic stimulus (Table 1). Real output has grown at a notable pace since the third quarter of 2009 and net job gains, which typically lag output, turned positive at the start of 2010.

Table 1. **Demand and output**

	2008	2009	2010	2011	Fourth quarter		
					2009	2010	2011
	Current prices $ billion	Percentage changes from previous year, volume (2005 prices)					
Private consumption	10 104	–1.2	1.5	2.3	0.2	1.9	2.5
Government consumption	2 383	1.9	1.0	0.9	1.0	1.2	0.7
Gross fixed investment	2 633	–14.8	3.9	9.6	–10.3	7.8	10.3
Public	496	0.2	0.7	1.4	–0.2	1.6	0.6
Residential	472	–22.9	–1.5	3.8	–13.4	–2.2	8.7
Non-residential	1 665	–17.1	6.6	13.9	–12.7	12.8	14.0
Final domestic demand	15 121	–3.1	1.8	3.1	–1.4	2.7	3.4
Stockbuilding[1]	–41	–0.6	1.3	–0.1	0.5	0.6	0.0
Total domestic demand	15 080	–3.6	3.1	3.0	–0.9	3.2	3.4
Exports of goods and services	1 843	–9.5	12.1	8.2	–0.1	9.6	8.0
Imports of goods and services	2 554	–13.8	13.2	10.0	–7.2	15.5	8.0
Net exports[1]	–710	1.2	–0.5	–0.6	1.2	–1.2	–0.3
GDP at market prices	14 369	–2.6	2.6	2.6	0.2	2.1	3.2
Memorandum items:							
Unemployment rate[2]		9.3	9.7	9.0	10.0	9.7	8.5
Household saving ratio[2, 3]		5.9	5.8	6.0	5.5	5.9	6.2
General government net lending[4]		–11.3	–10.5	–8.7	–	–	–
Federal government net lending[4]		–10.5	–9.2	–8.2	–	–	–
Current account balance[4]		–2.7	–3.4	–3.7	–	–	–
Consumer price index inflation		–0.3	1.5	1.1	1.5	0.8	1.1

Note: National accounts are based on official chain-linked data. This introduces a discrepancy in the identity between real demand components and GDP. For further details see *OECD Economic Outlook* Sources and Methods *(www.oecd.org/eco/sources-and-methods)*.

1. Contributions to changes in real GDP (percentage of real GDP in previous year), actual amount in the first column.
2. Year average in first three columns. Fourth quarter value in final three columns.
3. As a percentage of disposable income.
4. Calendar year average as a percentage of GDP.

Source: OECD, Preliminary revision to May 2010 *Economic Outlook* projections based on incoming data and indicator-model update for the second half of 2010.

Nevertheless the pace of growth is expected to be more moderate than most expansions, as recovery from severe financial crises is often slow and protracted (Reinhart and Rogoff, 2009). The recent financial crisis and recession inflicted considerable damage on the economy – most notably a significant tightening of credit and the loss of one-quarter of household net worth between the middle of 2007 and early 2009. Since then, though, between ⅓ and ½ that loss has been made up. Rebuilding the remaining lost net worth and reducing debt burdens will restrain domestic demand over the next couple of years. It is also likely that the financial crisis and response have raised the cost of capital for the foreseeable future and thus lowered potential output relative to its pre-crisis path. The high level of long-term unemployment could push down labour force participation for the next few years. Previous US recessions have exhibited no long-term damage to the economy or long-term increase in unemployment, but it is possible this recession will trigger these effects.

Unemployment will remain high for some time

With sluggish demand growth, the US labour market will take a significant amount of time to recover fully. Previous downturns throughout the OECD suggest that unemployment climbs more rapidly in recessions than it falls during recoveries. The normalisation of labour-market conditions is often a long healing process following severe recessions. After the US recessions of the early 1980s and 1990s, the return to pre-recession unemployment levels took about one-third longer than the preceding unemployment increase, and after the 2000 recession it took about 60% longer. During the 2007-09 recession, unemployment rose for 2½ years before peaking in the fourth quarter of 2009 at 10% of the labour force, suggesting that it could be early 2013, at best, before the rate returns to its pre-recession level.

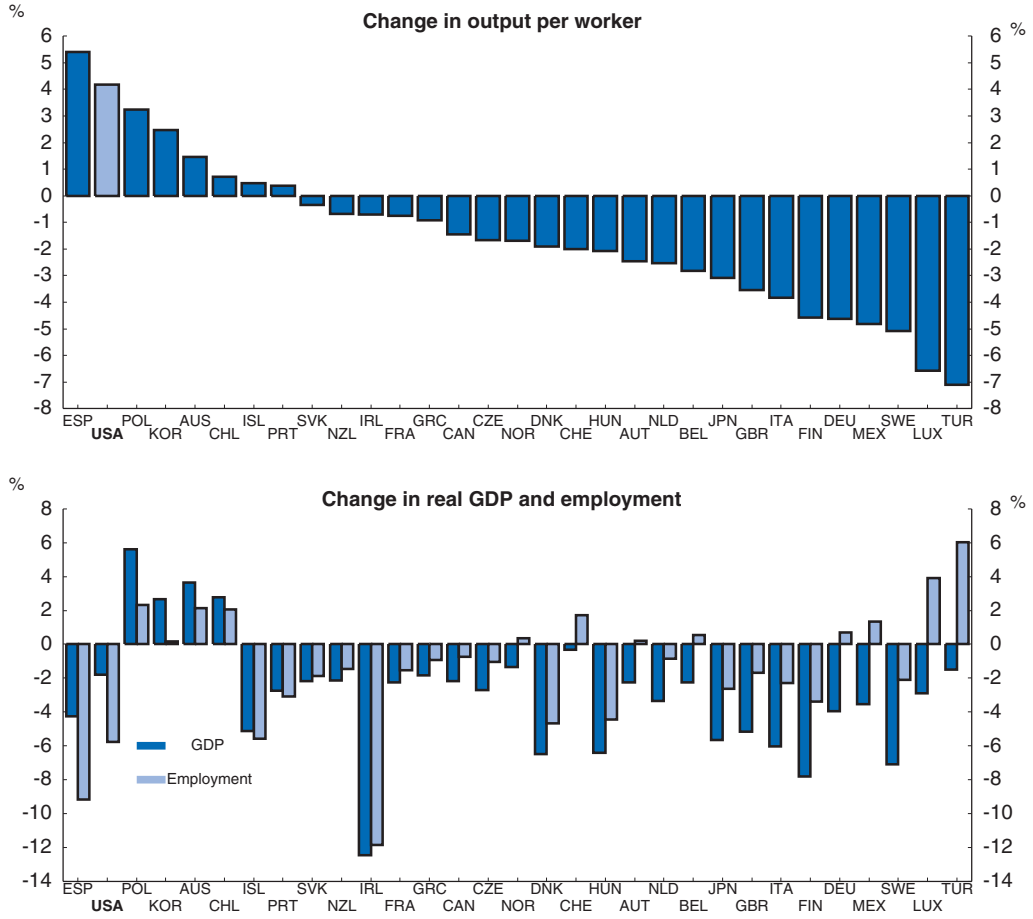
During the recession, net job losses have been large in the United States by OECD standards, while the fall in output has been relatively moderate, increasing productivity (Figure 1). Relatively flexible employment protection laws in the United States have enabled firms to shed workers. In most other OECD countries productivity fell during the recession, and in some employment fell surprisingly little. This pattern should reverse itself during the recovery, as employment in the United States grows faster than the OECD average while productivity grows less.

Combating long-term unemployment will be a challenge

Given that unemployment – particularly long spells of inactivity – can have long-lasting negative effects on earnings potential (Ellwood, 1982; Layard, 1986; Machin and Manning, 1999), the current high level of long-term unemployment – 4¼ per cent of the labour force has been unemployed more than half a year – is a particular concern. The risk is that part of this upsurge may not be fully absorbed during the ensuing recovery, resulting in a permanently higher level of unemployment, a pattern known as "hysteresis" (Ball, 2009). While there has been little observed hysteresis in the United States in the past, the level of long-term unemployment in this recession is far higher than its previous record of 2½ per cent in the early 1980s, increasing hysteresis risks.

Figure 1. **Productivity has increased strongly in the United States during the recession**

Change between the fourth quarter of 2007 and the fourth quarter of 2009, in %



Source: OECD (May 2010), *OECD Economic Outlook 87 Database.*

StatLink http://dx.doi.org/10.1787/888932324950

The lack of hysteresis in the United States may be partially a result of the benefits for people out of work being returned to a relatively short duration after recessions. By temporarily extending the duration of unemployment benefits from its pre-recession maximum of 26 weeks up to 99 weeks, in some cases, the United States has expanded income support for the unemployed at a time of acute need. While there is little evidence that extended benefit duration is reducing job-search incentives, it could become a drag on the return to employment later in the recovery. *Thus, as the unemployment rate comes down, the maximum duration of unemployment benefits should return to its pre-crisis level, as has occurred in past recessions.*

In the nearer term, however, some support for the labour market may be warranted. The US fiscal stimulus has raised aggregate demand and supported employment. Administration estimates suggest that the primary fiscal stimulus package passed in early 2009 has held employment some 2½ to 3½ million jobs above what it would have been without the fiscal stimulus (Council of Economic Advisers, 2010a). In circumstances of collapsing aggregate demand, the extensions of unemployment insurance likely provided the largest increase in employment for dollar of government revenue spent

during the current period of economic slack and low interest rates, because unemployed individuals save very little (Congressional Budget Office, 2010a). Phasing out these extensions as the labour market improves will continue to support output and employment for some time while gradually pushing more individuals toward employment.

Tax reductions to reduce unit labour costs can also support employment. They encourage private sector hiring, but are somewhat less effective per dollar of government spending. (Congressional Budget Office, 2010a). Nonetheless, various approaches to reducing unit labour costs through tax cuts have been used in many other OECD countries: reductions in employer social security contributions (Germany, Japan, Portugal, and Hungary), targeted labour tax cuts for new hires (France, Spain, Ireland, and Portugal), and expanded hiring subsidies targeted at specific groups such as the long-term unemployed (Austria, Korea, Portugal, and Sweden). Cuts to employer social security contributions for hiring workers unemployed more than 60 days, with additional incentives if those workers remain employed a year later, as passed in the United States in March 2010, should also reduce unit labour costs and help boost hiring.

During the downturn the skills of the unemployed may have become degraded or may no longer match the skills demanded by employers. Job training during long periods of unemployment may mitigate these problems, particularly for younger and less-educated job seekers. While job training in the United States has had mixed results, training programmes are likely to be more effective during significant recessions by keeping unemployed workers attached to the labour force and helping jobseekers shift from declining to growing sectors. Support for job training and post-secondary education, particularly community colleges, provided under the stimulus programme has been an important step in maintaining the level of funding for these resources at a time of tight state budgets, but funding may nonetheless not be able to keep pace with demand. Lack of available training and education may slow the process of restructuring and adapting the labour force to the post-recession employment structure. Thus, to the extent that programmes can be expanded and budget conditions allow, *further support for job training and enhanced education should be provided to reintegrate workers whose skills have become degraded from long periods of unemployment or that do not match the needs of employers.*

The federal government deficit should come down and, eventually, monetary policy needs to be normalized

The substantial fiscal and monetary stimulus successfully turned the economy around, despite much of the fiscal stimulus having been offset by consolidation measures at state and local level (Aizenman and Pasricha, 2010). However, it has also increased the national debt and limited the ability of the government to respond to potential risks in the future. As discussed in the next section, with the recovery in progress, the Administration has proposed to reduce the budget deficit from its historically high level in order to slow the rapid pace of debt accumulation

With substantial slack in the economy, and low levels of inflation, the current accommodative stance of monetary policy remains appropriate. However, over the longer term the exceptional level of bank excess reserves could lead to an excessive expansion of credit and inflation as the economy rebounds and lenders begin to feel comfortable taking

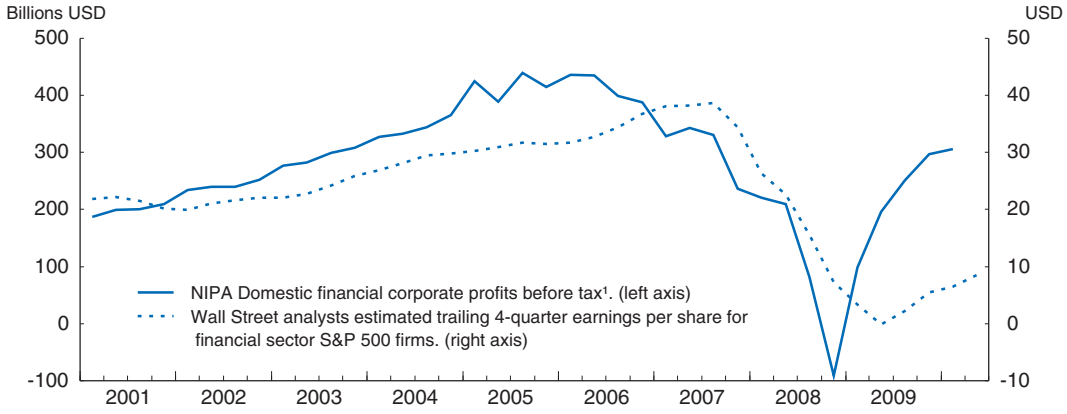
on additional risk. *Hence, laying the groundwork for withdrawing the very accommodative stance of monetary policy has begun and should be continued*. These steps include the Federal Reserve's exit from most of its short-term liquidity programmes, which has proceeded without incident, halting purchases of longer-term assets and raising the discount rate used to lend to distressed banks. Since the movement of interest rates from extremely expansionary levels to neutral levels and the gradual shrinkage of the Federal Reserve's balance sheet will take some time, initial increases need to begin well before the economy once again approaches full capacity.

Financial markets are recovering strongly

The massive, rapid and co-ordinated policy interventions introduced by the United States and other governments saved the financial markets from becoming almost completely illiquid. Such an outcome would have dried up nearly all sources of credit and forced a massive, sharp cutback in expenditures as consumers and businesses would have been forced to pay down existing credit without having access to new sources to soften the transition. As it was, credit conditions tightened significantly and consumer and business expenditures fell 6% between the second quarter of 2008 and the second quarter of 2009.

Financial markets are now on their way to recovery, but it will take some time before they return to full health. Higher interest margins and improving market conditions during 2009 boosted overall financial industry compensation and current period profits before write-offs of non-performing loans and elevated loan-loss provisioning. However, non-performing loans and loan loss provisioning continue to be a substantial drain on income, though progress is being made (Figure 2). Nonetheless, bank lending activity is still very weak and small businesses continue to report that it is becoming more difficult to obtain credit (Figure 3).

Figure 2. **Financial industry profits are improving, but remain held down by write-downs and provisioning**



1. Excludes provisioning and write-offs. Excludes Federal Reserve banks. Includes inventory valuation adjustment. Seasonally adjusted at annual rates.

Source: United States Department of Commerce NIPA Table 6.16D line 12, Thomson.

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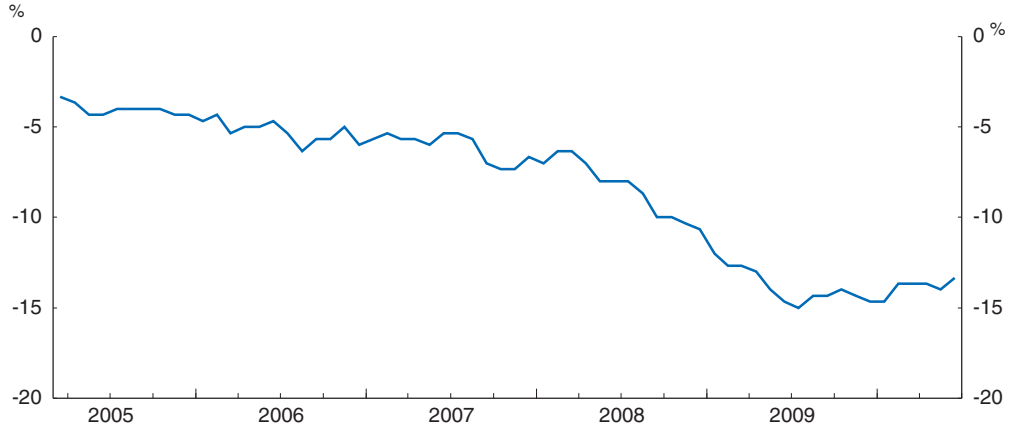
Figure 3. **Small business credit conditions remain tight**[1]



1. Three-month moving average of share of regularly borrowing small businesses reporting that loans are easier to obtain now than they were three months ago minus share reporting that loans are more difficult to obtain now than they were three months ago.

Source: National Federation of Independent Businesses, *Small Business Economic Trends* (July 2010).

StatLink http://dx.doi.org/10.1787/888932324988

The housing market still has a long way to go to recover

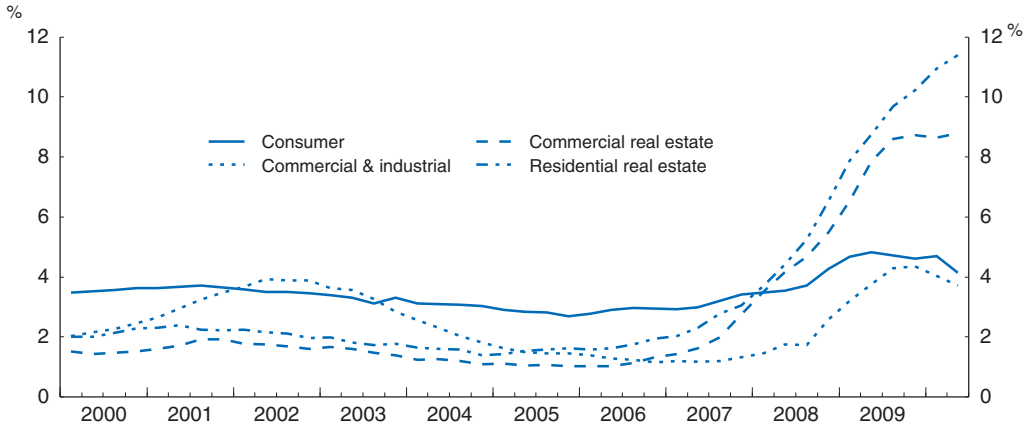
The housing market faces a long process of returning to normal. Despite the support provided by low interest rates and government housing programmes, mortgage loan delinquencies are still elevated by historical standards (Figure 4). The large fall of home prices from their peak has left about 11.2 million homeowners (24% of mortgaged homeowners) with negative equity in their home in the first quarter of 2010, *i.e.* they owed more on their home than it was worth. Increases in mortgage defaults could put additional downward pressure on house prices, which would drive even more households into negative equity. The large share of households in trouble will continue to weigh on residential construction, housing prices and financial industry balance sheets. As such, growth in residential investment is likely to be weak for some time by the standards of past recoveries.

Government policies to facilitate loan restructuring and modification can play an important role in easing the potential barrier of negative housing equity to labour reallocation across the United States (Ferreira, Gyourko, and Tracy, 2008). So far, measures to help mortgage borrowers in difficulty appear to have had mixed results. As of April 2010, 1.2 million trial modifications had been started, but there were only about 300 000 permanent modifications under the government's main programme, which has provided USD 3.1 billion in monthly mortgage payments relief to homeowners. Recently enacted policies that give financial encouragement to loan holders to write down principal amounts may increase the pace of restructuring and principal reduction, and therefore help the broader economy.

While delinquencies in commercial real estate have also been considerable (see Figure 4), this market is only one-fourth the size of the residential real estate market, which suggests that problems should be significantly less severe for the broader economy. Nonetheless, continued trouble in this market is causing problems for many small and medium-sized banks.

Figure 4. **US loan delinquency rates are high**

Per cent of loans delinquent



Source: United States Federal Reserve Board.

StatLink http://dx.doi.org/10.1787/888932325007

Imbalances have been reduced but may widen again

A number of economic imbalances have been reduced in recent years, and some of this progress may be structural. The household saving rate increased from 2% of disposable income in 2007 to 6% in 2009 as tax cuts increased disposable income and consumption growth turned negative. High frequency saving data are volatile, but the preliminary evidence suggests a shift to a higher steady state savings rate than prior to the recession, one more in line with historical norms. Likewise, the US current account deficit fell from 6% of GDP in 2006 to 2.7% in 2009, but increases in the government deficit, and rising consumption and investment growth have started to slightly widen the current account deficit again.

The Administration has noted the need to move the economy from one based on consumption and housing to one where non-residential investment and exports make up a larger share of the economy. The Administration has suggested proposals to help accomplish this goal, including: increasing private saving by expanding automatic enrolment in 401(k) and other retirement savings accounts; increasing public saving by reducing the federal government budget deficit; increasing non-residential investment and reducing oil imports by promoting energy efficiency and renewable power sources; and increasing exports by reducing barriers to trade, increasing export credit, providing technical assistance to first-time exporters and other proposals in the National Export Initiative. Additional policies, such as shifting the tax burden towards consumption, could also help achieve a goal of higher saving. Forcefully implementing these proposals to raise saving and exports would reduce the risk that large current account imbalances re-emerge and would support complementary efforts recommended for surplus countries. Such moves would be in line with the conclusions of the G20 Toronto meeting in June 2010.

The bursting of asset-price bubbles is very costly

The experience of this crisis suggests that unchecked credit-induced booms can result in costly cleaning-up efforts (White, 2009). Financial innovation, lax underwriting standards, insufficient supervisory and regulatory policies, low interest rates and improved macroeconomic stability, along with significant capital inflows, may have helped feed the asset price bubble. While it may be difficult to determine in real time if a credit-induced boom in asset prices is sustainable, *prudential regulation and supervision policies should counter the accumulation of risks to financial system stability.* If these policies prove insufficient, then monetary policymakers may need to consider raising interest rates. Wielding a broad tool like monetary policy to affect sectoral bubbles may create undesirable effects on the wider economy, pointing to the need for more research on how best to calibrate monetary policy in such situations.

Setting policy in a financial crisis necessarily involves difficult judgments about striking the appropriate balance between minimizing risks to economic and financial stability and limiting a heightening of moral hazard. The Troubled Asset Relief Program (TARP), the American Reinvestment and Recovery Act of 2009 (ARRA), the Federal Reserve's enhanced liquidity facilities, large scale asset purchases, as well as the normal automatic fiscal stabilizers and monetary policy illustrate this tradeoff. This support, while necessary at the time to help stabilize the economy and financial markets, may have provided market participants with the rational belief that the federal government will step in during times of market or industry stress. Such a belief will lead participants to under-price risk (so-called moral hazard). Macro-prudential regulation will need to be strengthened considerably to counteract this higher level of moral hazard, with attention given to winding down large institutions. Many pieces of the recent financial reform legislation seek to address these issues.

Housing finance needs to be reformed

Although not unique, the US housing bubble had a more devastating effect than those in many other OECD countries. The deterioration of underwriting standards through the greater use of risky no documentation, low or no down-payment, subprime and alt-A loans, combined with the securitization model, and the non-recourse nature of most US home loans has meant that US delinquency and foreclosure rates have been far above rates in most other OECD countries. *These high-risk loans, which were overused but have currently all but disappeared from the market, should be better priced and better regulated to prevent abuse. Higher down payments and lower loan-to-value ratios would also be a step towards reducing the foreclosure rate during the next downturn.*

Though international evidence suggests homeownership impedes labour mobility, it is seen as having positive externalities. Therefore, many OECD governments provide support to home buyers, through lower taxation or subsidised credit. However, the US level of support to homeownership is particularly large and poorly directed if the goal is to increase affordability and the share of the population owning a home. Prior to the downturn, support to the housing market came from the implicit government guarantee given to the securities issued by Fannie Mae and Freddie Mac, the mortgage interest income tax deduction in the absence of taxation of imputed rentals on owner-occupied housing, as

well as Federal Housing Administration (FHA) and Veterans' Affairs (VA) home loans, and additional programmes at the state level. This high level of subsidisation contributed to over-investment in housing. Moreover the tax treatment of owner-occupied housing encouraged increased household leverage, making households more vulnerable to a downturn in house prices. Since the downturn, several new programmes have increased this subsidisation significantly. *Over the medium term, when the housing market has returned to normal and house prices are increasing, the baseline level of housing subsidies should be cut to significantly below the levels prior to the crisis.*

The private ownership structure of Fannie Mae and Freddie Mac (known as Government-Sponsored Enterprises, GSEs) encouraged them to maximise the value of their implicit government guarantee for the benefit of management and shareholders by aggressively expanding their balance sheets. The GSEs became the biggest players in the mortgage market, though their role in the market shrunk as the bubble reached its peak when private market securitization was at its highest level. Despite the considerable subsidy from implicit government backing, there is little evidence they had much impact on home mortgage loan interest rate spreads (Lehnert, Passmore, and Sherlund, 2008). Following substantial losses, the GSEs were rescued by the government, resulting in majority government ownership. *As the recovery continues, the GSEs should either be retained in government ownership and have their portfolios reduced over time or be returned to the market with no government guarantee.*

The mortgage interest deduction should be reduced or eliminated as it encourages large home mortgages. There is little evidence that it leads to more people owning homes (Glaeser and Shapiro, 2003), though it does create an incentive for buying more housing. Also, the mortgage interest deduction, though capped, gives a significantly larger benefit to richer households. While cutting the mortgage interest deduction would be difficult, one approach would be to phase it out, as was done in the United Kingdom in the 12 years ending in 2000.

Down payments and closing costs are considered by most households to be the greatest barrier to homeownership (National Association of Realtors, 2009). The first-time homebuyer's tax credit seeks to encourage home ownership by helping with the down payment, thus making homeownership more affordable while providing equity to the new homeowner. Estimates suggest that extending the first-time homebuyer tax credit would cost around one-sixth of the budget cost of the mortgage-interest deduction. The credit, however, may discourage the accumulation of private savings for a down payment. *An alternative way to lessen the down-payment problem that should be implemented is to encourage savings more broadly, through accounts giving either tax deductions or government-matching contributions for savings*. Such accounts could be used to accumulate a down payment.

Financial reform needs to be implemented effectively

In reforming financial markets to address failures exposed by the recession and to reduce the risk of future financial crises, international co-ordination will be vital to avoid jurisdictional arbitrage. International co-ordination is also necessary to deal with differences in accounting standards and the potential bankruptcy of a large multi-national financial institution – areas where little consensus currently exists. The G20, the Basel

Committee on Banking Supervision and the Financial Stability Board provide forums for addressing these issues at an international level. Although the full set of standards and recommendations from these bodies has not yet been released, some general principles of financial reform have been agreed upon, and the work of turning them into practical regulation should continue.

The recent financial reform legislation goes some way towards laying out basic changes. Nonetheless, much of the reform will be left up to the regulators. This flexibility should allow regulators to incorporate continued suggestions by international and domestic bodies (like the Financial Crisis Inquiry Commission (FCIC), the President's Economic Recovery Advisory Board (PERAB), the Treasury's Special Investigator General and the Congressional Oversight Panel for TARP).

First and foremost among the generally-agreed principles is the need for higher capital and liquidity ratios across all financial institutions to provide a larger cushion in the event of trouble. *These ratios should be higher for larger, systemically important institutions to offset the moral hazard of their being too-big-to-fail (or too-interconnected-to-fail) and to reduce the costs of cleanup in the case that one of these firms does fail. It may also be useful to make these ratios time-varying so that capital buffers are built up during periods of strong growth, rather than attempting to raise them during time of stress.*

Another problem that became evident in the recent crisis is that risky assets were given too little weight when determining risk-adjusted capital ratios. Work remains to determine proper risk weightings, however, *ratios need to be higher for more risky transactions*. Some degree of risk is inherent in all assets that financial institutions hold. It may well be infeasible to determine the distribution risk for certain assets. Therefore it may be necessary to force those assets out of commercial banks and re-establish the sharp division between commercial and investment banking. However, even if this division is reinstated, the recent crisis shows that it is not a viable strategy to let investment banks take on enormous risk under the guise that they will be allowed to fail. Supervision and regulation of risk will need to be significantly more vigilant across the financial market than prior to the crisis.

In times of stress, what had appeared to be adequate capital may quickly disappear as assets become downgraded. Therefore, a *mechanism is also needed to preserve the capital ratio in times of stress*. Contingent convertible (Coco) bonds, which is debt that turns into equity when certain triggers occur, is one possible idea to preserve the capital ratio. However, it is unclear how useful they might be in practice. Determining the price at which such bonds should be converted to equity and the triggers which should cause such a conversion is unclear. Getting either of these two features wrong could inappropriately cause a severe drop in value for either the shareholders or bondholders. Alternatively, "stress tests", where regulators put firms' balance sheets through a couple adverse scenarios, in the context of government readiness to support undercapitalized banks if they could not raise capital on their own, helped re-open equity markets to some financial institutions and allowed them to raise capital through equity issuance. Such tests could be a useful tool in future crises.

The multitude of financial industry regulators is commonly noted in the US system, and the recently passed financial reform legislation moves somewhat in the direction of consolidation. Formally creating a council of regulators with the mandate to oversee systemic risk is a step in the right direction. Similarly, investing a regulator, in this

case the Federal Reserve, with the authority to force corrective action or take over and wind down any troubled financial institution that poses a risk to the financial sector is also useful and should help with the problem of institutions previously considered too-big-to-fail. Similarly merging the Office of the Comptroller of the Currency and the Office of Thrift Supervision consolidates one regulator at the national level, although there will still be a multitude of financial industry regulators at both the federal and, especially, the state levels. While the recent financial reform makes progress towards reducing regulatory fragmentation, further efforts should be made to reduce remaining fragmentation.

Additional welcome areas of reform include aligning compensation structures for both individuals and businesses to reduce the incentive for short-term gains irrespective of long-term risks, moving most CDS transactions to clearinghouses, having financial firms create living wills as an exercise of what might happen in the case of bankruptcy and creating a consumer protection agency for financial services.

Box 1. **Summary of recommendations for rebalancing the economy after the crisis**

- Monetary policy should remain accommodative to support the economy as fiscal policy tightens, but laying the groundwork for the eventual normalization of policy should continue.
- Ensure that fiscal policy is set appropriately so as to reduce the budget deficit over time and reverse the rise in the public debt-to-GDP ratio in due course (see next section).
- As the labour market continues to improve, the duration of unemployment benefits should return to its pre-recession level.
- Additional support for job training and enhanced education may be required to reintegrate unemployed workers who skills have deteriorated.
- Improve consumer protection against predatory mortgage lending.
- Public support to homeownership should be reduced over the medium term as the housing market recovers and house prices begin rising. Reform the GSEs, and replace mortgage interest tax deductions by narrower support to overcome down payment constraints of liquidity-constrained first-time homebuyers.
- Further strengthen financial regulation and supervision and international co-ordination, as is being currently pursued, which is likely to entail higher capital and liquidity ratios for larger, systemically important financial institutions and higher risk weightings for risky transactions.

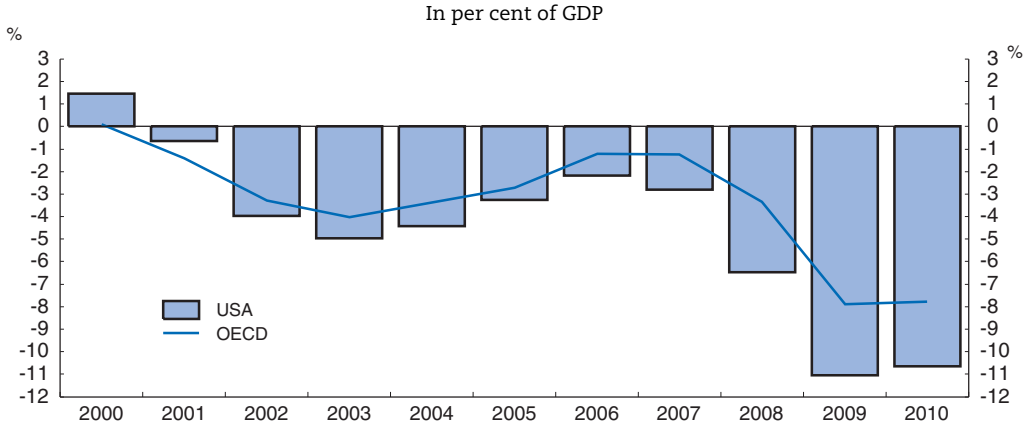
2. Putting public finances on a sustainable path

The budget position could have been stronger when the crisis struck

The United States entered the financial crisis and the subsequent economic recession with public finances already weakened by past policies. Tax cuts under the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) and the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) decreased government revenues below the levels prevailing in the second half of the 1990s. Meanwhile, public spending rose throughout the first half of the decade, reflecting increased appropriations for defence and homeland security and the introduction of the Medicare Part D prescription drug programme for the elderly. The abandonment in 2002 of the pay-as-you-go (PAYGO) budgeting rule, which required deficit-neutrality for any new tax or spending initiative contributed to the weakening of the fiscal position. As a result of these policy choices, at the peak of the cycle the United States was still running a general government budget deficit of about 2½ per cent of GDP (Figure 5), even as budgets in several other OECD countries were either in surplus *(e.g.,* Australia, Canada, Denmark, Finland, Iceland, Ireland, Korea, Luxembourg, Netherlands, New Zealand, Norway, Slovak Republic, Spain, Sweden, Switzerland), in balance (Belgium, Germany) or improving significantly (Italy and Japan).

Figure 5. **The United States entered the crisis with a budget deficit**[1]

In per cent of GDP



1. In this figure, the budget deficit is measured as the net lending position of the general government (federal, states and local governments) recorded by the national accounts, following OECD practice. This differs from the federal deficit, often quoted in the US policy debate, which only covers the federal government and measures the budget deficit as the saving balance, excluding government capital formation, net capital transfers and non-current receipts. Reconciliation between these two concepts is provided by BEA (2009, 2010), CBO (2009a) and OMB (2010a).

Source: OECD (May 2010), *OECD Economic Outlook 87 Database.*

StatLink http://dx.doi.org/10.1787/888932325026

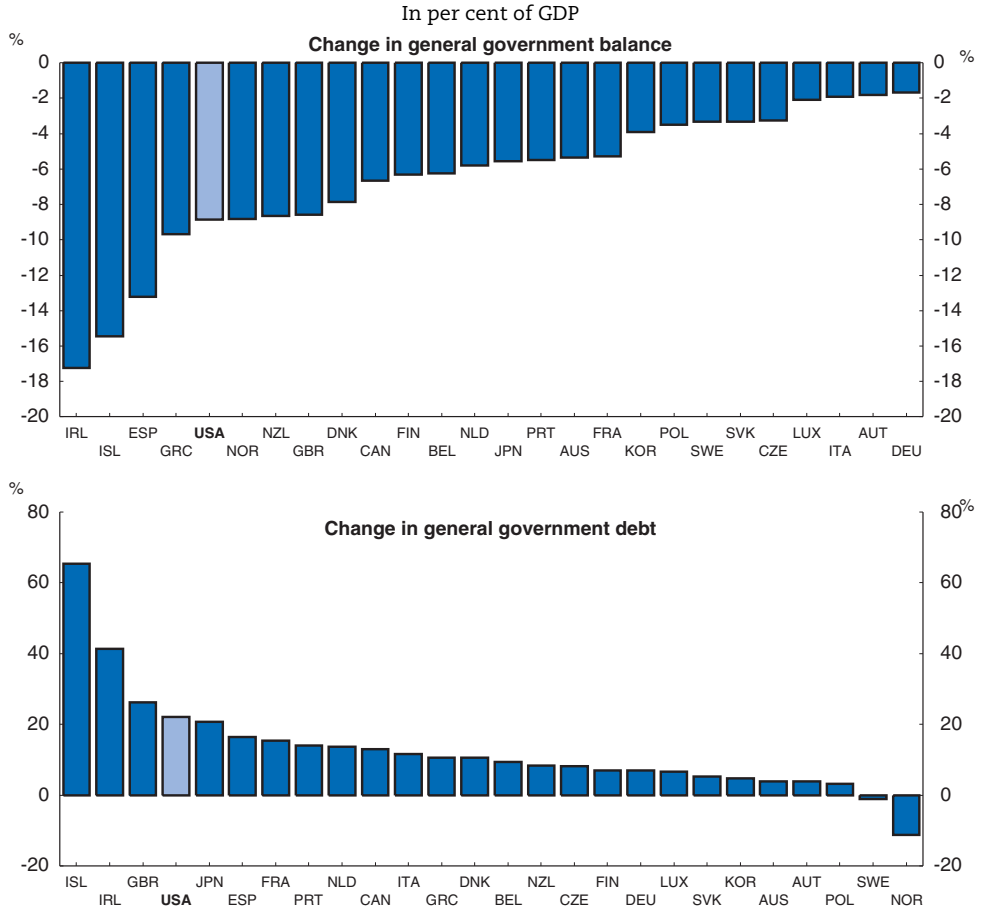
The budget deficit widened considerably during the recession

The government responded to the crisis with extraordinary fiscal interventions. Large injections into the financial sector, mostly through the Troubled Asset Relief Program (TARP), helped to shore up confidence and supported distressed private financial firms. The government also provided support to two government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, in the form of preferred stock purchase agreements and coverage of losses. The 2009 American Recovery and Reinvestment Act (ARRA) and its extensions provided a large countercyclical fiscal stimulus, consisting of tax cuts and spending increases. The

weakening of taxable incomes and the large revenue losses from asset markets also contributed to the sharp drop in tax receipts, while the recession triggered a significant increase in unemployment compensation. As a result, the US budget deficit widened by about 9% of GDP from 2006 to 2009, a large deterioration by international standards, although not surprising given that the US economy was at the centre of the crisis (Figure 6). The federal deficit is estimated to exceed 10% of GDP in both 2009 and 2010 (Table 2) and the federal debt held by the public will reach the highest level since the early 1950s.

Figure 6. **The fiscal deficit and government debt increased sharply during 2006-09**

In per cent of GDP



Source: OECD (May 2010), *OECD Economic Outlook 87 Database.*

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Table 2. **Public finances have deteriorated during the crisis**

(General government, percentage of GDP, calendar years)

	95-2000	2001-07	2008	2009	2010 (f)	2011 (f)
Total tax and non-tax receipts	34.6	32.9	32.3	30.5	30.9	32.0
Total outlays	35.3	36.0	38.8	41.5	41.6	40.9
Net lending	–0.7	–3.2	–6.5	–11.0	–10.7	–8.9
Memorandum items						
Underlying net lending	–0.9	–3.4	–5.9	–8.5	–8.9	–8.1
General government debt, gross	64.5	59.5	70.4	83.0	89.6	94.8
General government debt, net	45.8	40.1	47.0	58.2	66.6	72.6
Federal budget balance[1]	0.2	–1.9	–4.7	–10.3	–10.6	–8.3
Federal debt held by public[1]	36.6	36.5	44.1	54.8	63.6	68.6

1. Office of Management and Budget, fiscal years for 2010 and 2011.

Source: OECD (May 2010), *OECD Economic Outlook 87 Database.*

The Administration seeks to stabilize the debt-GDP ratio by the middle of the decade

Against this background, the Administration has proposed to balance the primary federal budget (*i.e.*, the budget excluding net interest payments on government debt) by 2015, enough to stabilize the debt-GDP ratio (Council of Economic Advisers, 2010b). This would imply reducing the federal deficit from 10.6% of GDP in fiscal year 2010 to 3% of GDP in fiscal year 2015. A large part of deficit reduction would come from the expiration of the fiscal stimulus, the unwinding of financial rescue measures and the positive impact of automatic stabilizers as the economy recovers (the CBO projects that the output gap will fall from 6½ per cent of potential GDP at the end of 2009 to zero per cent by the end of 2014, from which it can be inferred that high economic growth is projected on average over this period). In addition, the government has proposed fiscal tightening measures reducing the annual deficit by about 1% of GDP to be introduced in fiscal year 2011. Marginal income tax rates would return to the pre-2001 level for the top-income taxpayers and the tax rate on dividends and capital gains would be raised from 15% to 20%. In addition, the 2.9% Medicare tax is to be increased to 3.8% and the base to be broadened to capital income. The government has also suggested capping at 28% the rate at which individual taxpayers can itemize deductions. A financial crisis responsibility fee applied to large financial firms would raise additional revenues. On the spending side, the government has proposed to freeze non-defence discretionary outlays in real terms, but the impact would be rather small, reflecting the small proportion (under 15%) of such outlays in the federal budget. All of this is projected to leave a gap of about 1% of GDP (1½ per cent of GDP according to CBO estimates) to reach the target of balance in the primary budget. To find ways to close this gap, the President established a "National Commission on Fiscal Responsibility and Reform", with a mandate to identify the necessary measures.

Allowing deficits on the scale of those in 2009-10 to persist would result in rapid debt accumulation, which could not be sustained for long. On the other hand, the course of the recovery is still uncertain, arguing against a sharp and immediate deficit reduction. In view of these conflicting considerations, *the Administration's fiscal plan is ambitious, but appropriately gradual and should therefore be implemented in full*. In order to progress along this path, *measures in the fiscal stimulus programme should be allowed to expire, though* there is value to temporarily extending measures targeted to difficult areas, such as long-term unemployment.

The assessment of debt sustainability has several dimensions

The goal of the government is to stabilize the federal debt held by the public at around 73% of GDP by the middle of the decade (Council of Economic Advisors, 2010b). There is no rule to establish the sustainable level of public debt. This depends on the specific situation of each country, financial-market conditions and long-term fiscal prospects. Nonetheless, it should be noted that the government's plan would stabilize the debt-GDP ratio at nearly twice its pre-crisis level. This would leave little freedom for fiscal policy to act decisively in the face of large contingencies. In addition, this would further complicate the task of dealing with long-run challenges associated with the ageing of the population. It is worth noting that states and local governments also have substantial debts, although these liabilities are not federally guaranteed and were generally contracted to finance capital expenditure, sometimes earning revenues. All told, gross debt of the general government is projected to reach 95% of GDP in 2011 (Table 2), close to the average for the OECD.

In principle, it makes economic sense, when assessing the sustainability of debt, to subtract from the public debt any financial assets owned by the government. These financial assets yield a return, which accrue to the budget and lower the net debt-service burden. The Administration notes that, net of financial assets, debt held by the public would stabilize at 66% of GDP. However, this calculation slightly understates net government debt as some of the financial assets, which were acquired in the midst of the recession as part of the programmes to support the economy and the banking system, are worth less than face value. Estimates put the final cost of the Troubled Asset Relief Program (TARP), which was the largest such scheme, at between 0.8 and 1% of GDP (CBO, 2010b). In addition, the government provided substantial support to Fannie Mae and Freddie Mac to avoid their bankruptcy and keep credit flowing to the mortgage market. The CBO (2010c) evaluates the subsidy cost of this support at USD 389 billion during 2009-19 (2.7% of 2009 GDP).

The debt-GDP ratio should be brought down after 2015 at an appropriate pace

In view of these various considerations, the plan to stabilize the debt-GDP ratio in 2015 should be followed by a policy to put the debt ratio on a downtrend during the second half of the decade, although the actual pace of reduction should depend on economic circumstances. Not only would this re-create fiscal room of manoeuvre to respond to unexpected contingencies, it would also help to prepare for the long-run effects of the ageing of the population. For illustrative purposes, balancing the federal budget by 2020 is estimated to lower the federal debt held by the public to just below 70% of GDP. This would still be high by historical standards, but nevertheless a better outcome than projected under current policies (Figure 7).

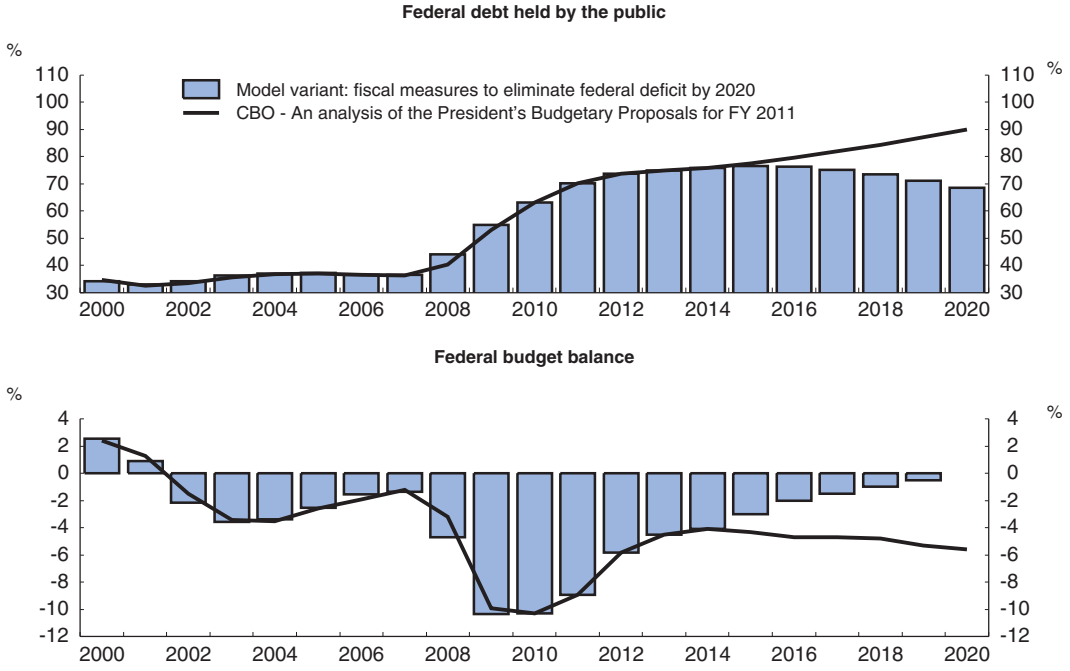
Adopting a strong fiscal framework

Stronger fiscal rules would help to sustain the large effort of budgetary tightening over many years that will be required. The current Administration took a step in this direction in February 2010 when it reinstated the PAYGO rule, which requires new spending programmes or tax cuts to be compensated by other spending cuts or tax increases. This served the United States well during the second half of the 1990s, although experience suggests that *it could be improved by reducing the number of exemptions allowed under current rules, such as for "emergency spending" or "current-policy adjustments"*.

In addition, experience in a number of OECD countries suggests that it may be important to go further by *adopting a public debt objective*. Such an objective, which should remain flexible in the face of evolving economic circumstances, makes clear the implications of short-term budget decisions for the sustainability of public finances. *To fix these targets and increase commitment to them, it would be helpful to have an agreed legislative framework that provides guidance on what constitutes prudent or responsible policy.* This was the approach adopted in Australia and New Zealand, which passed legislation in the 1990s requiring budgets to be formulated taking into account their long-term consequences and, when budgets departed from a prudent long-term path, requiring government to indicate how fiscal policy would be returned to such a path. The idea behind this legislation was that, while future governments could repeal these laws, doing so would be unattractive as it would entail a political cost to the government's reputation for sound economic management. These arrangements have helped both countries to achieve substantial reductions in public debt.

Figure 7. **United States – Eliminating the federal deficit by 2020 would bring down the debt ratio**[1]

In per cent of GDP



1. The model variant incorporates the reduction in the federal budget deficit by 1% of GDP through measures to be identified by the fiscal commission, bringing the deficit down to 3% of GDP by 2015, whereas the CBO analysis of the President's budgetary proposals does not.

Source: Congressional Budget Office (2010d) and OECD calculations.

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Expenditure should be restrained

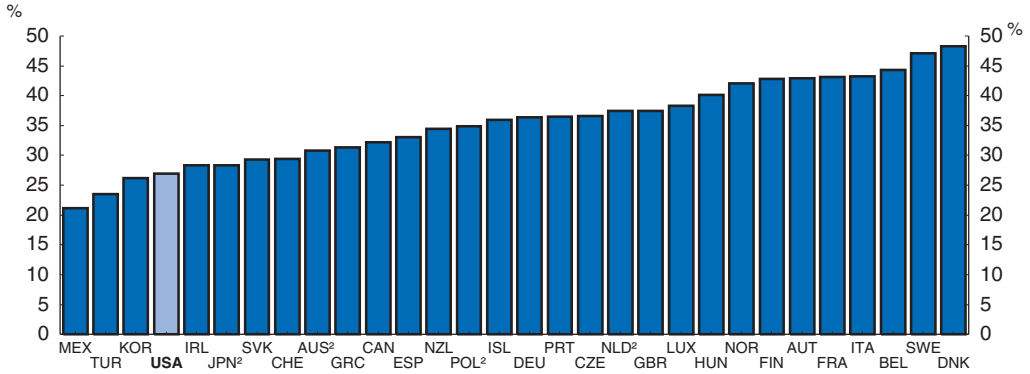
While exit from fiscal stimulus will help, it will not be sufficient to balance the primary deficit by the middle of the decade or bring down the debt-GDP ratio thereafter. Some experiences in other countries suggest that restraining spending best demonstrates the authorities' commitment to deficit reduction and therefore has a better chance of being sustained in the long term, compared to policies based solely on tax increases, though the substantial fiscal consolidation in the United States in the 1990s took place with both spending restraint and tax increases. In addition to proposing a freeze on non-defence discretionary spending, the Administration is taking steps to move towards best practices in the management of its public agencies, to achieve efficiency gains. In particular, the authorities have reviewed past policies that have increased the contracting out of public services to private-sector suppliers and, on this basis, decided to strengthen the management and oversight of these contracts, to get more value for money and reduce wasteful spending. New procurement guidelines also seek to move to fixed-price contracts rather than "cost-plus" contracts, which had led to slippages and cost overruns. As well, a new effort is underway to more rigorously evaluate the performance of public programmes, using evidence-based analysis regarding the attainment of final outcomes. In the longer run, given the large share of fast-rising mandatory spending, the effort should focus on reforming social benefit entitlements, including old-age pensions and health care, as was done recently in the context of health-care reform.

Tax revenue will likely have to increase

These measures to restrain spending are welcome, but large effects seem possible only in the long term. Barring cuts in entitlements and defence spending, which are currently not on the policy agenda, *taxes will likely have to increase to stabilise the debt-to-GDP ratio by the middle of the decade and put it on a downward path thereafter.* While raising taxes necessarily distorts activity and therefore imposes a cost, there would nevertheless appear to be more scope for tax increases – the United States tax-to-GDP ratio is among the lowest in the OECD area, even including taxes at the levels of state and municipalities (Figure 8). Thus, modest increases would still keep the overall tax burden at a relatively moderate level and not impose excessive costs. A variety of options is available to raise tax revenue, some of which are discussed below. Combined, they have the potential to raise considerably more revenue than is required to close the fiscal gap by 2015. Hence, any fiscal package would only need to include some of these options, not all of them. The advantage of relying on a package of measures is that the increase in taxation faced by individual groups is more limited than otherwise, reducing incentives to mobilise to oppose the tax increase, and may appear to be more equitable as other groups are also facing tax increases. A package of reforms could also enable the most vulnerable/lowest income groups to be compensated for any losses. In any case, taxes should be raised in ways that are least harmful to growth, notably by reforming aspects of the tax system that are particularly inefficient and cause large distortions.

Figure 8. **The US tax-GDP ratio is low by OECD standards**[1]

In per cent of GDP, 2008



1. The Revenue Statistics database contains data provided by the national tax authorities, which are generally based on standard national accounts definitions and methodologies. However, divergences with the national accounts exist in some areas. The differences are small for most countries and in most years, but are substantial in some cases. The most frequently used measure of the tax burden is shown in the figure (total taxes plus social security contributions as a percentage of GDP).
2. 2007 final data, provisional 2008 data not available.

Source: OECD, *Revenue Statistics Database*.

StatLink http://dx.doi.org/10.1787/888932325083

The tax base should be broadened and a more balanced tax structure sought

The US tax code provides numerous tax expenditures (*i.e.*, exemptions, deductions, preferences or other exclusions under tax law resulting in losses of revenues) that distort behaviour and reduce tax receipts. Tax breaks have grown significantly since the major tax reform of 1986. These tax exemptions are more generous than in many other OECD countries (Table 3). *As argued in previous* OECD Economic Surveys, *widespread evidence suggests that the*

Table 3. **Tax expenditures in personal income tax: international comparisons**
(as a per cent of central government personal tax receipts)

	Canada (2004)	Germany (2006)	Korea (2006)	Netherlands (2006)	Spain (2008)	United Kingdom (2006)	United States (2008)
Total	32.97	2.91	10.09	2.74	3.86	13.47	29.36
of which							
Retirement	10.72	0.05	0.10	0.16	0.46	6.38	5.77
Health	1.70	0.00	1.67	0.00	0.00	0.00	5.38
Housing	1.29	2.01	0.29	0.12	1.12	3.30	5.90
Intergovernmental	9.94	0.30	0.00	0.00	0.00	0.00	3.54
Other	9.32	0.55	8.03	2.46	2.28	3.79	8.77

Source: OECD (2010a), Tables 29 and 30.

major tax expenditures – mortgage interest deductions on owner-occupied housing, the exclusion from personal income and payroll tax of employer-provided health insurance coverage, and the tax deductibility of state and local taxes – need to be reduced. There is also scope for reducing other tax expenditures, such as the exclusion of capital gains from estate taxation, that neither enhance economic performance nor social equity. The Administration has proposed to limit to 28% the rate at which itemized deduction can be subtracted from taxable income. *This goes in the right direction, but this limit could be reduced further.* For instance, estimates by the CBO (2009b) suggest that reducing the rate to 15%, which is closer to the marginal income tax rate on medium household income, would bring about USD 1.3 trillion of additional tax revenues over 2010-19.

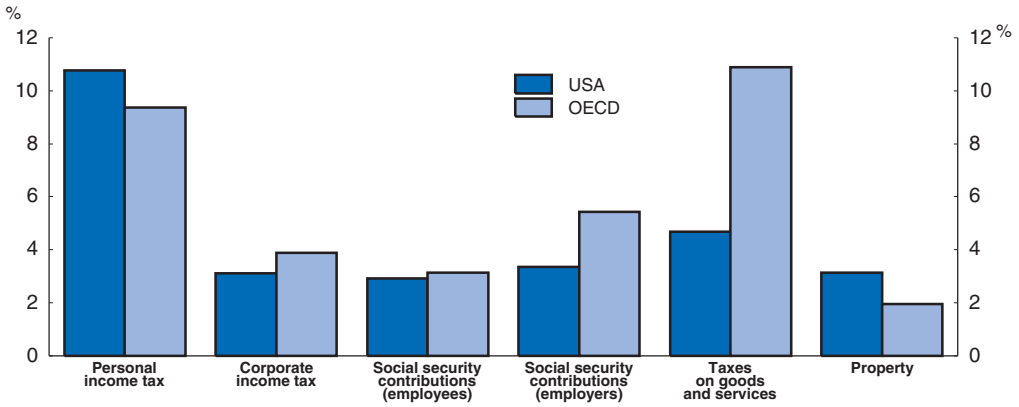
The tax code provides very favourable treatment to owner-occupied housing by allowing the deduction of mortgage interest and property taxes from adjusted gross income without taxing the rental income accruing to the owner-occupant. Not only is this system not based on a sound framework, but it also disproportionately favours high-income taxpayers and therefore makes the income tax system less progressive than otherwise. As noted above, this policy probably does not add to the overall proportion of households that are owner-occupiers, is likely to have encouraged over-borrowing during the housing boom, and thus to have contributed to the high share of homeowners with negative housing equity, which has adverse effects on labour mobility. As recommended above, *the mortgage interest income tax deduction should be replaced by a homebuyer savings account scheme where the government provides matching contributions to encourage access to homeownership. The policy could be phased in during 2013-18 to allow the housing market to stabilize.*

The tax system also excludes employer-provided health insurance premiums from taxable income, which fosters employer-provided health insurance but also encourages over-consumption of health-care resources. This amounts to an open-ended subsidy that encourages the purchase of insurance policies that have little cost sharing, accentuating problems of moral hazard. The recent health reform partly reduces the importance of this exclusion by introducing in 2018 an excise tax on so-called "Cadillac" plans, but the tax exclusion has been left largely intact. In view of its contribution to the excess cost growth of health care and of the substantial potential revenue gains, *the government should reduce further this tax expenditure.*

A distinctive feature of the US system is the small share of consumption taxes (Figure 9). Raising consumption taxes instead of personal income taxes would have the advantage of not reducing the after-tax return on saving, which could be beneficial in view of the need to narrow the structural savings – investment imbalance. *Raising consumption taxes, notably by introducing a federal value-added tax (VAT), could therefore be another approach to addressing*

Figure 9. **The United States relies less heavily on consumption taxes**

In per cent of GDP, 2007



Source: OECD, *Revenue Statistics Database*.

StatLink http://dx.doi.org/10.1787/888932325102

fiscal challenges. A national VAT would be easier to enforce than other taxes, as each firm in the production chain pays only a fraction of the tax and must report the sales of other firms. Because VAT applies to goods and services sold domestically, it does not increase the cost of exported products and therefore does not hamper international competitiveness. A VAT may be regressive, however, but this could be addressed by using part of the proceeds to finance the expansion of programmes like the earned income tax credit. This would also mitigate the adverse effect on work incentives that is likely to ensue from the higher tax burden, particular for workers in the low income deciles. US states could keep their existing sales taxes if they wanted, as provinces did when Canada introduced a national VAT. Alternatively, harmonizing state and federal consumption taxation would allow joint administration and collection, leading to substantial efficiency gains.

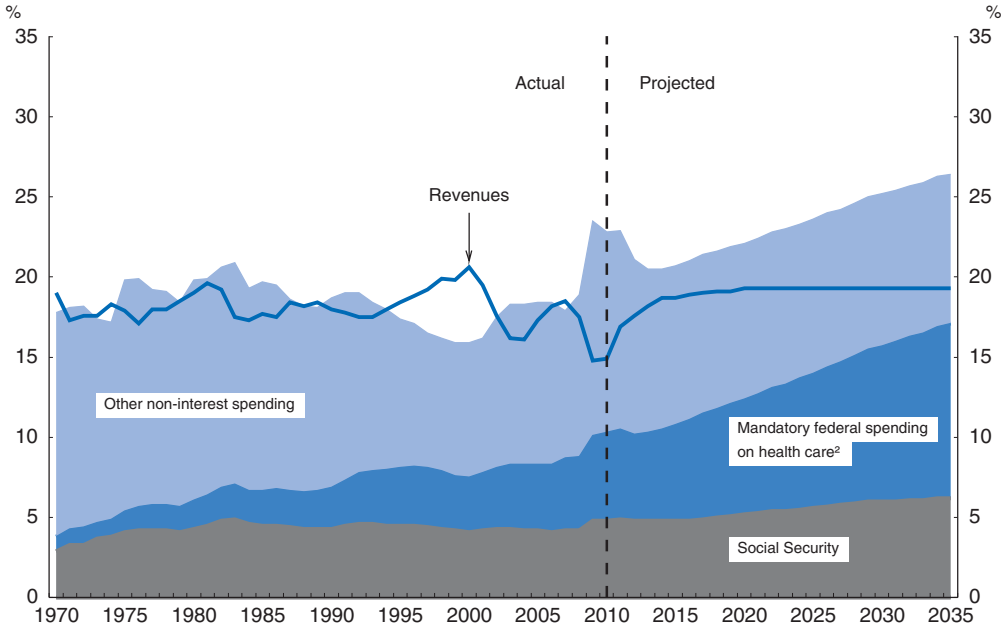
In the event that it proves not to be politically feasible to raise significant extra revenue from broadening the tax base, it will likely be necessary to increase taxation of personal incomes to achieve the requisite reduction in the federal budget deficit. Such increases should occur when the economy is back on its feet and should be done in such a way as not to unduly blunt incentives to work. In this regard, tax hikes on secondary earners should be avoided as their labour supply decisions are more responsive to changes in tax rates than are those of primary earners (CBO, 2007). Similarly, persons in the low-income deciles should be spared as their labour supply decisions are also more responsive to changes in after-tax income than are those of people in the top deciles.

The long-run fiscal outlook is challenging

Even if fiscal consolidation is sufficient to reverse the debt-GDP ratio trend during the second half of the decade, demographic pressures stemming from the ageing of the large cohorts of post-war baby boomers and the excess cost growth of public health insurance schemes will once again put the budget on a deteriorating trend thereafter. Population ageing will increase expenditures on old-age pension and Medicare benefits, while the population of workers making social security contributions will grow slowly (Figure 10). While the measures in the recent health reform legislation to expand health insurance coverage will increase mandatory federal health care spending, this effect is expected to be

Figure 10. **Long-term fiscal trends are unsustainable**[1]

In per cent of GDP



1. The scenario depicted is the CBO's alternative fiscal scenario, which incorporates several changes to current law (shown in the extended baseline scenario) that are widely expected to occur or that would modify some provisions that might be difficult to sustain over a long period. (For details, see CBO (2010e), Table 1.1, p. 3.) As discussed in the text, the CBO heavily discounted many new health care cost containment and revenue provisions after 2020.
2. Mandatory federal spending on health care includes Medicare, Medicaid and CHIP and, for the projection period, Exchange Subsidies.

Source: Congressional Budget Office (2010e).

StatLink http://dx.doi.org/10.1787/888932325121

compensated by other measures in the legislation that reduce overpayments, waste, fraud, and abuse in Medicaid and Medicare. Indeed, mandatory federal health care spending could well turn out to be lower than shown in these projections because the CBO did not score various cost-saving measures in the reform owing to uncertainty about the scale of their effects and, in the alternative fiscal scenario (which reflects the CBO's assessment of current policy) shown below, assumes that other cost-saving measures in health reform are rolled back by Congress starting in 2020 (increasing health-care expenditures by 0.8% of GDP by 2035 compared with the extended baseline scenario, which reflects the implications of current law). Furthermore, revenues would be higher over the long-run than shown here if fiscal drag (the increase in tax revenues from leaving tax rates, brackets and other features of the tax system unchanged in the face of rising nominal incomes) were not to be offset after 2020. In the projection shown here, the CBO assumes that revenues remain constant near their historical average of 19% of GDP after 2020, whereas, without the enactment of new tax cuts, revenues would tend to naturally rise as real income growth produces higher average tax rates under the graduated income tax and as the tax base subject to the health reform's new excise tax on high-cost insurance expands (these factors increase revenue in the CBO's extended baseline by 2.6% of GDP by 2035).

Actions taken during the 1980s to reform social security, including increases in social security contribution rates and a phase-in of increases in the statutory retirement age from 65 to 67, postponed eventual programme deficits for several decades, but now the time has come to act again. Similar solutions can be used again to raise revenue needed to pay for

rising social security costs, or to contain spending. *Linking the age of eligibility for full social security benefits to active life expectancy so as to hold fixed the ratio of work life to active retirement would be one such solution. Now that the health reform has passed (see below), extending health insurance coverage to almost the entire legally-resident population, it would also be feasible to reduce Medicare outlays by making the age of eligibility the same as for full social security benefits.*

The recent health-care reform will help to reduce long-term growth in public health spending

The major long-term risk to fiscal sustainability, however, is public health care outlays. Spending on the federal government's two main health care programmes, Medicare and Medicaid, has grown markedly as a share of GDP in recent decades and, together with other federal health care programmes, is projected to continue doing so, rising from about 5% of GDP in 2009 to 11% by 2035 (see Figure 10) and 20% by 2084 in the CBO's alternative fiscal scenario, although such long-term projections are admittedly subject to considerable uncertainty. Most of this increase is attributable to "excess cost growth", which is the extent to which the growth in health-care expenditure per enrolee exceeds that in GDP per capita after adjusting for changes in the age structure of the population. Excess-cost growth appears to be driven mainly by technological progress making new, expensive treatments available. Population ageing is the other main factor explaining the projected rise in government health-care expenditures, accounting for 45% of the increase up to 2035, but only 30% of the long-term increase. Slowing growth in total health-care expenditures by increasing value for money is the most important health-policy challenge for the United States. The comprehensive reform legislation should contribute to the achievement of these goals by reducing the growth rate of public health care spending, but the CBO does not allow for these effects in the alternative scenario shown above.

The CBO assumes for these projections that the private sector will take steps to restrain excess-cost growth so that the annual increase in health-care expenditure converges to the total annual increase in consumption expenditure (*i.e.,* excess-cost growth converges to zero) by 2084. Such steps would probably entail households facing increased cost sharing, new technologies being introduced and diffused more slowly, and more treatments or interventions not covered by insurance. State governments, which pay half of Medicaid costs, could respond to growing costs by limiting the services they cover and by tightening eligibility criteria. Such a slowdown in excess-cost growth would affect Medicare, which is integrated with the rest of the health care system, through the spread of lower-cost "patterns of practice". The CBO assumes that Medicare's excess-cost growth will decline linearly from 1.7% in 2020 to 1.0% in 2084, one third of the reduction assumed for non-Medicare spending. The CBO also assumes for the "alternative scenario" shown in Figure 10 that Medicare payments to physicians grow with the Medicare economic index rather than at the lower rates of the "sustainable-growth-rate" (SGR) mechanism, which would entail an immediate 21% cut in payment rates if applied; it has not been possible to implement the SGR because it would result in an untenable increase in the discrepancy between provider fees for Medicare- and other patients.

The health care reform signed into law in March 2010 approaches universal health insurance coverage, which exists in almost all other OECD countries, but also raises taxes and cuts some spending items. In its official scoring of the bill, the CBO projects that the reform will barely reduce the budget deficit over the next decade (over USD 100 billion) but

will have a considerably larger effect in the following decade (savings of USD 1 trillion in the extended baseline), although again it should be recognized that such long-term projections are uncertain. The largest sources of financing for the expansion in health-insurance coverage are the above-mentioned 0.9 percentage point increase in the Medicare tax rate and 3.8 percentage point increase on unearned income for high-income households, a reduction in Medicare fee-for-service (FFS) market-based price updates for hospitals by 1% per year (reflecting economy-wide productivity growth) for the next decade, and a cut in overpayments to Medicare Advantage (private) plans, which cost more than the traditional FFS-Medicare programme. For these budget savings to be realised, *Congress will need to refrain from subsequently overriding the relevant provisions of the legislation*. If Congress maintains the provisions in the bill as passed into law, and if these measures have the intended effects, the long-run budget outlook will be substantially improved relative to the CBO alternative scenario shown in Figure 10.

The legislation also includes measures that could significantly reduce government health care outlays in the long term but for which the CBO was generally unable to estimate budget effects owing to uncertainty regarding their effectiveness or how they could be scaled up. The effectiveness of these provisions may be a critical part of containing long-run health costs. A potentially important measure in this regard is the creation of a Centre for Medicare and Medicaid Innovation within the Centres for Medicare and Medicaid Services to test provider-payment reforms that move away from the current FFS model. These reforms have considerable potential to slow growth in health-care outlays by better aligning health providers' incentives and patients' interests. This is particularly important for episodes of treatment that include hospital treatment and ambulatory care, which is the fastest growing component of US health-care expenditure. It has been estimated that bundling payments for chronic diseases and elective surgeries into a single treatment episode could reduce medical spending by 5.4% through 2019 (Hussey *et al.*, 2009). *If these reforms are found to be effective in reducing costs without compromising quality of care, they should be rolled out widely, as planned*.

In another provision, the newly created Independent Payment Advisory Board (IPAB) would be required to make recommendations to reduce growth in Medicare spending if projected growth per beneficiary exceeded certain indexed limits. This is potentially a very powerful tool because the recommendations would go into effect automatically unless blocked by subsequent legislation. There is also a variety of other cost-saving proposals in the legislation, including: value-based benefit design; funding for comparative effectiveness research, which analyses the effectiveness of treatments (and could be important for deciding prices to pay for new drugs); and incentives for hospitals to reduce hospital-acquired infections. The legislation is also funding demonstration projects to reduce the practice of defensive medicine, thought to be caused by medical malpractice lawsuits, by finding other routes to dispute resolution. Despite the potential importance of the IPAB and other deficit-reduction measures, the CBO assumes in the alternative scenario shown above that they are curtailed by Congress after 2020, whereas if implemented as enacted, the long-term fiscal outlook would be significantly improved.

State and local governments also face long-term fiscal challenges

Many state and local governments also face a challenging long-run fiscal outlook. The Government Accountability Office (2010) estimates that, on unchanged policies, the 50-year fiscal gap facing states and local governments could be as high as 12% of GDP. The principal drivers of the widening operating budget gap are pension and health care costs for public employees. Pew Center on the States (2010) puts the scale of the unfunded pension liability at end-June 2008 (the end of most sub-national governments' fiscal year) at around USD 1.1 trillion. A much larger estimate of the unfunded liability of state pension schemes is obtained when pension obligations are discounted not by the expected rate of return on assets – as is required by state government accounting standards – but by a lower discount rate that reflects the low risk profile of pension liabilities (Novy-Marx and Rauh, 2009). Either method of discounting future liabilities suggest unfunded pension debt exceeds the states' publicly traded debt of USD 0.94 trillion.

Box 2. **Summary of recommendations for restoring fiscal sustainability**

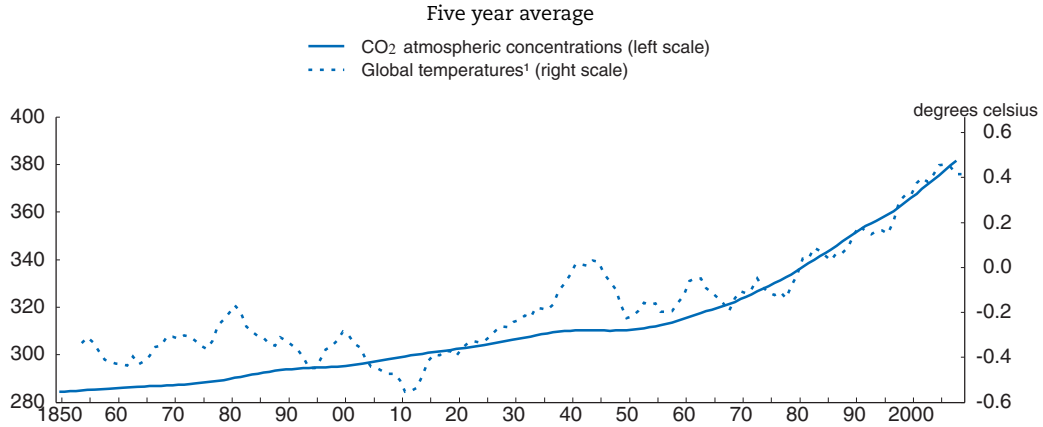
- Allow measures in the fiscal stimulus package to expire.
- Implement the proposed plan to stabilize the debt-GDP ratio by the middle of the decade.
- Bring the debt-GDP ratio down during the second half of the decade to create fiscal room and to prepare for demographic ageing.
- Strengthen the budget process and restrain spending, including by expanding the coverage of PAYGO.
- Increase tax revenue, mainly by broadening the tax base.
- Stabilise the ratio of work life to active retirement by linking the age of social security eligibility to active life expectancy.
- Do not override expenditure restraints contained in the March 2010 health care reform.
- Roll out Medicare provider-payment reforms that prove to be successful in pilot tests across the programme, as planned.

3. Implementing cost-effective climate change-mitigation policies

It would be prudent to reduce Greenhouse Gas (GHG) emissions to limit climate change

The consensus view of scientists is that GHG emissions from human activities are causing global warming. There have been large increases in atmospheric concentrations of GHG since the beginning of the industrial era (about 1750) and global temperatures have increased by about 0.7 °C over this period (Figure 11). The pattern of climate change – warming in the lower atmosphere and cooling in the stratosphere – is consistent with greenhouse gases being the main cause. Large increases in atmospheric-GHG concentrations are in prospect in the absence of further policy action to curb emissions or of major technological breakthroughs (*i.e.*, on a business-as-usual (BAU) basis), which will lead to further significant global warming.

Figure 11. **CO_2 atmospheric concentrations and global temperatures are rising**



1. Deviation from average 1961-90.

Source: World Meteorological Organisation.

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There is much uncertainty about the likely increase in temperatures caused by rising GHG concentrations and an even greater level of uncertainty around the damages associated with such temperature increases. Studies suggest that the costs of inaction are likely to be significant, but if climate sensitivity is very low, the damages could be lower. For example, based on Intergovernmental Panel on Climate change (IPCC, 2007) climate-sensitivity-parameter estimates (the impact on temperature of a doubling of the atmospheric concentration of GHG) and a projected increase in the atmospheric concentration of GHG on a BAU basis that falls roughly in the mid-range of previous studies quoted in IPCC (2007), OECD (2009) projects an increase in the global mean temperature of about 4 °C by 2100, but with a one-in-six chance of the increase being more than 5.8 °C and a one-in-six chance of it being less than 2.2 °C. Climate modelling suggests that damages rise much more than in proportion to the rise in global mean temperatures beyond 2.0 to 2.5 °C (Nordhaus, 2007). Damage estimates associated with a given increase in global temperatures are also subject to considerable uncertainty – damages could be somewhat lower or significantly higher (the probability distribution of most damage estimates is skewed to the right). In view of

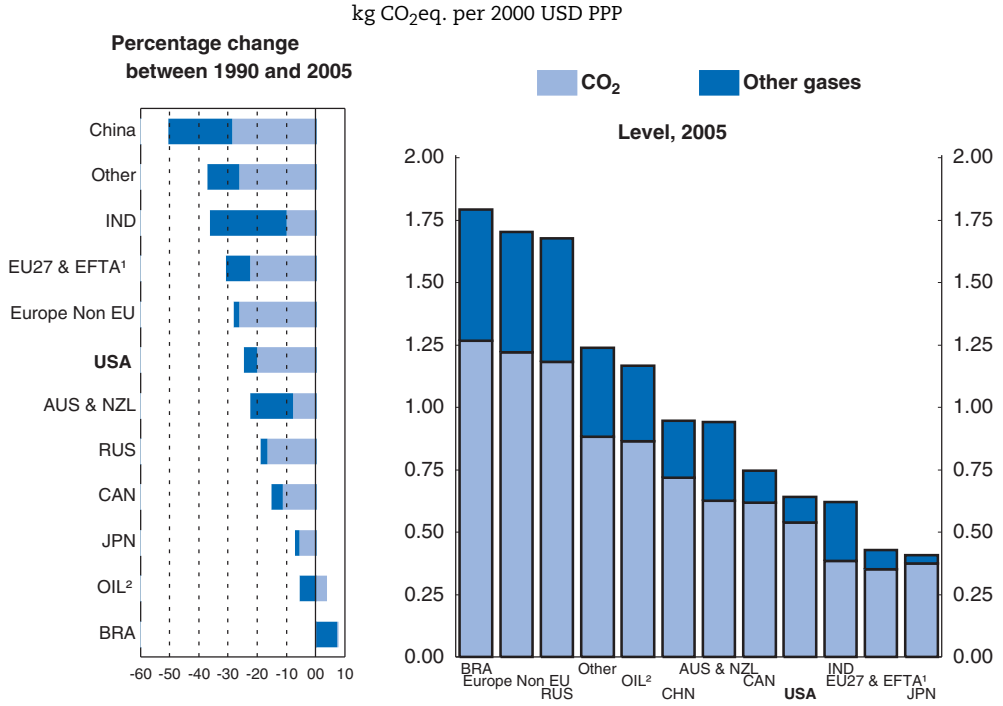
this uncertainty, mitigation action should be seen as reducing the probability of severe climate-change costs occurring.

The United States is a major emitter of GHG

While growth in US GHG emissions has slowed substantially in recent years, emissions were nevertheless some 17% higher in 2005 than in 1990. This increase compares with a decline of 6% on average in the EU27 + EFTA countries, partly reflecting the collapse of heavy industry in Eastern Europe. This factor clearly contributed to the 18% decline in emissions in Germany over this period. However, emissions also fell steeply in the United Kingdom (10%) and only rose modestly (4%) in France. The US share of current global emissions has declined in recent years to 15% in 2005 as its emissions growth has slowed and emerging countries have developed. The US share is the second largest of any country or region, after China. The OECD (2009) projects that US GHG emissions will increase by 28% by 2050 on a BAU basis, which, together with rapid growth in developing countries'emissions will result in the US share of global emissions falling somewhat to 13% by 2050.

Growth in GHG emissions has been slower than economic growth both in the United States and most other countries. The GHG emissions intensity of the US economy (GHG emissions per unit of GDP in 2005 prices) fell by one quarter between 1990 and 2005 (Figure 12). This

Figure 12. **GHG emission intensity of output is declining in the United States but is higher than in most OECD countries**



1. EU27, Iceland, Norway and Switzerland.
2. Indonesia, Venezuela, Middle East, North Africa, and Nigeria.

Source: IEA (2009a).

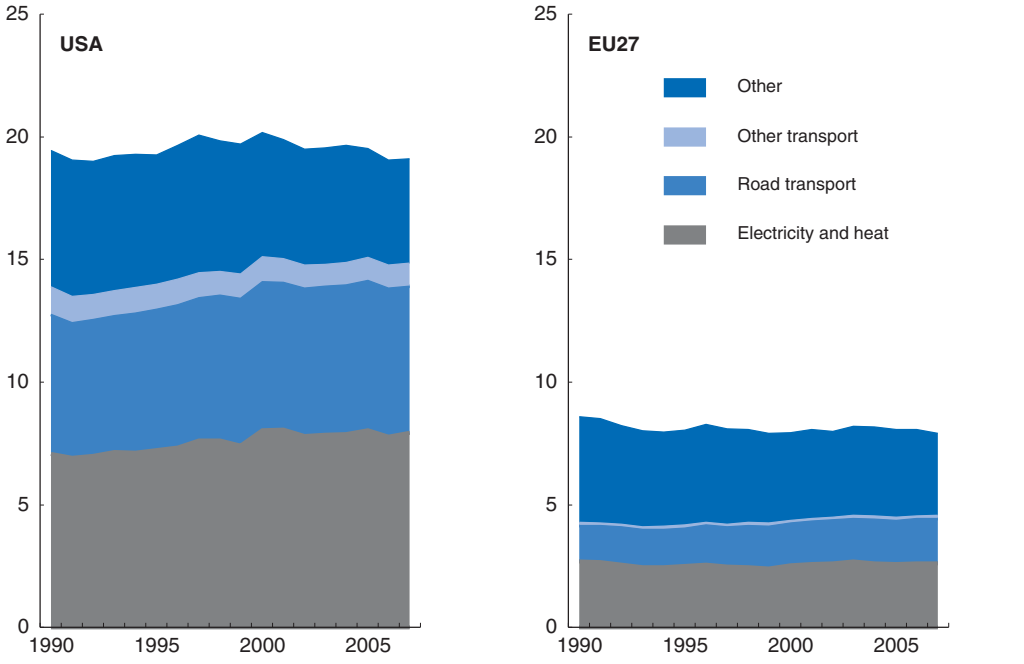
StatLink http://dx.doi.org/10.1787/888932325159

reduction in GHG intensity was less than achieved in EU27 + EFTA countries on average, but more than in the remaining OECD countries (GDP is converted to USD at 2005 PPP exchange rates). The GHG emissions intensity of GDP is higher in the United States than in the EU27 + EFTA countries and Japan but lower than in Canada, and the Australia and New Zealand region.

Emissions per capita in the United States in 2005 were approximately double the levels in the EU27 + EFTA and Japan, though they were lower than in the Australia and New Zealand region. The large difference between US- and EU27 + EFTA emissions is mainly attributable to much higher CO_2 emissions from electricity and heat production and from transportation (Figure 13). Emissions from electricity production in the United States are relatively high owing to heavy reliance on traditional coal-fired power stations, which supply almost one half of US electricity. This technology choice reflects the low cost of coal relative to natural gas in parts of the country, fuel prices that are distorted by subsidies and the absence of strong financial incentives to encourage more efficient use of fossil-fuel plants or to use cleaner fuels for power generation (IEA, 2008). Even though public-mass-transit investment and usage have been increasing in the United States, development is still limited compared to European countries, contributing to transport emissions. Other factors that contribute to relatively high transport emissions are the low population density and consequent long distances travelled per capita and the low mileage performance of the vehicle fleet, although US fuel-economy standards are being raised (see below). Low fuel taxes relative to EU27 + EFTA countries may contribute to higher annual vehicle miles travelled and preferences for vehicles with low fuel economy (Figure 14).

Figure 13. **CO_2 emissions per capita are much higher in the United States than in the EU27**

Tonnes, thousand



Source: IEA (2009a).

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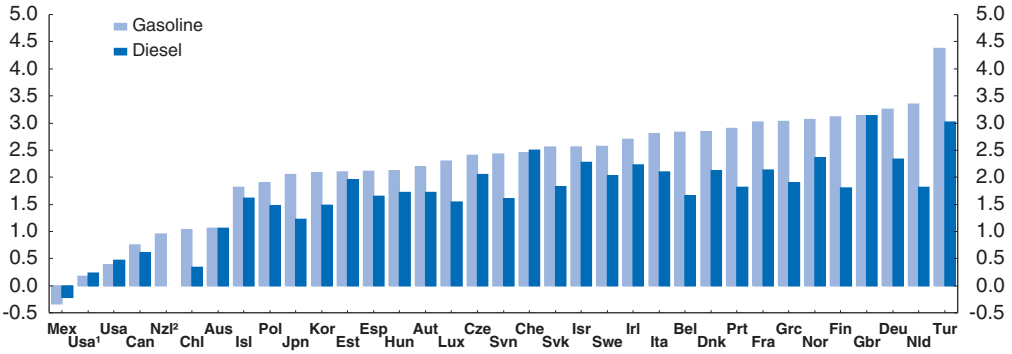
Figure 14. **Gasoline and diesel tax rates are relatively low in the United States**

USD per gallon, 2010



1. Federal.
2. New Zealand levies road-user charges on diesel vehicles.

Source: OECD, *EEA Database*.

StatLink http://dx.doi.org/10.1787/888932325197

Participation of the United States and other large emitters is pivotal to reaching an international agreement to reduce GHG emissions

Stabilising the CO_2-equivalent concentration of long-lived GHG in the atmosphere at around 550 ppm would offer about a 50% chance of limiting the long-term increase in global mean temperature to about 3 °C above pre-industrial levels (IPCC, 2007). However, it would be difficult for a global coalition of countries and/or regions to achieve this goal by 2050 without the participation of the United States and any other large emitter as this would entail very high global mitigation costs and would be impossible if neither the United States nor China participated. OECD (2009) analysis using the World Induced Technological Change Hybrid (WITCH) model (Bosetti *et al.*, 2009; and Bosetti, Massetti and Tavoni, 2007) provides theoretical support for these conclusions. Moreover, it would be difficult to assemble a coalition of countries to take action that did not include the United States as other countries, especially developing countries, are unlikely to consider it equitable that they bear abatement burdens while the United States, which is one of the richest countries and largest emitters in the world, does not. This makes US leadership vital. Indeed, some countries have made the adoption of mitigation policies dependent on US action, with this link being explicit in the case of Canada. The current Administration has clearly signalled its desire for the United States to assume its leadership responsibilities by adopting a comprehensive package of policies to substantially reduce GHG emissions, subject to Congress passing the associated legislation (see below).

The United States agreed to the Copenhagen Accord (noted by the United Nations Framework Convention on Climate Change, Conference of the Parties 15th session (COP15)) negotiated in December 2009. It committed to a national target for reducing GHG emissions from the 2005 level by around 17% by 2020 (equivalent to a reduction of about 3% from the 1990 level) subject to passing the requisite energy and climate legislation. The EU27 + EFTA group of countries committed to a 30% reduction from the 1990 level (equivalent to a reduction of about 25% from the 2005 level) provided that other industrialised countries make comparable commitments and that developing countries make adequate commitments, falling to a 20% reduction otherwise. OECD

(2010b) estimates that the EU27 + EFTA maximum commitment and the US commitment entail comparable efforts in terms of loss of real income (around 0.7% of BAU income by 2020 below). Based on the maximum commitments made by other OECD countries, OECD (2010b) estimates that the countries with high emissions intensity (Canada, Australia and New Zealand) would incur somewhat larger income losses while Japan would incur a smaller income loss. According to OECD (2010b), the US target, taken together with the declared targets of other industrialised countries, would lead to a 12-18% reduction in GHG emissions in 2020 compared with 1990 levels. While this is significant, further reductions from industrialised countries and the more advanced developing countries would be required to achieve the reductions judged by the IPCC to be necessary by 2050 to have a 50% probability of limiting warming to 2 °C (this scenario entails stabilising the atmospheric concentration of long-lived GHG at 450 ppm CO_2-equivalent). To reach a final agreement, it will be necessary to agree a fair distribution of abatement burdens.

In addition to reducing the exposure of Americans to the risk of high-cost-climate-change events, US participation in global mitigation efforts would generate co-benefits from reduced local air pollution. Bollen *et al*. (2008; 2009) estimate that health co-benefits from reduced local air pollution in the United States could cover a sizeable part of mitigation costs. By reducing the fossil-fuel intensity of both the US and other economies, policies to reduce GHG emissions could also enhance energy and national security.

The most cost-effective way to reduce GHG emissions is to price them and support emission-reducing innovation

Private production and consumption decisions do not fully take into account the social costs of GHG emissions. Consequently, the level of GHG-intensive production and consumption activity is higher than is socially optimal. The most cost-effective means of ensuring that these external costs are taken into account is to price emissions, either through an emission tax or a cap-and-trade scheme. This would encourage producers and consumers to exploit abatement opportunities. Because they have an incentive to exploit the cheapest abatement opportunities first, abatement costs would be minimised. This applies all the more at the international level, where there are large differences in marginal abatement costs across countries. The power of pricing to minimise abatement costs has been amply demonstrated in the United States through experience with the cap-and-trade scheme to reduce sulphur dioxide (SO_2) emissions in the electric-power sector, introduced in 1995. It has resulted in almost a halving of these emissions and compliance costs are estimated to have been 30-40% lower than would have been incurred had the command-and-control regulatory approaches considered by the Congress instead been adopted (Stavins, 2005 and 1998; Carlson *et al*., 2000). Railroad deregulation increased the cost savings from the cap-and-trade scheme by enabling Mid-western electric utilities to reduce their SO_2 emissions by increasing their use of low-sulphur coal from Wyoming.

While pricing of GHG emissions would also increase incentives to invest in RD&D (R&D and Demonstration), this alone would not bring such investment up to the socially optimal level owing to a number of market failures. First, firms making such investments are typically unable to appropriate all or most of the returns they generate owing to the public-good nature of knowledge (Griliches, 1992). Second, political uncertainty surrounding climate-change policy reduces the incentive to bear the costs of innovation (OECD, 2009).

Third, firms will focus RD&D investments on existing polluting technologies rather than low-emissions technologies owing to market-size effects (Acemoglu *et al.*, 2009). Fourth, a lack of appropriate infrastructure may be a barrier to the adoption of some new technologies, such as electric cars or renewable energy (de Serres, Murtin, and Nicoletti, 2010). And finally, learning-by-doing effects reduce the costs of existing technologies as firms and consumers learn better how to use them, resulting in slower than socially optimal diffusion of new technologies because neither firms nor consumers take these spillovers into account when making production and consumption decisions (Arrow, 1962).

Very large increases in global RD&D are likely to be required to enable backstop technologies to emerge that would substantially reduce abatement costs. OECD (2009) estimates that a six-fold increase in such investments would be needed, assuming a world carbon price scenario that targets stabilisation of the atmospheric concentration of GHG at a 550 ppm CO_2-equivalent. In an alternative approach that identifies spending gaps in the main technologies concerned, the IEA (2009b) estimates that an increase of three to six times the current level of RD&D spending is needed. It has been estimated that the emergence of plausible technology backstops could reduce abatement costs by 50% or more, which represents savings in the tens of trillions of dollars over the next hundred years (Edmonds *et al.*, 2007; Manne and Richels, 1992; and Clarke *et al.*, 2006).

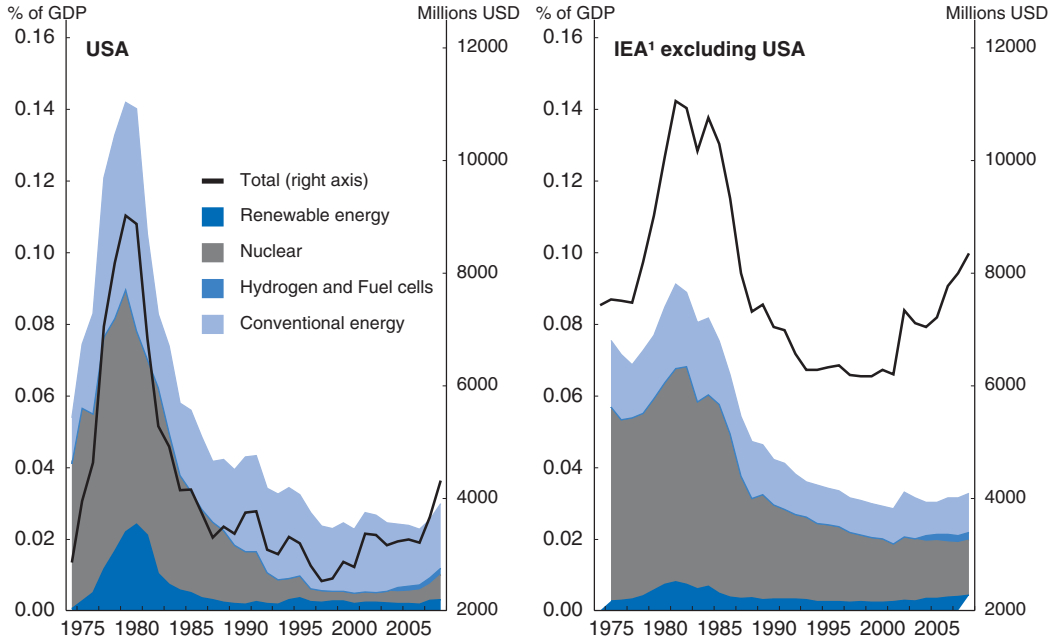
Government policies implemented thus far to reduce GHG emissions have been neither ambitious nor cost effective

Prior to the recent non-binding Copenhagen Accord, the only international agreement to reduce GHG emissions that the US government had ratified was the United Nations Framework Convention on Climate Change (UNFCCC), under which the United States and other industrial countries made a non-binding commitment to return GHG emissions to their 1990 level by 2000 and to stabilise them at this level. The United States, like most non-European OECD countries, has not met this target while the EU27 + EFTA countries have, on average (see above). The United States did not ratify the Kyoto Protocol through which other industrialised countries committed to reduce GHG emissions to 5.2% below the 1990 level by 2012. Domestically, the previous Administration unilaterally adopted the non-binding target of reducing the GHG emissions intensity of the economy by 18% over 2002-12, four percentage points more than projected on a BAU basis (minus 14%) at the time (2002) (IEA, 2008). The United States appears to be on track to meeting this target.

Rather than price GHG emissions – the cornerstone of a cost-effective approach to reducing GHG emissions – the previous Administration focused on voluntary agreements with industry, which accounted for around one half of the estimated mitigation impact of measures reported in the fourth US Climate Action Report (United States Department of State, 2007), and on supporting the development and dissemination of technologies to reduce GHG emissions, notably through measures in the Energy Policy Act of 2005. Public spending on energy-related RD&D has increased in recent years, but both the increase and the level attained have been modest, especially compared with the period following the first two oil-price shocks (Figure 15). This increase and the level attained are comparable to those in other IEA member countries. While no comprehensive data exist on private sector RD&D, available evidence suggests that its share in overall private RD&D spending is low

Figure 15. **Public spending on energy-related RD&D has increased in recent years but remains low**

2008 PPP prices



1. Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom.

Source: International Energy Agency, RD&D Budget – Edition 2009; OECD (May 2010), *OECD Economic Outlook 87 Database*.

StatLink http://dx.doi.org/10.1787/888932325216

compared with other sectors and has been decreasing over the past two decades (OECD, 2009).

None of these policy instruments is cost effective as a substitute for emissions pricing. They do not internalise the costs that GHG emissions impose on others and, accordingly, there is no reason for abatement to be the least costly. Moreover, the absence of pricing weakens incentives for induced technical change to reduce emissions. Rather, such policies have the potential to work best as complements to emissions pricing. For example, support for RD&D to reduce emissions complements emissions pricing by addressing market failures (those listed above) other than the pollution externality.

The Energy Policy Act of 2005 also mandated an increase in the bio-fuel content of gasoline sold in the United States. This programme has been a particularly costly way of reducing GHG emissions. Abstracting from indirect land use effects (ILUE, which refer to the extra carbon emissions from land-use changes (such as conversion of forests into farmland) induced by the expansion of croplands for ethanol or biodiesel production) and assuming that corn-based ethanol reduces GHG emissions by 10-20% compared with fossil-fuel-based gasoline, the OECD (2008) estimates abatement costs of at least USD 1 000 per tonne of CO_2. This programme has also taken land out of production of food for (direct or indirect) human consumption, pushing up food prices. It has also increased the cyclical volatility of global food prices because subsidies for corn-based bio-fuels are positively related to oil prices, which are positively correlated with the global business cycle.

The Renewable Fuels Standard (RFS) was substantially revised in The Energy Independence and Security Act of 2007 (EISA) to give increased weight to bio-fuels that are more effective in reducing GHG emissions, allowing for direct emissions and significant indirect emissions (such as from indirect land use changes). EISA established new renewable fuel categories, setting mandatory life-cycle-GHG-emissions thresholds for them in relation to average petroleum fuels used in 2005. It requires a gradual increase in the use of bio-fuels by American fuel producers from 9 billion gallons in 2008 to 36 billion by 2022 and requires them to use an increasing proportion of advanced bio-fuels (21 billion gallons by 2022). The Act also created a USD 1.04 per gallon subsidy for cellulosic bio-fuel and reduced the ethanol subsidy from USD 0.51 to USD 0.45 per gallon. *The requirement in EISA to take account of ILUE when setting the revised renewable fuel standard (RFS2) is a major improvement on the original RFS that should not be sacrificed, as would occur were the provision in theAmerican Clean Energy and Security Act of 2009 (ACES, see below) prohibiting the EPA from taking this factor into account to be retained in final climate-change legislation*. This provision was not included in the American Power Act (Kerry-Lieberman), which was submitted to the Senate earlier this year but has not been passed owing to insufficient support in the Senate.

To implement RFS2, the EPA has had to estimate the life-cycle GHG emissions effects of bio-fuels, allowing for significant ILUE. The EPA's analysis supports earlier evidence that sugarcane-based ethanol has much lower GHG emissions abatement costs than corn-based ethanol, even when the latter is produced under conditions that minimise GHG emissions (using natural gas instead of coal to power dry mill plants) (US Environmental Protection Agency, 2010a). However, agriculture and trade policies discourage the use of sugarcane-based ethanol, which would be imported from Brazil, by setting high import tariffs on sugarcane-based ethanol. *Abatement costs could be reduced by eliminating subsidies for bio-fuels with lower life-cycle GHG emissions reductions than sugarcane-based ethanol* – i.e., *corn-based ethanol and biobutonal, including from plants currently grandfathered – and by abolishing the import tariffs on sugarcane-based ethanol*. These measures could also be used to help to negotiate lower barriers imposed by Brazil on imports of technologies to reduce GHG emissions. Removing the barriers to sugarcane-based ethanol could also make it easier to meet the advanced bio-fuels requirements in EISA, as there are still considerable technical barriers to overcome before commercialisation of other such fuels. Abatement costs could be further reduced by replacing the bio-fuels mandate with appropriate pricing of GHG emissions.

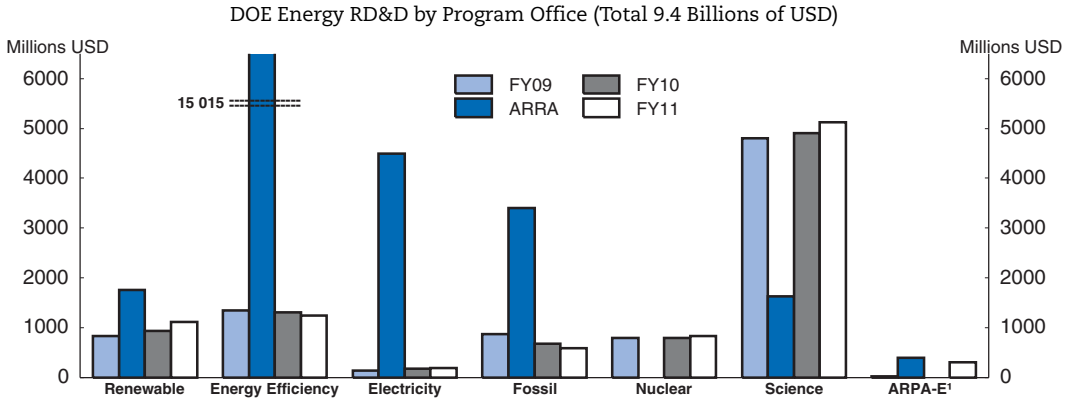
Local and state land-use regulations often do not integrate housing development and transport infrastructure decisions. The result is that the United States has many urban areas that are not adapted for public transport. *For this to change in the long term, land-use regulations should integrate housing development and public transport availability.* This could result, for example, in more redevelopment of brown-field sites to attract new housing to already built-up areas, which are better suited to public transport than the alternative green-field sites. In making this change, policymakers could learn from the experiences of Germany and the Netherlands, which have successfully implemented such policies.

The current Administration's preferred climate-change policy would yield large cost-effective reductions in emissions if implemented

The current Administration is endeavouring to establish a comprehensive climate-change policy, the main planks of which are pricing GHG emissions and supporting the development of innovative technologies to reduce GHG emissions. As discussed above and emphasized in the OECD (2009), this is the right approach to deliver cost-effective abatement. The Administration has proposed pricing GHG emissions through a cap-and-trade scheme that would reduce emissions broadly in line with the conditional commitments made at Copenhagen. To prepare the ground for such a scheme (or regulation of GHG emissions if a cap-and-trade scheme is not implemented – see below), the United States will begin collecting data in 2010 on greenhouse gases from large emitters, eventually covering 82.5% of US emissions.

The Administration gave a substantial boost to public funding for Research, Development and Deployment (RD&D, which includes expenditure to speed the spread of a given technology (deployment), in additional to traditional R&D, which is focused on creating new technologies) to reduce GHG emissions through the American Reinvestment and Recovery Act of 2009 (ARRA), which raised such funding by about USD 26.7 billion according to US Department of Energy estimates (Marlay, 2010) (Figure 16). ARRA also included a loan guarantee programme for innovative technologies amounting to USD 6 billion. The US Department of Energy's (DOE's) innovation budget ("Science" in Figure 16) has increased steadily in recent years, to USD 5.1 billion in the FY 2011 budget request, and the government plans to double this budget over the next five years. To further deployment, the DOE has requested funding authority to support loan guarantees of USD 36 billion for new nuclear power plants and of USD 4.4 billion for renewable energy and electricity transmission. While the increased commitment goes in the right direction, *the authorities should increase public support for energy RD&D further to increase the probability of developing breakthrough technologies that would greatly reduce abatement costs as argued by Acemoglu* et al. *(2009)*. A constraint to expanding rapidly both public- and private-energy R&D, however, could be the availability of an adequate supply of scientists; there is evidence that R&D subsidies can drive up wages of

Figure 16. **The Department of Energy's (DOE's) innovation budget ("science") is steadily rising**



1. Advanced Research Projects Agency-Energy.

Source: Marlay (2010).

StatLink http://dx.doi.org/10.1787/888932325235

scientists enough to prevent significant increases in R&D (Goolsbee, 1998). *This makes it important to increase investment in training scientists, as planned*. The Administration has also proposed in the FY 2011 Budget to eliminate most fossil-fuel subsidies by ending tax credits worth USD 39 billion over the next decade.

Regulation can be a cost-effective approach to reducing emissions where information and other barriers prevent market-based instruments from working efficiently. For example, the Administration has been proactive in establishing minimum energy efficiency standards for motor vehicles and a wide variety of consumer products and commercial equipment. In the case of motor vehicles, the EPA and the Department of Transportation (DOT) recently issued new joint regulations to reduce GHG emissions and increase fuel economy of new passenger cars and light trucks sold in model years 2012 through 2016. The EPA projects that CO_2 emissions per mile of the average new light-duty vehicle will be 23% lower by 2016 than in 2011 and that the fuel savings associated with the more efficient GHG technologies will far outweigh the higher initial vehicle costs (Table 4). These estimates do not, however, allow for the loss of consumer welfare from requiring consumers to purchase more fuel economy than they would absent the regulation. President Obama also issued an Executive Order in 2009 requiring federal agencies to set and meet strict GHG reduction targets by 2020. He also called for more aggressive efficiency standards for common household appliances and put in motion a programme to open the outer continental shelf to renewable energy production.

Table 4. **Fuel savings from vehicles complying with motor vehicle CO_2 regulations will outweigh higher initial vehicle costs**

Annual cost per metric ton of CO_2e abatement from motor vehicle CO_2 emission regulations, USD 2007

	Vehicle compliance cost[1] (USD millions)	Fuel savings[2] (USD Millions)	CO_2-equivalent reduction (million metric tons)	Cost per ton-vehicle program only
2020	15 600	–35 700	160	100
2030	15 800	–79 800	310	50
2040	17 400	–119 300	400	40
2050	19 000	–171 200	510	40

1. Costs here include vehicle compliance costs and do not include any fuel savings.
2. Fuel savings calculated using pre-tax fuel prices.

Source: US Environmental Protection Agency (2010b).

The House of Representatives has passed legislation (The American Clean Energy and Security Act of 2009, ACES) containing a cap-and-trade programme covering 85% of US emissions by 2016 that would deliver the GHG-emission reductions signalled in Copenhagen (17% below the 2005 level by 2020 and 83% below by 2050), and the Senate introduced a new climate bill (The American Power Act, sponsored by Senators Kerry and Lieberman) in May 2010 that is broadly similar, although it has not been passed owing to insufficient support in the Senate. Extensive analyses of ACES highlight a number of lessons that can inform legislators as they decide whether or not to support future climate-change legislation. First, the economic costs of reducing GHG emissions are modest when a comprehensive approach is adopted, the centrepiece of which is the pricing of GHG emissions. The CBO (2009c) estimates that GDP would be 1.1% to 3.4% lower in 2050 than on a BAU basis were ACES to be passed, which corresponds to a tiny reduction in annual GDP growth. CBO (2009c) also concluded that annual workforce turnover caused by comprehensive climate-change legislation would be small compared with what normally

occurs, reflecting the facts that there are few workers in energy-intensive sectors and that change occurs over a long period. According to the Inter-Agency Report (2009), competiveness- and employment impacts in energy-intensive and/or trade-exposed sectors (which account for 10% of emissions and 0.5% of non-farm employment) are minimal, if they are given output-based allocations of emission permits. *Congress should pass comprehensive climate-change legislation that includes the pricing of GHG emissions as this would enable the United States to meet the targets to reduce GHG emissions communicated at Copenhagen in a cost effective way. The border-tax-adjustment (BTA, import fees levied by countries that price GHG emissions on goods manufactured in countries that do not) provisions in the ACES legislation passed by the House of Representatives should not, however, be included in the final law as they would be costly to the economy, administratively burdensome to implement, unlikely to be successful at protecting domestic industries from competiveness impacts, and may not be the most effective means of addressing leakage* (OECD 2009). The Senate bill has much more flexible language on this front, although, as noted above, there has not been enough support in the Senate to pass this bill.

One aspect of achieving modest abatement costs is the availability of a large supply of international offsets provided that they are subject to strict oversight and are verifiable, to ensure that they represent genuine reductions from business-as-usual (a concern with offsets is that they may be subject to fraud and double counting). For example, the US Environmental Protection Agency (2010c) estimates that emission-permit prices would be up to 150% higher by 2050 if ACES did not allow international offsets. If comprehensive climate-change legislation is passed, *the authorities should support multilateral efforts towards strengthened emissions monitoring in developing countries and develop sectoral or even country-based approaches to ensure that a large supply of genuine offsets is available. The authorities should also work with their foreign counterparts to harmonise national cap-and-trade programmes so that they can eventually be linked*. All of these measures would help to ensure that abatement occurs where it is cheapest rather than where it is being paid for. In the presence of an adequate supply of international offsets, the bringing on-stream of Carbon Capture and Storage (CCS) electricity generation capacity and/or of more nuclear power is not a critical factor in containing abatement costs. However, in the absence of international offsets, these technologies make a large difference to abatement costs. Regardless of whether or not there are international offsets, ACES would be a relatively low-cost approach to reducing emissions.

Another issue for legislators to consider if they adopt a cap-and-trade scheme is the extent to which permits will be issued free of charge. The more permits that are given away, the less scope there is to offset the increase in effective taxation associated with pricing GHG emissions or, if the budget deficit is to be reduced, the higher that other taxes need to be or lower that government expenditures need to be (OECD, 2010). *In view of the need to put public finances on a sustainable path, legislators should aim to keep the free allocation of permits to a minimum so that funds raised from permit auctions can be devoted to deficit reduction, once low-income households have been compensated and more funds made available for energy RD&D*. Insofar as this reduces the need for other tax increases, this use of the funds raised reduces the excess burden of taxation (*i.e.*, the costs to economic efficiency of taxation) compared with what it otherwise would have been.

If climate change legislation is not passed, the EPA will progressively extend regulation to reduce emissions from motor vehicles to all other sectors. This would not be as cost-effective an approach to abatement and would be unlikely to be sufficient to enable the United States to achieve the emission reduction targets communicated at Copenhagen. *In this scenario, such regulation should be complemented by increases in gasoline and other fossil-fuel taxes*.

Box 3. **Summary of recommendations for achieving cost-effective abatement of GHG emissions**

- Implement comprehensive pricing of GHG emissions, as in ACES or the American Power Act.
- Support multilateral actions to strengthen emissions monitoring in developing countries and work with other countries to ensure that a large supply of genuine offsets is available, *e.g.* through sectoral or even country-based approaches. Work with other countries to harmonise national cap-and-trade programmes so that they can eventually be linked.
- Limit the free allocation of emission permits as much as possible so that revenue can be applied to budget deficit reduction once low-income households have been compensated and more funds have been made available to energy RD&D. Increase the energy RD&D budget to increase the probability of developing breakthrough technologies that substantially reduce abatement costs and take steps to increase the supply of scientists working in the field.
- Remove import barriers against sugarcane-based ethanol and eliminate subsidies for domestic producers of corn-based ethanol.
- In the event that it is not possible to pass legislation pricing GHG emissions, reduce emissions using the next most cost-effective instruments available, such as energy taxes and regulation.

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ANNEX A.1

Progress in structural reform

This annex summarises recommendations made in previous *Surveys* and action taken since the last *Survey* was finalised in November 2008.

Recommendations	Action taken since the previous *Survey* *(December 2008)*
A. Labour markets	
The Earned Income Tax Credit (EITC) should be increased.	The American Recovery and Reinvestment Act of 2009 (ARRA) increased the EITC in 2009 and 2010 for families with three or more children and for married couples. There was also a modest temporary expansion of EITC for childless workers, who alone pay federal income taxes on incomes below the poverty line. These arrangements will expire at the end of 2010 unless Congress approves the extension requested by the Administration in the FY 2011 budget.
Implement strategies to increase employment of the disabled.	No action.
Monitor whether guidelines for labour market programmes are being followed	No action.
Avoid increasing the federal minimum wage.	The federal minimum hourly wage was increased from USD 6.55 in 2008 to USD 7.25 in 2009.
Expand trade adjustment assistance.	The Trade Globalization Adjustment Assistance Act of 2009 made assistance more widely available.
B. Education	
The No Child Left behind (NCLB) framework of standards, assessment and accountability should be extended through upper secondary education.	The Administration is helping states to strengthen their school assessment and accountability systems so that they provide information about the progress of individual students. ARRA provided funding to support these objectives and to establish the Race to the Top Fund. It provides competitive grants to reward and encourage states that have taken strong measures to improve teacher quality, develop meaningful incentives, incorporate data into decision-making, and raise student achievement in low-achievement schools.
Greatly raise limits on Stafford loans, especially for unsubsidised direct loans, so that they cover the full cost of study. The interest rate on these loans should vary with the long-term bond rate. The default repayment plan should be income-contingent.	The limits have not been increased since July 2008. Interest rates on subsidised loans (for undergraduate students) have been reduced from 6.0% in 2008/09 to 4.5% in 2010/11 but remain unchanged at 6.8% on unsubsidised loans. Repayments are not income-contingent.
Simplify or abolish tax preferences for higher education expenses.	No action.
C. Health care	
Reform the individual and small-group market to facilitate greater risk pooling. To this end, require community-rated and guaranteed issue policies and make health insurance compulsory. Introduce means-tested subsidies to help low-income persons afford health insurance.	These were key features of the 2010 health reform.

Recommendations	Action taken since the previous *Survey* *(December 2008)*
Replace the health tax exclusion (*i.e.,* the exclusion from taxable personal income and payroll tax of compensation paid in the form of health insurance cover) with more efficient subsidies that are independent of the health plan (subject to minimum standards of coverage being satisfied).	The 2010 health reform includes an excise tax that will be levied on high cost plans from 2018. It would have been preferable, however, for the limit for this tax to be adjusted for regional and individual factors that affect plan costs.
Enhance the dissemination of information on the effectiveness and cost of treatments and procedures.	The 2010 health reform includes funding for comparative effectiveness research.
Gradually lower Medicare Advantage payments to the level of traditional fee-for-service Medicare plans.	The 2010 health reform lowers excess payments for Medicare advantage plans.
Decrease the generosity of supplemental Medicare insurance designs for beneficiaries without chronic conditions to reduce moral hazard risks.	No action.
Ensure that prescription drug benefits do not jeopardise Medicare's long-run solvency.	The comparative effectiveness pilot study provided for in the 2010 health reform could reduce pharmaceutical costs if successful and rolled out nationally by helping to determine the prices to pay for new drugs. However, the 2010 reform added to Medicare prescription drug benefit costs by providing USD 250 rebates to beneficiaries who reach the coverage gap (also known as the donut hole) between the basic coverage limit and catastrophic coverage.
Do not delay further the use competitive tenders for Medicare purchases of medical equipment and supplies.	No action.
D. Ageing	
Speed up the phased increase in the official retirement age (at which full social security benefits are paid) from 65 to 67. Link the retirement age to active life expectancy thereafter such that the ratio of the expected duration of active retirement to working life remains constant.	No action.
Reduce the replacement rate for higher earners and raise the Social Security tax cap.	No action.
E. Product markets	
Improve energy infrastructure, in particular electricity transmission.	ARRA provided funding for improving the electricity network, in particular to facilitate the use of renewable electricity.
Roll back extra support given to farmers in recent years.	Apart from a small reduction in the subsidy for corn-based bio-fuel, no action has been taken.
F. Financial markets	
Improve and streamline the regulatory framework to make it more unified and comprehensive.	Financial reform legislation passed in the summer of 2010 makes the Federal Reserve responsible for regulating all systemically important financial institutions. The Office of Thrift Savings is merged with the Office of the Currency Controller. The bills also create a Financial Services Oversight Council to oversee policy on systemic stability.
Subject systematically important financial institutions to strict and conservative prudential standards. These institutions should hold capital against off-balance sheet risks and be subject to counter-cyclical capital requirements.	Capital adequacy ratios are being revised in co-ordination with the Basel Committee on Banking Supervision. These ratios are likely to be increased, account for off-balance sheet exposures, and to include counter-cylical adjustments.
Reform corporate governance laws to give shareholders more influence over management.	The financial reform legislation gives shareholders a non-binding vote on executive pay, gives the SEC authority to grant shareholders proxy access to nominate directors, and requires directors to win by a majority vote in uncontested elections. Compensation committees will only be allowed to include independent directors and will have authority to hire compensation consultants.
Leave the securitisation of mortgages to the private sector. This would entail privatising the Government Sponsored Enterprises, cutting off their access to preferential lending facilities with the federal government, subjecting them to the same regulation and supervision as other issuers of mortgage-backed securities, and dividing these entities into smaller companies that are not too big to fail.	The federal government has had to support Fannie Mae and Freddie Mac to stave off bankruptcy. The Administration has announced that it would work toward a comprehensive housing finance reform proposal for delivery to Congress by January 2011.

Recommendations	Action taken since the previous *Survey (December 2008)*
Strengthen underwriting standards for non-prime mortgages. Help the private sector to solve the agency problems that have afflicted mortgage securitisation.	The Federal Reserve has implemented new guidelines for high-cost mortgages to improve underwriting standards. The financial reform bills require companies that sell products like mortgage-backed securities to retain at least 5% of the credit risk, unless the underlying loans meet standards that reduce riskiness. The bills also call for better disclosure on the underlying assets and their quality. The bills also impose new requirements on credit rating agencies and enhance oversight of them, including by prohibiting compliance officers from working on ratings, methodologies, or sales and requiring agencies to disclose their methodologies, their use of third parties for due diligence, and their ratings track record.
Reduce legal impediments to voluntary mortgage restructuring.	The various programmes to encourage mortgage restructuring that have been initiated have had little success. The legal impediments to mortgage restructuring remain.
G. Taxation	
Reduce deductions for mortgage interest and state and local income tax.	The Administration has proposed in the FY 2011 budget to reduce the rate at which high-income owner-occupiers (married couples with incomes of over USD 250 000 per year and singles with incomes exceeding USD 200 000 per year) can deduct mortgage interest expenses to 28%.
Increase reliance on consumption taxation and consider the introduction of a value added tax.	No action.
H. Environment	
Consider introducing a domestic cap and trade system for CO_2 emissions or a carbon tax on all carbon-based energy products.	The Administration is endeavouring to implement a comprehensive climate change policy that includes a cap-and-trade system for domestic greenhouse gas emissions. The House of Representatives passed a bill in 2009 that includes such a system but the Senate has not passed comparable legislation.

Chapter 1

Rebalancing the economy

At its most basic level the US recession was brought on by housing and real estate-related financial problems. Steps that can be taken to strengthen the economy and reduce the likelihood and severity of similar issues in the future include: reducing overinvestment in housing and increasing the resilience of the mortgage market; revising financial supervision; repairing the household balance sheet and reducing the current account imbalance; and ensuring the preservation of labour market flexibility following the current troubles.

The US recession was the outgrowth of problems in the pricing and financing of housing and other real estate. Low interest rates and financial innovation, such as interest only and subprime loans as well as expanded use of adjustable rate mortgages (ARMs), helped increase demand for housing. Supporting the increasing demand for low interest rate home loans was a surge in the securitization market, which increased the supply of funds to create loans and shifted risks from originators of loans to purchasers of mortgages and mortgage-backed securities (MBSs).

After years of considerable house price increases the risks of falling house prices were discounted by individuals and market participants alike and credit standards for home mortgages were loosened. When interest rates later increased, and homes price increases faltered and then reversed, households who found themselves overextended became unable to withdraw home equity to maintain increasing consumption, and, in more serious cases, were unable to pay their mortgage or sell their home. This, in turn, led to reduced consumption and a rise in mortgage delinquencies. Increasing losses on MBSs and other collateralized debt obligations (CDOs) put in jeopardy the financial health of businesses and institutions heavily invested in the housing market. Financial institutions and markets, worried about their own financial health and left vulnerable in some cases by high leverage and a reliance on short term funding, were unsure of the creditworthiness of borrowers. As a result they reduced outlays of credit, causing liquidity shortages. As credit conditions tightened significantly consumer and business expenditures fell 7% between the second quarter of 2008 and the second quarter of 2009. The ensuing recession has arguably been the most severe since the Great Depression of the 1930s.

Changes in economic policy can play a key role in reducing the likelihood of similar future bubbles and the severity of their impact as they deflate. Rebalancing the economy away from an overinvestment in housing and increasing the resilience of the mortgage market can reduce the contribution of housing to economic volatility in the future. Reforming the financial system and improving regulation can reduce the likelihood of future financial crises and lessen their transmission to other areas of the economy. Repairing household balance sheets and reducing the current account imbalance can reduce adjustments that need to be undertaking when shocks do occur. Finally, maintaining labour market flexibility in the wake of recession can avoid an increase in the duration of future shocks. Progress has already been made on a number of these areas in the United States. In some cases, particularly the labour market, useful steps are merely to avoid letting policies that have been appropriate during the crisis continue to the point where they became harmful.

Rebalancing the economy away from overinvestment in housing and increasing the resilience of the mortgage market

The housing market faces a long adjustment process to return to normal. Nationally homes prices fell by 15% from early 2007 to late 2009 as measured by the FHFA. In large

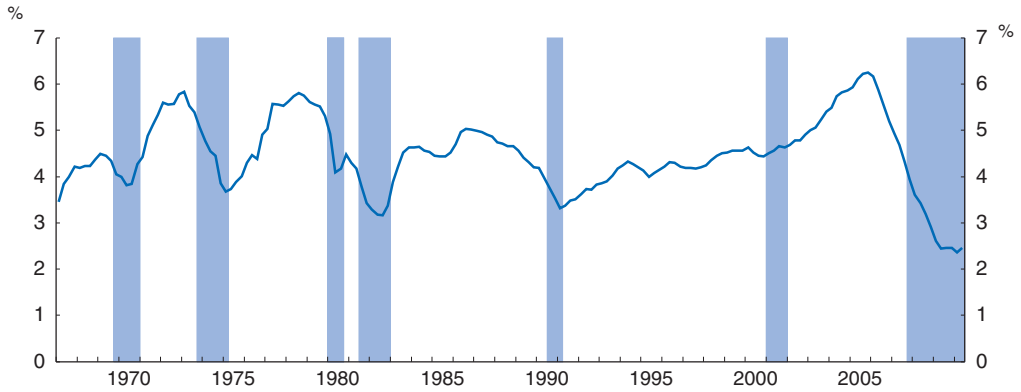
cities the decline was larger and earlier – the Case-Shiller index of homes prices fell around 40% from early 2006 to early 2009. Low interest rates and government housing programmes have provided support to the market, and the collapse in home prices appears to have ended. Nonetheless mortgage loan delinquencies remain elevated. Around 25% of mortgaged homeowners (about 11 millions properties), had negative equity in their home at the end of 2009 (*i.e.* they owed more on their home than it was worth) (First American CoreLogic, 2010). In about 40% of those cases, the home was worth less than 75% of the value of the loans. Meanwhile, the share of housing units that is vacant is only slightly below its all-time high, and the rate of new home construction has fallen sharply to a level below the long-run rate of household formation. While the fall in home prices may have brought house price-to-rent ratios roughly in line with fundamentals in the United States (Andre, 2010), the fundamentals are based on mortgage interest rates remaining at historical lows. Using Andre's methodology a 1.5 percentage point increase in the 30-fixed mortgage rate – putting them a bit above 6½ per cent or around their 2006 levels – could push those fundamentals down about 10%.[1]

Swings in the housing market are not new with the recent business cycle. Housing contributes significantly to the volatility of most US business cycles. Residential investment increased considerably as a share of GDP in the years prior to the majority of the recessions since 1970, and then fell strongly as the economy moved into recession (Figure 1.1). Beyond the direct effect of residential investment, the housing market contributes additional volatility to the economy through swings in real house prices, which boost consumption through increased household wealth and lower saving (Carroll, 2004). Such housing induced wealth effects are likely to have been important in the recessions of the early 1980s and 1990s, when real housing prices fell, as well as in the most recent recession (Figure 1.2).

The recent housing downturn in the United States has been much worse than downturns in previous cycles. It has also been worse than that in most other OECD countries, except Ireland and Spain, despite the US growth in real house prices in the years prior to the recession not being much different than in many other countries (Figure 1.3). The extraordinary severity of the recent housing downturn in the United States

Figure 1.1. **US residential investment has fallen sharply prior to most recessions**[1]

In per cent of GDP

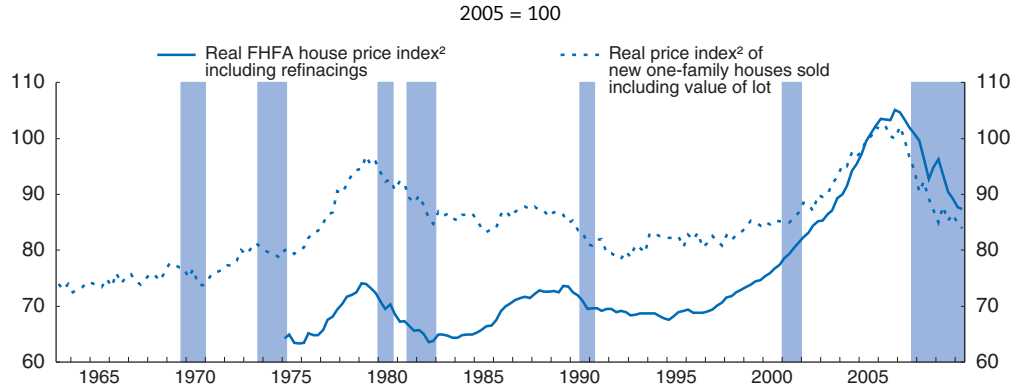


1. Grey areas represent period between peak and trough.

Source: OECD, *National Accounts Database*.

StatLink http://dx.doi.org/10.1787/888932325254

Figure 1.2. **Real house prices declined prior to three of the past four recessions**[1]



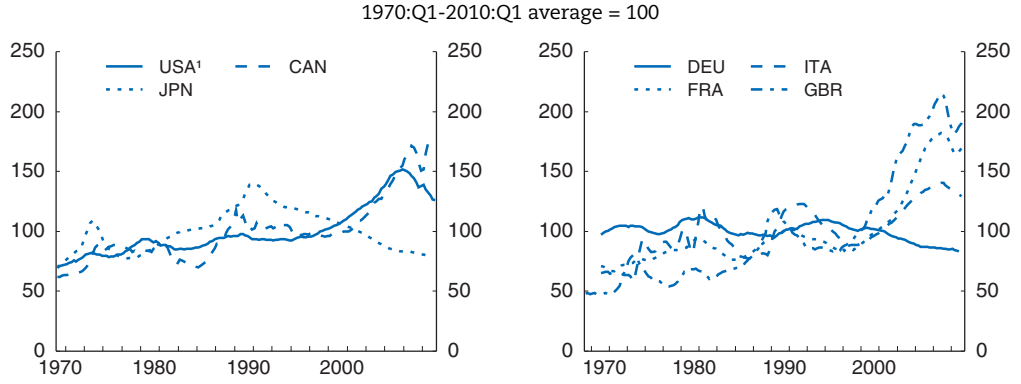
1. Grey areas represent period between peak and trough.
2. Prices are deflated by the CPI.

Source: Datastream.

StatLink http://dx.doi.org/10.1787/888932325273

was likely the result of innovations in housing finance and deteriorating lending standards, developments which have been much more pronounced in the United States than in other countries. The greater use of risky no documentation, low or no down payment, interest-only or long amortization, subprime and alt-A mortgages, and adjustable interest rate loans allowed a significantly wider range of people to qualify for mortgages. The number of nonprime (subprime and Alt-A) mortgages represented 32% of all mortgage originations in 2005, more than triple their 10% share only 2 years earlier (Mayer *et al.*, 2009). The growing use of securitization allowed loan originators to pass those risky mortgages on to other parties and, in the absence of effective regulation, encouraged a deterioration of underwriting standards (Keys, *et al.*, 2010). Combined loan-to-value ratios for Alt-A mortgage purchases rose from 90% in 2003 to 95% in 2006. For subprimes the increase was even more dramatic, rising from 90% in 2003 to 100% in 2006 (Mayer *et al.*, 2009). While subprime mortgages and adjustable rate mortgages (ARMs) do certainly have some positive aspects and have a place in the housing finance market – ARMs are used widely in Australia and Canada, where there were few housing problems in the recent recession – they were overused and abused. Many households received loans that they had little

Figure 1.3. **The increase in real house prices was similar in the United States to those in most other G7 countries**



Source: OECD calculations. For US, real house prices are the FHFA index divided by the CPI.

StatLink http://dx.doi.org/10.1787/888932325292

chance of paying back, particularly if interest rates increased in the case of an ARM. (These financial innovations will be addressed further in the next section.) However, the deterioration of lending standards combined with the nonrecourse nature of many US home loans and the relatively low level of home equity that has persisted in the United States for many years led to delinquency and foreclosure rates in the United States that have been far above those in most other OECD countries.

Looking over a longer time period than just the most recent turmoil, housing has been a traditionally volatile sector, as noted above. Some of this volatility is inevitable because houses are a durable good usually bought on credit. When uncertainty increases – as occurs in a recession – purchases of all durable goods fall more than overall GDP. However, growth rates for real US residential construction have been more volatile than other durable goods in the United States, and also more volatile than residential construction in other G-7 countries over the years for which data are available prior to the crisis. Part of this excess volatility is likely a result of the higher household leverage encouraged by significant government support for the housing market.

From a general economic standpoint government support for home ownership may be worthwhile. Home ownership has positive externalities. While evidence suggests homeownership can impede labour mobility (Ferreira, Gyourko, and Tracy, 2008), which could slow down labour reallocation in times of stress, property values rise as homeownership levels increase in a neighbourhood (Rohe and Stewart, 1996), and social problems, such as single-parent households, poverty, high unemployment, and low labour force participation, are correlated with a low level of homeownership in a neighbourhood (Galster, Quercia, and Cortes, 2000). Further, homeowners are more civically active in both voluntary and political organizations (Rohe, Van Zandt, McCarthy, 2002).

As a result of these positive externalities, many OECD governments provide some form of support to home ownership through lower taxation or subsidised credit. Because the externalities above all occur from getting people to own homes, rather than getting people to own larger homes or multiple homes, government subsidies should be structured to raise the share of households that own their own home. However, support to housing markets in the United States revolves around subsidies for loans to purchase a home.

To the extent that subsidies lower the effective rate that individuals pay on home mortgage debt, they will have two effects at the level of the individual: an income effect that will increase consumption of both housing and non-housing items, and a substitution effect that will shift consumption towards housing and greater debt financing of the housing purchase. (See appendix 1 for these results in the context of a simple two-period optimization problem.) Since the subsidies are widely available they will also have a macroeconomic effect which will drive up overall housing demand, thus increasing the total size of the housing market and housing prices.

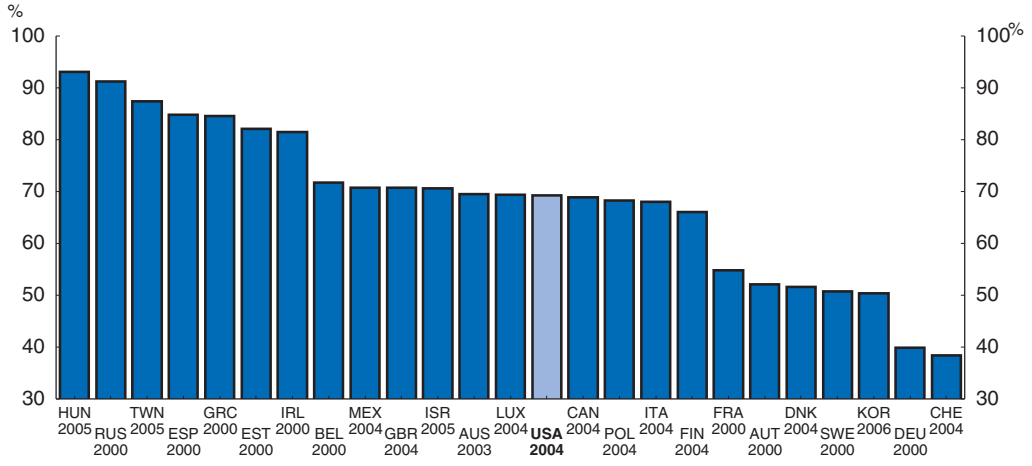
The most notable of the subsidies in the United States is the mortgage interest deduction, which treats mortgages differently from other personal interest expenses, except student loans.[2] Other subsidies include the (previously) implicit (now explicit) government guarantee given to the securities issued by Fannie Mae and Freddie Mac, Federal Housing Administration (FHA) and Veterans' Affairs (VA) home loans and additional programmes at the state and local levels. Since the onset of the recession, additional temporary support for the housing market has occurred in the form of: purchases of mortgage backed securities and GSE debt by the Federal Reserve, which

supported housing by pushing down mortgage and other long-term interest rates; a substantial increase in the number of FHA and VA loans; the Home Affordable Refinance Program (HARP) and Home Affordable Modification Program (HAMP), which have attempted to facilitate loan refinancing and modifications to reduce delinquencies and foreclosures; and resources provided in the American Recovery and Reinvestment Act (ARRA) for the Department of Housing's Neighborhood Stabilization Program and for state and local home finance.

The mortgage interest deduction, valued at USD 100 billion in 2010 (Joint Committee on Taxation, 2010), directly encourages higher mortgage loan values and transfers wealth from less well off households to higher income, larger-mortgage households. There is little evidence that it has increased home ownership, as opposed to raising house prices (Glaeser and Shapiro, 2003).[3] Meanwhile, the government sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, were designed to keep the mortgage market liquid, lowering spreads and thus reducing interest rates and encouraging mortgage borrowing. The ambiguous relationship between Fannie Mae and Freddie Mac and their government backing is estimated to have amounted to a considerable subsidy in the years before the recent downturn. Estimates of the subsidy vary significantly, with the Congressional Budget Office (2004) placing the subsidy at between USD 23 to 46 billion in 2003 while Passmore (2005) places it around USD 150 billion. However, both studies find that a significant portion of the subsidy was not passed on to borrowers. Lenhardt, Passmore, and Sherlund (2008) suggest that the GSEs had only a small effect on mortgage rate spreads.

Despite the subsidies, the US homeownership rate is little different from those in other OECD countries (Figure 1.4). It bounced between 63% and 66% between 1965 and 1995 before rising to 69% in the mid-2000s. But the encouragement for large mortgages has led US households to have less equity in their houses. Mortgage debt as a share of non-financial wealth is higher in the United States than in any other G7 country (Figure 1.5). With the fall in underwriting standards in the years preceding the recent crisis this indebtedness increased and the downpayment for a typical first-time home buyer in the United States dropped to less than 10% of the purchase price of the home.[4]

Figure 1.4. **The homeownership rate in the United States is near the middle of rates in OECD countries**

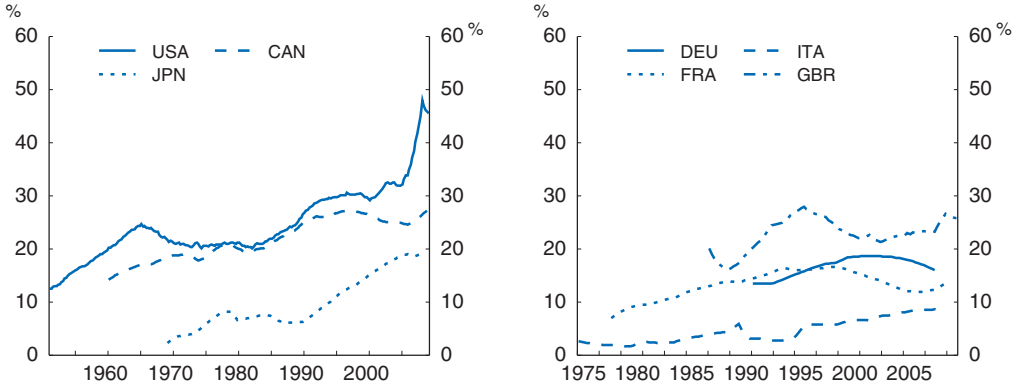


Source: OECD calculations.

StatLink http://dx.doi.org/10.1787/888932325311

Figure 1.5. **US households have lower housing equity than households in other G7 countries**

Mortgage debt as a share of non-financial wealth



Source: OECD, *Analytical Database*.

StatLink http://dx.doi.org/10.1787/888932325330

Reducing or eliminating housing market subsidies that encourage highly-leveraged home loans, such as the mortgage interest deduction and, to a lesser extent, government subsidies to the GSEs, can lessen the likelihood and severity of future housing market shocks.[5] Nonetheless such changes will be politically difficult, and, in any case, they should not take effect until the housing market has recovered. However, the political will to reform should not be wasted. Precedents exist for removing the mortgage interest deduction, probably the most politically difficult portion of reforming the housing market.[6] The United Kingdom removed the mortgage interest deduction by slowly lowering the deduction rate over twelve years of rising home prices with the deduction being phased out completely in 2000. (Whitehead, Gibb, and Stephens, 2005). During the period that mortgage interest deductibility was being phased out, households in Great Britain responded by deleveraging and decreasing their mortgage debt as a share of non-financial wealth (Figure 1.5).[7] Over this same period of time US household were increasing their mortgage debt. For a withdrawal of the mortgage interest deduction in the United States, a similarly long transition period during a time of rising home prices would be desirable to offset the depressing effects of undoing the mortgage interest deduction.

If it is felt that a subsidy is desirable to increase homeownership, or politically necessary to pass other changes, then the subsidy should be more directly focused at increasing home ownership. The National Association of Realtors finds that down payments and closing costs are considered by most households to be the greatest barrier to homeownership. Thus a continuation of the first-time homebuyer's tax credit may be a useful policy to encourage households to enter the market. This subsidy focuses on the largest impediment to homeownership and automatically provides equity to the new homeowner, thereby reducing the likelihood of future delinquency or foreclosure. Evidence from a similar program in Australia suggests that a first-time home buyer tax credit is helpful at raising the homeownership rate of young households (Bourassa and Yin, 2006). Further, the cost of such a program would be substantially less than the mortgage interest deduction: the Congressional Budget Office (2010) estimates that extending the first-time homebuyers tax credit over the next few years would cost a bit over USD 20 billion per year – an amount around one-sixth the Joint Committee on Taxation's estimated cost of the mortgage interest deduction for those same years.

Extending the first-time homebuyers' tax credit is not without problems, however. Many of the households receiving the credit would buy a home regardless of the tax credit. To limit this unnecessary subsidy an argument can be made for targeting the assistance toward the poor or other households which are less likely to buy a home. The credit could also have a negative effect by reducing the accumulation of private savings for a down payment or closing costs. An alternative down payment support programme which would not have this effect is to encourage savings more broadly, through tax advantaged or government-matching savings accounts. Those accounts can be used to accumulate a down payment. Such a home buyer's savings account has been used in Canada, and in a somewhat different form, in Australia. In many ways such an account is an expansion of the deductible IRA already in use in the US, but with higher limits and the ability to withdraw funds for home down payments without paying tax. There is some evidence that a more general programme (Individual Development Accounts), where matching funds are provided rather than tax deductions, has boosted homeownership rates amongst some groups in the United States (Mills, *et al.*, 2006).

Revising financial supervision to reduce the likelihood of future financial crises and lessen their transmission to other areas of the economy

In the recent crisis, as residential mortgage delinquencies rose, losses on mortgage backed securities (MBSs) and other collateralized debt obligation (CDOs) soared. This put severe strains on the financial health of businesses and institutions heavily invested in MBSs and CDOs as well as the sellers of credit default swaps (CDSs) written to insure against such losses. Many financial firms had left themselves vulnerable by overly concentrating risk, having very high leverage ratios, and becoming overly reliant on the shadow banking system for short term financing. The staggering size of the losses led to bankruptcies or the forced sales of many significant US financial institutions: Bear Stearns, Washington Mutual, Countrywide, Lehman Brothers, AIG, Fannie Mae, and Freddie Mac, among others. As other firms became concerned with the creditworthiness of borrowers and counterparties, the withdrawal of credit and freezing of credit markets transmitted what began as a housing shock throughout the economy and the world.[8]

The massive, rapid and co-ordinated policy interventions of the US government and governments across the globe likely saved financial markets from becoming almost completely illiquid. Along with dropping their short-term policy rate, the federal funds rate, to essentially zero in late 2008, the Federal Reserve initiated a series of facilities that provided at their peak USD 1.5 trillion of short-term liquidity to institutions and markets and succeeded in lowering bond spreads and unfreezing large sections of the credit markets. On the fiscal side, the federal government enacted the Emergency Economic Stabilization Act in October 2008, which created the TARP, to provide up to USD 700 billion of support to the financial industry. Direct injections of capital into the banking system through the TARP, along with later stress tests (Supervisory Capital Assessment Program) designed to test the capital adequacy of the largest banks, began to restore some confidence in the financial sector and improved the ability of large financial institutions to regain access to private funding.

Government support for financial markets during the financial crisis reduced losses for bondholders significantly below what would have occurred without government intervention. Separately, executives at some of failing firms benefited handsomely from their risky practices in the years prior to the crisis and, despite considerable declines in

their portfolios during the crises, overall likely ended up far ahead of where they would have been had they engaged in more prudent practices (Bebchuk, Cohen, and Spamann, 2010). These two features of the recent cycle may have increased moral hazard and principle agent problems in financial markets. Tighter regulation under existing laws and standards plus additional reforms to the financial system from the recently-passed financial reform legislation may be able to reduce any increase in moral hazard and principal agent problems as well as lower the risk that future shocks will cause such widespread harm to the economy.

Several national and international bodies are investigating aspects of the financial crisis and formulating reform suggestions. International bodies looking into the crisis include the G20, the Basel Committee on Banking Supervision, and the Financial Stability Board. Domestically, bodies like the Financial Crisis Inquiry Commission (FCIC), the President's Economic Recovery Advisory Board (PERAB), the Treasury's Special Investigator General and the Congressional Oversight Panel for TARP are releasing their own findings. The financial reform legislation passed by the US Congress incorporates many suggestions from these bodies and others. Reforms can be categorized into three main areas: reducing individual loan failure, reducing individual firm risk and reducing systemic risk.

Reducing individual loan failures

Firms failed to use adequate prudential standards in the offering of home loans. This led to a significant amount of loans to individuals who lacked the ability to pay, particularly once loan interest rate resets on ARMs occurred. The trend to lending to less and less qualified borrowers was encouraged by the originate-to-distribute model, in which the originators of mortgages quickly sold them to other entities which may in turn have packaged them along with other mortgages into MBSs to sell to yet other parties. These transactions shifted the risk that the customer would default from the originators of mortgages to the ultimate purchasers of the mortgage-backed securities or guarantors of those MBSs. While this spread risks, including to institutions thought to be most able to bear them, it also reduced the incentive for originating firms to diligently consider the quality of the loans. When property prices fell a large number of these loans had little likelihood of being paid back.

A number of steps can be taken to reduce the probability of individual loan failures. Requiring issuers of the MBSs to retain a percentage of the MBS (*i.e.* to have some "skin in the game"), is one way to more properly align incentives of loan originators, though it may reduce the availability of credit. Such a provision is included in the US financial reform legislation. It orders regulations that require securitizers to retain some of the credit risk for ABS and MBS (Subtitle D, Section 941). A second step that can be taken to reduce the probability of loan failure is better use of adjustable rate mortgages (ARMs) and high risk loans. ARMs, which shift the burden of interest rate risks to consumers, have seen a significantly higher default rate than fixed rate mortgages in the recent recession. In fact, after interest rates started increasing in mid-2004 foreclosure rates began rising on subprime ARMs in late-2005 and on prime ARMs in late-2006. Meanwhile the foreclosure rates on fixed-rate prime and fixed-rate subprime mortgages did not start rising until mid-2007 (Liebowitz, 2009). While ARM and non-conventional loans have a place in the mortgage market, they were used far too often and better financial education of consumers about these products, as well as better regulation and supervision of the lenders, is needed. Third, requiring higher down payments would lessen the likelihood of underwater

mortgages and reduce defaults and foreclosures. Higher down payments would make it more difficult for some people to buy a home, though, if desired, access to the market could be maintained through the first-time homebuyer's tax credit or subsidized savings accounts mentioned in the previous section.

Enforcing some of these changes, particularly improved financial education of consumers and policing loan practices, may be best left up to a dedicated consumer financial protection agency (US Treasury 2009). Financial regulators focus on the banks and as such may have an incentive to keep the banks profitable, rather than focusing on individual loan practices. In the long run, the interests of a consumer financial protection agency and a banking regulator often align, such as in reducing the overextension of credit to borrowers who are unable to pay over the life of the loan. But in the short run, when the firm may profit from origination fees or may not be expecting to hold the loan for long, a conflict of interest may exist between a banking regulator and a consumer protection agency. Such a consumer financial protection agency is one of the three pillars of Australian financial regulation (OECD, 2009) and has been incorporated in the US reform legislation with the creation of an independent consumer protection bureau housed inside the Federal Reserve.

Reducing individual firm failures

Even if steps are taken to reduce the failures of individual loans, some loans will still fail. The next step is to reduce the likelihood that those loan failures will drive the creditor firm into bankruptcy. This is where improved risk management comes in. In the years leading up to the financial crisis, risk management standards of financial firms were clearly inadequate *ex-post*. Firms took on too much risk given the amount of capital they were holding. A quarter century of relatively short or mild shocks may have led firms to generally misperceive and under-price risk. In hindsight, the "great moderation" has not reduced risk as much as was believed. The under-pricing of risk was aided by inappropriate incentives structures in firms, financial innovation, lax underwriting standards, insufficient supervisory and regulatory policies, as well as low interest rates and considerable capital inflows from abroad which pushed down the yield curve.[9] As a result, firms became overexposed to the housing market while it was creating large profits. When they did diversify into other assets, they failed to anticipate the high correlation across assets in times of stress and discounted the likelihood of a shock which would hit a broad swath of asset categories. Furthermore, too much trust was placed on counterparties and credit ratings agencies, which may have had differing incentives, and therefore the ultimate asset holders often had an inadequate understanding of the risks they were assuming.

In order to reduce the likelihood of firm failure in such a scenario, the first and foremost step that can be taken is to require higher capital and liquidity ratios across all financial institutions. Such changes do not reduce the riskiness of assets, but provide a larger cushion in the case of trouble with the assets. Further, improved accounting for the riskiness of assets needs to be addressed. For example, the risk weightings used for determining risk-adjusted assets in the denominator of the capital ratio have been found to under penalize for risk or liquidity concerns. The Basel Committee on Banking Supervision is currently drafting revised international capital standards (Table 1.1).

If the distribution of risks for each banking activity can be accurately determined (as well as the covariances of risks across various activities), in theory it should make little

Table 1.1. **Assessing progress and timeline for implementation of financial regulatory reform by international bodies**

Progress to date and timeline for implementation

Strengthening global capital and liquidity	A consultative document on proposals to strengthen the capital and liquidity frameworks was released in December 2009 by the BIS, for comments by mid April 2010. These measures are intended to be introduced by end-2012, after conducting a thorough impact assessment and allowing for a sufficiently long period to ensure a smooth transition to the new standards.
Expanding oversight of the financial system	The FSB, the IMF and the BIS have developed at end-2009 guidance for national authorities to assess the systemic importance of financial institutions, markets and instruments. A set of high level principles that would be sufficiently flexible to be applied to a broad range of countries and circumstances, is still to be defined. Moreover, the FSB and the IMF have reached a consensus over information gaps that need to be filled, including data to better capture the build-up of risk in the financial sector, the degree of international financial network connections, and to monitor the vulnerability of domestic economies to shocks. The FSB and the IMF will issue a report by mid 2010 on the actions taken together with a plan and timetable for implementing recommendations.
Reducing moral hazard posed by systemically important institutions	The FSB, the BIS and the International Organisation of Securities Commission (IOSCO) are already working on a set of final proposals expected to be delivered in October 2010. Moreover, the Cross-border Bank Resolution Group of the Basel Committee released a report at end-2009 on specific actions to achieve an effective, rapid and orderly wind-down of large cross-border financial firms.
Implementing sound compensation practices	The FSB has issued Principles for Sound Compensation Practices and Implementation Standards in April and September 2009, respectively. The FSB is currently monitoring the steps being taken or planned by member jurisdictions.
Strengthening accounting standards	The IASB is seeking comments until mid-2010 on accounting standards for expected loss provisions. The IASB has already issued in November 2009 standards on the classification and measurement of financial assets, while the FASB is expected to seek comments on a proposed model for accounting for financial instruments in the first half of 2010. Discussions are being held between the IASB and the FASB in order to harmonise these standards by mid 2011.

Source: OECD (2010a).

difference how risky the activities are that a bank engages in. Banks engaging in more risky activities would simply be required to hold higher capital and liquidity buffers. In practice, it may not be possible to determine the distribution of risk for some classes of assets and changes in risk and the value of capital may occur quickly over time making it difficult for a financial institution to hold adequate buffers. Creating a sharp division between normal commercial banking operations and some of their most risky undertakings can be a response to these concerns. Along these lines is the non-operating holding company structure which segregates different divisions into separate legal entities, each with its own capital pool that could not be shifted across branches in the event of crisis (OECD 2009). Thus, insolvency by one portion of the company is contained in that portion and does not affect other profitable divisions. The recent-enacted financial reform legislation includes steps in this direction in the form of the "Volcker rule", which separates propriety trading from essential bank services, and a compromise to push most derivatives trading operations into a legal entity separate from the commercial bank.

Firm failures can also be reduced through improved planning for unforeseen circumstances. The success of the stress tests at restoring market confidence and creating an atmosphere where the financial firms were able to raise funding suggests that repeating them at regular intervals should be considered.[10] Regular stress tests would help determine when additional capital was necessary and pinpoint other areas of firm risk. The stress tests may also serve to enhance co-ordination across the existing regulators. Similarly, the exercise of creating living wills, which would be a pre-planning of how to

unravel the structure of the company in the case of a failure, might also serve to strengthen supervision by highlighting areas of firm weakness.

Once a financial firm does get into trouble the value of the company can plunge quickly as credit becomes hard to obtain, thereby increasing the risk of firm failure. Thus, a mechanism to preserve the capital ratio in times of stress may be helpful. Contingent convertible (Coco) bonds, which are debt that turns into equity when certain triggers occur, is one idea to preserve the capital ratio. However, it is unclear how useful they might be in practice and if the market would buy them at quantities and prices high enough to be useful. Further, determining the rate at which such bonds should be converted to equity and the triggers which should cause such a conversion is uncertain. Getting either of these two features wrong could lead to inappropriately causing a severe drop in value for either the shareholders or bondholders.

Finally, in an era where individual actions by one or a handful of employees can cause the bankruptcy of large companies, aligning the incentives of the employees and officers of a firm with the long-term incentives of the shareholders of that firm is vital. Initial post-crisis principles were laid out by the Financial Standards Board in April 2009 with implementation guidance issued in September 2009. The Federal Reserve Board has expanded on those principles with draft guidance released in October 2009 and final guidance issued in June 2010 (Alvarez, 2010). Prior to the crisis, stock options had been one of the primary methods of incentivising officers and employees. Stock options encourage risky behaviour because they have little downside risk and significant upside reward. The compensation guidance issued by the Federal Reserve notes that preferable compensation structures have the possibility for both a downside and an upside. One such incentive structure would be to give most of an executive's compensation in the form of company stock placed in an account which pays out a small pre-specified percentage, perhaps around 10%, of the value of that account in each year. Such an account would align the executive's incentives with the long-run interests of the firm. Stock is less likely to be effective for mid- and lower-level employees (Alvarez, 2010). For these employees, deferring compensation in order to allow clawbacks in the case that outcomes of a risky transaction turn out to be less profitable than expected may be a better solution.

Reducing overall market risk

Even if structures are put in place to reduce the likelihood of individual firm failure, some financial firms will still fail. The goal then is to reduce the likelihood that an individual failure will have significant repercussions throughout the financial system. A number of steps have been proposed to reduce this market risk. The most important of these include dealing with too-big-to-fail firms and improving systemic regulation.

Dealing with too-big-to-fail or too-interconnected-to-fail

There was a reluctance to allow the primary discipline mechanism of the market – firm failure – to occur in the recent crisis. The concern was that failure of a large, highly connected firm would lead to a series of failures in other firms with which it had dealings, and ultimately cause a complete freeze up in the market. In essence, some large firms were just too big or too interconnected for the government to allow them to fail outright, and the government lacked the authority to wind down many of these firms in an expeditious manner. Too-big-to-fail or too-interconnected-to-fail firms receive an advantage in financial markets because bondholders feel the firm is less likely to default and therefore

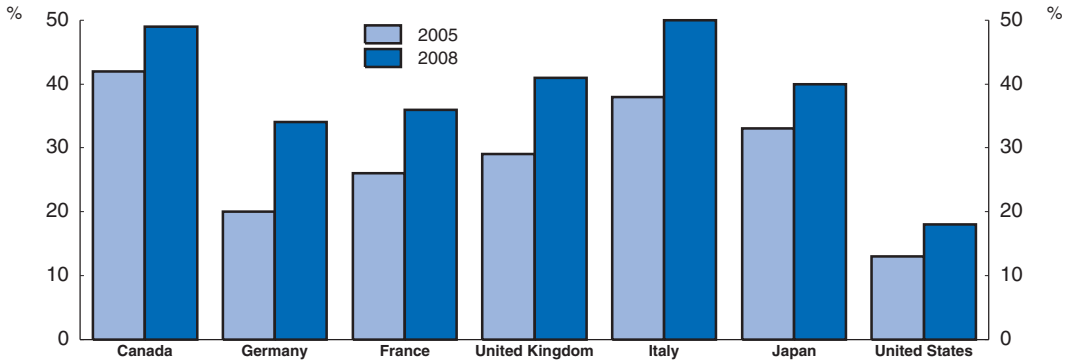
do not require as high an interest rate as they would if the failure of the firm were an option. In the past, if there has been a problem with a firm considered too big or too interconnected to fail, the government has usually stepped in to organize a rescue of the firm by the private sector (Long-Term Capital Management in 1998, Bears Stearns in 2008) or essentially taken over the firm (Continental Illinois in 1984; AIG, Fannie Mae and Freddie Mac in 2008).[11] While equity holders were generally wiped out in either of these cases, creditors (including bondholder and other uninsured creditors) usually have not been forced to take significant losses, with the notable exception of Washington Mutual in 2008. These interventions have led credit markets to underprice risk for too-big-to-fail firms.

A number of methods can be used to reduce the problem of too-big-to fail. The most direct method of dealing with too-big-to-fail firms is to put size limits on firms. In essence this approach follows Alan Greenspan's comment that "if they're too big to fail, then they're too big" (Bloomberg, 2009). Reducing firm size and allowing firms to fail could restore market discipline. However, it is not clear that countries with less concentrated banking systems, as would occur with bank size limits, have had less problems than countries with more concentrated banking systems. US institutions relative to GDP are not inordinately large compared to financial institutions in other countries, nor are they particularly concentrated. While financial industry concentration has increased in most OECD countries in recent years, the financial industry in the United States is the most fragmented among the G7 countries (Figure 1.6). Further, big institutions may be able to deliver some efficiency gains, though the empirical literature is divided. Recent studies suggest that banks may face increasing economies of scale up to at least USD 500 million of assets in the United States, a relatively low level, but scale economies may continue to be present at higher levels for large bank holding companies (Wheelock and Wilson, 2009). Another problem of simply reducing the size of a financial firm is that it does nothing to reduce the interconnectedness of financial institutions with other companies. Therefore a failure in one firm could still lead to corresponding failures in other firms.

Less dramatic than capping firm size is to force larger firms that pose greater systemic risk to pay an additional tax or hold higher capital or liquidity ratios. This extra burden on

Figure 1.6. **Concentration in the US financial system is less than in other G7 countries**[1]

Largest three institutions, share of total assets



1. Includes clearing institutions and custody, commercial banks, cooperative banks, finance companies, governmental credit institutions.

Source: OECD (2010a), based on Bankscope.

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large firms offsets some of the funding advantage that the firms receive and directs it to more helpful purposes. Increasing capital and liquidity ratios based on firm size would reduce the likelihood that a large firm will fail, while a tax that increases based on firm size would offset the expense in the case that a too-big-to-fail firm does run into problems. An example this type of tax includes the financial crisis responsibility fee, which the Administration proposed in December.

A special wind-down authority for all large systemically important financial institutions, similar to FDIC's ability to take over a bank and wipe out its shareholders, would also lessen the too-big-too-fail problem. Such authority is in the financial regulation legislation passed by Congress. This authority was lacking in the recent crisis for non-banking financial institutions and implementing it would reduce the need for bailouts like AIG where the authorities lacked the ability to wind down the institution. Unfortunately, FDIC experience shows that such wind-downs can be extremely expensive. In 2009 the FDIC realized approximately USD 58 billion in estimated losses from 140 banks failures, most relatively small banks, with combined assets of over USD 170 billion, or losses amounting to about one third of assets (GAO, 2010). Imposing losses on bondholders and other uninsured creditors of large financial institutions, as allowed for in the financial reform legislation, would reduce costs and could restore market discipline by reducing the funding advantage that large institutions face. The best method of funding any remaining costs of takeovers during financial crisis is unclear (IMF, 2010). The financial reform legislation proposes funding such takeovers by *ex post* assessments on systemically important financial firms. However, such a method penalizes the surviving (and presumably less imprudent) firms.

Improved systemic regulation

What may be prudent for a single firm may not be prudent for the overall financial system, and changes to the overall architecture of the financial system can reduce the likelihood of systemic financial industry failure. For instance, counter cyclical capital requirements, which raise capital requirements in the expansion phase of the business cycle, or dynamic loss provisioning, which forces firms to set aside more resources for losses when times are good, would both improve the soundness of the system because firms would have increased buffers to deal with negative common shocks. Such mechanisms have been included in draft of the Basel III proposals and are a step forward.

Similarly, revamping the regulatory framework to reduce the ability of firms to change regulators to find the most lenient one, *i.e.* regulatory arbitrage, would strengthen the regulatory system and reduce instances such as Countrywide's switch from the Office of the Comptroller of the Currency to the Office of Thrift Supervision, which some have claimed occurred to obtain more lax oversight (Applebaum and Nakashima, 2008). The recently enacted US financial reform legislation merges the Office of the Comptroller of the Currency and the Office of Thrift Supervision, but still leaves many other regulators at the federal and state levels.[12]

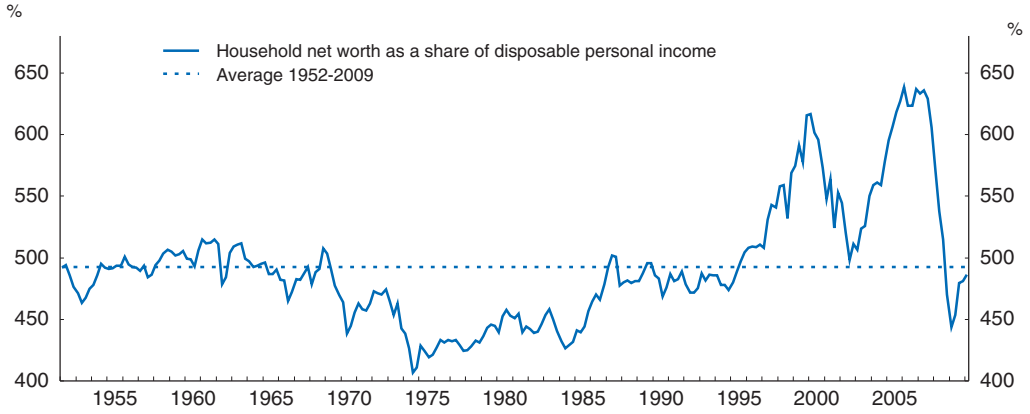
Much work remains on coordinating financial reform across countries. How to deal with a bankruptcy of a large multi-national financial institution is unclear. Similarly, dealing with arbitrage across different international financial regulators is a concern as was highlighted by Lehman's use of differences in the US and foreign tax laws to move assets off the balance sheet (Vallukas, 2010). Progress on co-ordination may be slow, but it is important in an increasingly interconnected world. Table 1.1 (above) lists current progress and a timeline for international co-ordination of financial reform.

Repairing household balance sheets and reducing the current account imbalance

The financial crisis and the recession reduced household net worth by around a quarter between the middle of 2007 and early 2009 (Figure 1.7), leading to a significant fall in consumption as households increased saving to rebuild assets and hedge against economic uncertainty (Box 1.1). More broadly, the US current account deficit fell from 6% of GDP in 2006 to 2¾ per cent in 2009, as investment declined and household saving increased from 2% of disposable income in 2007 to 6% in 2009 (Figure 1.8). Despite concerns by some economists regarding the size of the current account deficit in the middle of the decade, the recent improvements were not the result of classic current account troubles, and consequently there were few of the usual problems – the exchange rate did not fall, inflation did not increase and government interest rates did not soar. The current account improvement began prior to the onset of the more general recession as residential investment began falling from around 6% of GDP in 2005-06 to its 2009 level of 2½ per cent.

Figure 1.7. **Household net worth fell by about a quarter between the middle of 2007 and early 2009 but has moved up somewhat since then**

In per cent



Source: United States Federal Reserve Board Flow of Funds Accounts.

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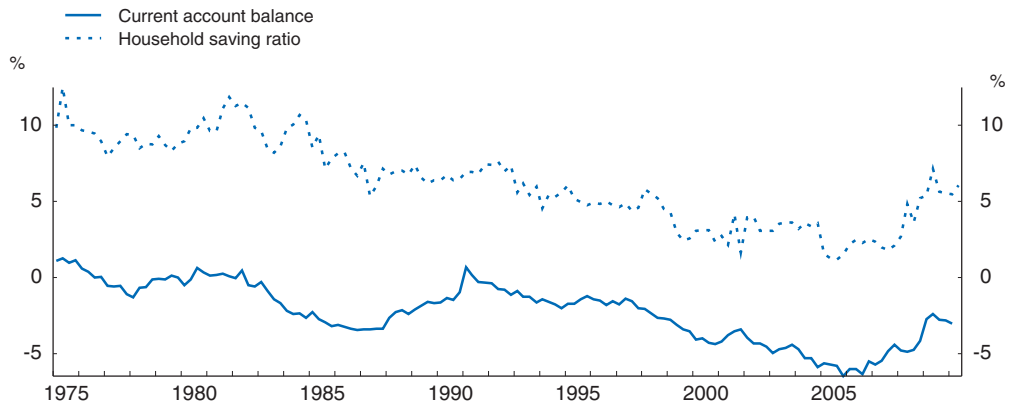
Figure 1.8. **The US current account balance and saving rate have risen after trending down from 1991 to 2006**

In per cent of GDP



Source: United States Bureau of Economic Analysis.

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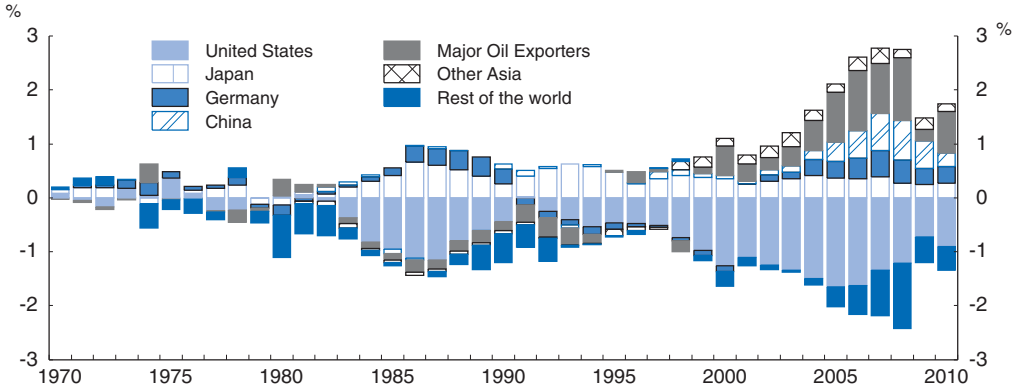
A small portion of the significant improvement in the current account balance in the few years prior to 2009 has been undone more recently. Nonetheless the overall improvement is notable. Still, longer-term risks remain. If investment rebounds faster than public borrowing returns to a more sustainable level, the current account deficit could rebound, unless private saving continues to rise.

Current account imbalances need not always be a concern. For example, running a current account deficit to borrow from abroad may make sense when investment opportunities give a high rate of return, or running a current account surplus may be useful to serve as a national saving account if the workforce of a country is aging quickly and expects dissaving to occur in coming years (Blanchard and Milesi-Ferretti, 2009). However, the current account deficit in the United States has not been one of extremely high investment – private investment in the US has been no higher than other G7 countries as a share of GDP – nor is the workforce getting younger. Instead, the deterioration in the current account in the United States between the late 1990s and 2006 was largely the result of a fiscal expansion, a fall in household saving, partially driven by higher asset prices, and a willingness by the rest of the world to finance these changes.

While domestic imbalances were an important aspect of the current account, a portion of the US current account balance may reflect the depth of the US financial market and the confidence that international financial players place on the United States as a place to store financial assets (Mendoza, Quadrini and Rios-Rull 2009; Caballero, Farhi, and Gourinchas, 2008). It gives the United States a privileged position, making it able to sustain low saving rates and high current account imbalances for a significantly longer time than would be possible for other nations. However, even if this view is correct it does not mean that the US current account imbalance is a benign phenomenon. (Obstfeld and Rogoff, 2009) It allows the United States to avoid adjustments that would otherwise occur through higher interest rates, along with changes in exchange rates and asset prices. Before the crisis, the US current account imbalance represented a significant share of global GDP (Figure 1.9). The current period is the second time in the past fifty years when there has been significant concern about economic imbalances in the United States. In the earlier

Figure 1.9. **The US accounts for a large share of global current account imbalances**[1]

In per cent of world GDP



1. This panel represents the sum absolute current account positions in % of world GDP of all OECD countries and non member zones. Data for 2010 are projections from the OECD Economic Outlook 87 database.

Source: OECD (May 2010), *OECD Economic Outlook 87 Database.*

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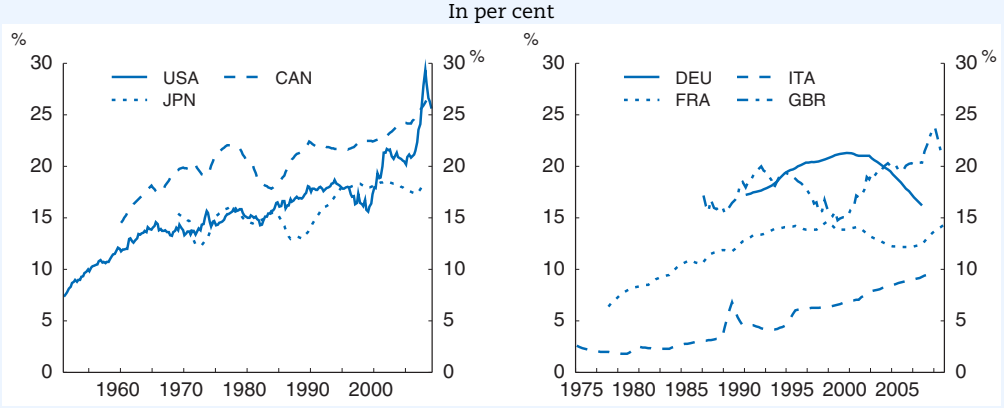
Box 1.1. **The household balance sheet and savings**

Household leverage, measured as household liabilities as a share of household net worth, and household indebtedness, measured as household liabilities as a share of disposable personal income, has increased considerably in the past 50 years (Figures 1.10 and 1.11), but particularly since 2000. Similar long run increases occurred in many other G7 nations, outside of Germany and to a lesser extent France, but few have seen the strong increases since 2000. A portion of this increase is no doubt related to easier availability of credit which has allowed consumption growth in the United States to exceed disposable personal income growth by around ⅓ percentage point annually since 1982.

Figure 1.10. **Household liabilities as a share of household net worth have increased considerably in the past 50 years**

In per cent



Source: OECD, *Analytical Database*.

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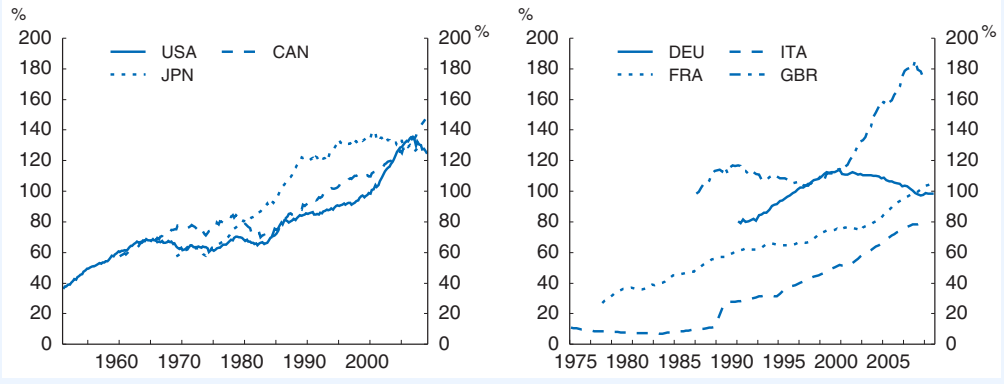
Figure 1.11. **Liabilities as a share of disposable income have also increased considerably in the past 50 years**

In per cent



Source: OECD, *Analytical Database*.

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Since the late 1990s the increase in liabilities has primarily been residential mortgages. While non-mortgage liabilities remained relatively constant at 31 to 35% of disposable income between 1997 and 2009, household mortgage liabilities ballooned from 64% of disposable income in 1998 to 104% 2007. The share of income devoted to servicing this mortgage debt rose less dramatically, but still significantly – from 8¾ per cent of the average US homeowner's income in 1998 to 11¼ per cent in 2007 (Federal Reserve, 2010).

Box 1.1. **The household balance sheet and savings** *(cont.)*

A key issue for the US current account deficit is the response of the household saving rate over the next few years as the recovery gains traction and the labour market improves. For this we note that since the 1950s net worth has bounced around 4 to 6½ times the annual flow of disposable personal income with a mean of just below 5 – a level to which it has once again returned (Figure 1.7). A back-of-envelope calculation links household saving to the evolution of household net worth over time:

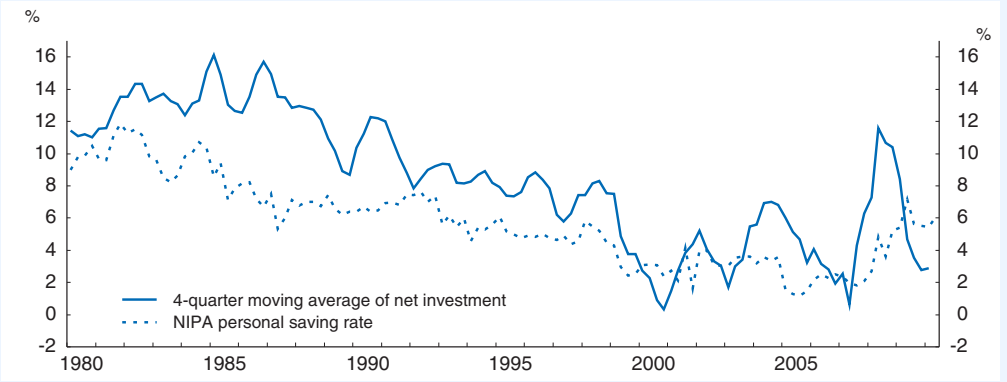
$$w_t = w_{t-1}\frac{1+r_t}{1+g_t} + s_{t-1}\frac{1}{1+g_t}$$

Where w is the ratio of net worth to disposable income, s is the ratio of household savings to disposable income, r is the rate of return on net worth holdings, and g is the growth rate of disposable income. Thus, net worth is higher if: net worth was higher in the previous period; the rate of return on net worth holdings (*e.g.* house price appreciation or return on stocks) is higher; the saving rate is higher; or, holding all other things constant, the growth rate of disposable income is lower.

The commonly-used NIPA household saving rate is not appropriate for this equation because it is constructed on a different basis than the household net worth data. Instead, an alternative measure of private saving, household and non-profit sector net investment from the Federal Reserve's Flow of Funds accounts, should be used. In theory the two measures of household saving are similar. The primary difference between them is the treatment of durable goods. The NIPA household saving rate treats durable goods as consumption items. In contrast, durable goods in the Federal Reserve's Flow of Funds measure have an investment component and add to household net worth in future periods. As a result of this difference, net investment from the Flow of Funds account will be somewhat higher than NIPA household saving. In practice, the data used to construct the two measures come from different sources and the discrepancy between NIPA personal saving and Flow of Funds net investment can vary significantly (Figure 1.12).

Figure 1.12. **Household saving and net investment increased during the recession after declining since the 1980s**

Share of disposable personal income



Source: United States Federal Reserve Board Flow of Funds Accounts.

StatLink http://dx.doi.org/10.1787/888932325463

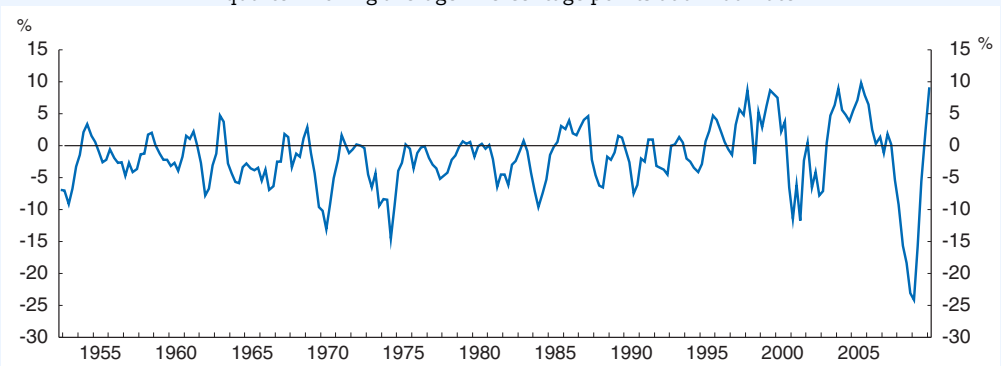
episode of the 1980s, improvement in the current account balance came from a reduction in the government budget deficit and significant decline in the value of the dollar.

Box 1.1. **The household balance sheet and savings** *(cont.)*

Using data from the Flow of Funds accounts, the rate of return on net worth holdings is on average slightly below the growth rate of disposable personal income.* As a result households must have a positive saving rate to maintain a stable net worth to income ratio. However, in the late-1990s and again in the mid-2000s, considerable increases in equity prices and house prices pushed the growth rate of net worth holdings above the growth rate of personal income. This allowed households to reduce their rate of net investment while still increasing their wealth to income ratio. This pattern reversed sharply in the recent recession forcing households to increase their level of saving (Figure 1.13).

Figure 1.13. **Return on net worth fell sharply during the recession**[1]

4-quarter moving average – Percentage points at annual rate



1. Rate of return on household net worth holdings minus the growth of disposable personal income.

Source: United States Federal Reserve Board Flow of Funds Accounts and OECD calculations.

StatLink http://dx.doi.org/10.1787/888932325482

For a constant level of net worth to disposable personal income the formula above can be re-written:

$$w(g - r) = s$$

Setting the long-run level of net worth, w, to about its long-run average of 5 times disposable income and the difference in growth rate of personal income and the rate of return on net wealth holdings, g-r, to its long run average of 2% implies a long-run equilibrium saving rate of about 10% using the Flow of Fund measure of net household investment, or about 6 to 7% using the more common NIPA measure of household saving. This level is only a touch above the rate of personal saving that has persisted since early 2009, suggesting little additional increase in the household saving rate is needed to maintain the long-run level of net worth to disposable personal income. On the other hand, if personal income grows less than 2 percentage points more quickly than the return to net worth holdings – since the early 1980s the difference has averaged 1¼ percentage points – then the saving rate needed to maintain a constant level of net worth to income would be lower.

* All the data for these calculations are available on table R.100 of the Flow of Funds accounts. The rate of return on net worth holdings is the holding gains on financial assets valued at market prices plus the holding gains (depreciation) on consumer durables and equipment and software valued at current cost all as a share of net worth. Alternatively, the rate of return on net investment can be backed out from the equation in the text. The two methods give similar results and are identical except for the category of "other volume changes" in the Flow of Funds accounts.

Increased public saving from reduced federal government budget deficits will go some way towards improving the current account over the medium term. The Administration has announced plans to reduce the federal budget deficit to around 3% of GDP by 2015 from around 10% of GDP in 2009. Some of this reduced deficit will occur naturally as the fiscal stimulus winds down and the economy recovers (see Chapter 2 of this *Survey*). Additional Administration proposals to help bring imbalances in line include increasing private saving by expanding automatic enrolment in 401(k); reducing oil imports by promoting energy efficiency and a renewable power sources; and increasing exports by reducing barriers to trade, increasing export credit, providing technical assistance to first-time exporters and other proposals in the National Export Initiative. These useful proposals could be bolstered by additional steps such as extending tax advantaged saving accounts and policies to reduce household leverage, such as shifting the tax burden towards consumption.

While this survey focuses on the United States, current account imbalances are a global issue. The changes mentioned above for the United States would complement efforts recommended for net surplus countries to bring their imbalances under control (De Mello and Padoan, 2010). The need for surplus countries to expand domestic demand has been recognized by the G20. Increases in social safety nets could reduce the need for individuals in surplus countries to engage in precautionary savings. Improving financial markets could reduce the flow of capital out of surplus countries while improving access to credit for their domestic population. Further, allowing more flexible exchange rates could reduce trade imbalances while reducing the costs of imports in surplus countries and improving the purchasing power of their domestic population.

Avoiding reduced labour market flexibility

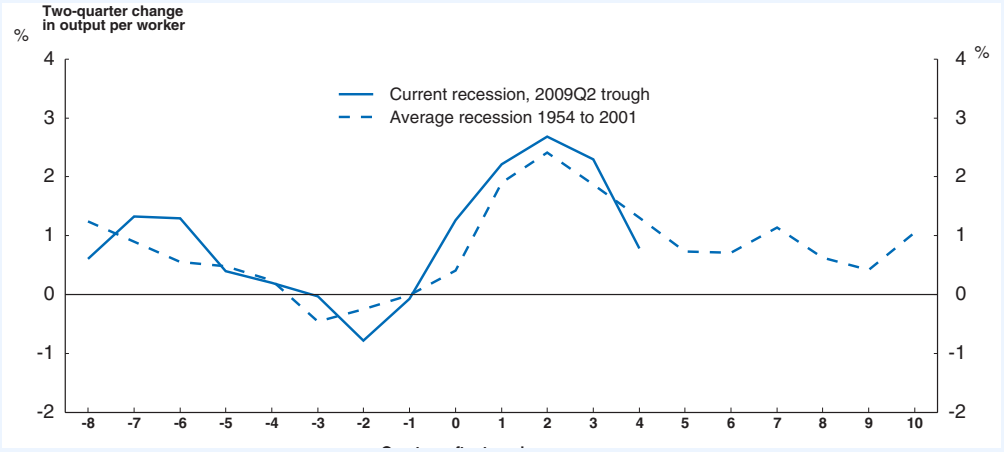
The labour market in the United States continues to improve. Employment has begun growing again since the first of the year and the length of the work week has started to reverse its decline during the recession. The unemployment rate has also moved down a touch from its peak. As hiring has increased improvements in output per worker have begun to slow following substantial increases in labour productivity in the second half of 2009 (Box 1.2).

Nonetheless the labour market in the United States will likely take a significant amount of time to recover fully. Previous downturns throughout the OECD suggest that unemployment climbs more rapidly in recessions than it falls during recoveries. After the US recessions of the early 1980s and 1990s, the return to pre-recession unemployment levels took about one-third longer than the preceding unemployment increase. After the 2000 recession the fall in the unemployment rate took about 60% longer than the preceding increase. During the current recession, unemployment rose for 2½ years before peaking in the fourth quarter of 2009, suggesting early 2013 before the rate returns to its pre-recession level. However, there are reasons to believe that the return to pre-recession levels will be even slower this time. First, recoveries from financial crises tend to be slower than recoveries from other recessions (Reinhart and Rogoff, 2009). Second, given the considerable depth and length of the recession, long-term unemployment has been significantly higher in this recession than in past recessions (Figure 1.15). Around 4¼ per cent of the labour force has been unemployed more than half a year, and the median length of unemployment for those currently unemployed has risen to around half a year.[13] Both levels are about twice as high as their previous peaks in the early 1980s. Long term

Box 1.2. **Productivity growth during the recession**

Unlike long-term unemployment, changes in productivity tend to be one of the first harbingers of labour market turnaround (followed by a decline in initial claims for unemployment insurance, increases in the workweek, increases in temporary help, increases in total employment and a fall in the unemployment rate [Council of Economic Advisers, 2010]). In the United States toward the end of recessions employment often continues to fall after output has begun to expand, creating a boom in productivity, as measured by output per worker. As the recovery becomes more sustained and employment begins to rise again, productivity growth slows down. The pattern for the recent recession has been similar to recent recessions (Figure 1.14).

Figure 1.14. **After a surge in productivity, labour productivity has begun to slow**



Source: OECD, *OECD National Accounts Database*, and NBER.

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Compared to other OECD economies net job losses have been large in the United States, while the fall in output has been relatively moderate (Table 1.2). Correspondingly, in most other OECD countries, productivity fell during the recession rather than increased. This pattern should reverse itself during the recovery, as employment in the United States grows faster than the OECD average while productivity grows less.

unemployment tends to be one of the most difficult and last areas of labour market improvement after a recession (Council of Economic Advisers, 2010).

During the 2½ years of increasing unemployment, the unemployment rate rose 5½ percentage points – an increase larger than any recession since the Great Depression of the 1930s, with a peak unemployment rate higher than any period except the early 1980s recession (Figure 1.15). The increase in the unemployment rate has occurred even with a falling labour force participation rate, resulting in the lowest share of the working age population in employment since the early-1980s. Despite the large increase in unemployment in the current recession, labour force reallocation appears to be rather similar to past recessions given the size of the downturn (Box 1.3).

Box 1.2. **Productivity growth during the recession** *(cont.)*

Table 1.2. **Changes in GDP, employment, and productivity in selected OECD countries**

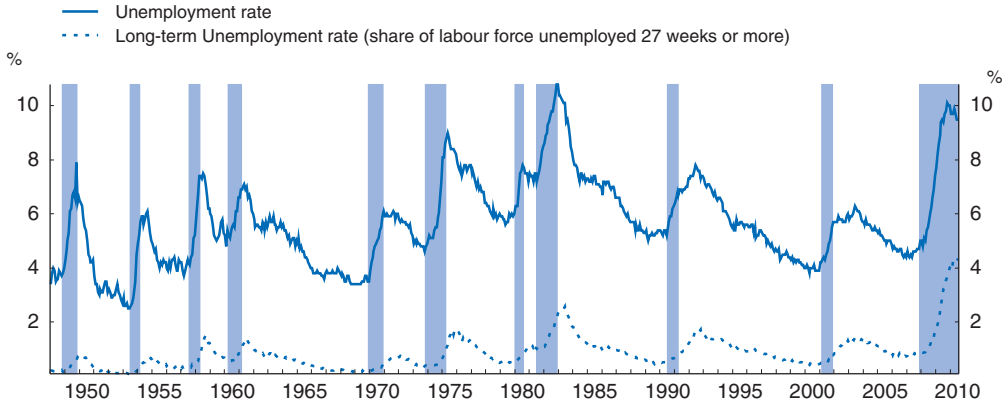
	Annual growth rate from 2007: Q4 to 2009: Q4			Projected annual growth rate from 2009: Q4 to 2011: Q4		
	GDP	Total employment	Labour productivity[1]	GDP	Total employment	Labour productivity[1]
Spain	–2.1	–4.7	2.7	0.9	–0.1	1.0
United States	**–0.9**	**–2.8**	**2.1**	**3.2**	**2.0**	**1.5**
Poland	2.8	1.1	1.6	3.6	0.2	3.4
Korea	1.3	0.1	1.2	4.9	1.5	3.3
Australia	1.8	1.1	0.7	3.6	2.3	1.3
Chile	1.4	1.0	0.4	4.4	2.7	1.7
New Zealand	–0.4	–0.7	0.3	3.7	2.0	1.6
Iceland	–2.6	–2.8	0.2	1.1	–0.5	1.7
Slovak Republic	–1.1	–0.9	0.2	3.4	0.1	3.4
Portugal	–1.4	–1.6	0.2	1.1	–0.2	1.3
France	–1.1	–0.8	–0.4	2.0	0.5	1.5
Ireland	–6.4	–6.1	–0.4	2.7	0.0	2.8
Greece	–0.9	–0.5	–0.5	–2.9	–2.7	–0.2
Canada	–1.1	–0.4	–0.7	3.6	1.9	1.7
Norway	–0.7	0.2	–0.8	2.0	0.3	1.6
Czech Republic	–1.4	–0.5	–0.8	2.9	0.4	2.5
Switzerland	–0.2	0.8	–1.0	2.1	1.2	0.9
Denmark	–3.3	–2.4	–1.0	2.1	0.1	1.9
Hungary	–3.3	–2.2	–1.0	3.1	0.2	2.9
Austria	–1.1	0.1	–1.2	2.1	0.4	1.7
Netherlands	–1.7	–0.4	–1.3	1.8	–0.2	2.1
Belgium	–1.1	0.3	–1.4	1.8	0.2	1.6
Japan	–2.9	–1.3	–1.6	2.5	0.3	2.2
United Kingdom	–2.6	–0.8	–1.8	2.4	0.1	2.3
Italy	–3.1	–1.1	–1.9	1.6	0.2	1.4
Germany	–2.0	0.4	–2.3	2.2	–0.4	2.5
Finland	–4.0	–1.7	–2.3	2.9	–0.9	3.9
Mexico	–1.8	0.7	–2.4	3.6	1.7	1.8
Sweden	–3.6	–1.1	–2.6	3.2	0.6	2.6
Luxembourg	–1.5	1.9	–3.3	2.6	1.6	1.0
Turkey	–0.8	3.0	–3.6	4.4	0.8	3.6

1. Output per worker in the total economy (including government) used for international comparability. Differs from most common US definition of labour productivity which is output per hour in the nonfarm business sector.

Source: OECD (May 2010), *OECD Economic Outlook 87 Database*.

The current and previous US Administration have provided a substantial increase in support to unemployed workers during the recession. Unemployment benefits, which ranked among the least generous in the OECD prior to the recession (OECD 2009b), have expanded significantly from a pre-recession maximum of 26 weeks of benefits to up to 99 weeks in some cases. Additional resources have been put into increasing support for job training and additional education, but it is difficult to ramp up such programmes quickly and they may not have kept up with the increase in need. Further, incentives have been offered for hiring unemployed workers (Box 1.4).

Figure 1.15. **Long-term unemployment is much higher than in previous recessions**[1]



1. Grey areas represent period between peak and trough.

Source: United States Bureau of Labor Statistics.

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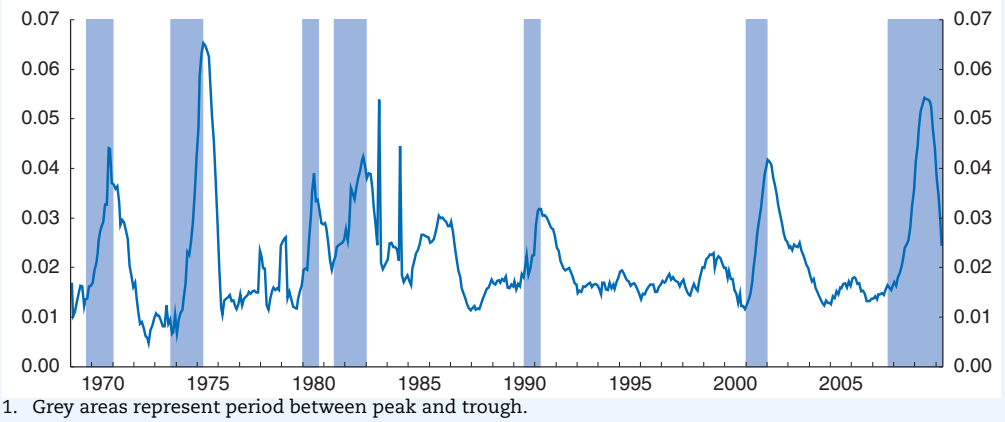
Box 1.3. **Sectoral reallocation of labour in recessions**

Recessions invariably hit some sectors harder than others. The current recession has affected employment in housing, manufacturing, and financial industries more than employment in other industries.

One measure of sector reallocation is the standard deviation of employment growth rates across industries, weighted by employment size (Lilien, 1982). Using an 11 industry breakdown and 12-month growth rates, the sectoral reallocation of labour in the recent recession does not appear to be greater than in previous recessions once the size of the recession is taken into account (Figure 1.16).* In fact, the amount of reallocation of jobs across sectors seems rather similar to recessions in the 1970s. Looking at industry outflow rates Elsby, Hobjin and Sahin (2010) find that the probability of an unemployed worker becoming employed does not vary much across the industry that worker was in at the start of the recession. They see this as evidence against concerns of skill mismatch which would result in a slower adjustment of the labour market.

Figure 1.16. **Sectoral reallocation of labour does not appear to be high given the size of the recession**[1]



1. Grey areas represent period between peak and trough.

Source: OECD calculations based on United States Bureau of Labor Statistics data.

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* Using a more disaggregated industry structure and/or growth rates over more or less than 12 months showed similar results.

The extensions of unemployment benefits have provided macroeconomic stimulus and eased the lives of those who lost their jobs. But the extensions may have reduced the intensity of job search or kept unemployed workers from dropping out of the labour market thereby pushing the unemployment rate up by ½ to 1¾ percentage points according to some estimates (Valletta and Kaung 2010; Burns 2010; Feroli 2010; Elsby, Hobjin and Sahin 2010). This effect is relatively small in the context of the actual 5½ rise in the unemployment rate. To the extent that the higher unemployment rate is occurring through maintaining increased labour force participation (FOMC 2010) it could be considered a positive outcome because higher labour-force participation (essentially, looking for work) may help people stay in touch with changes and opportunities in the labour market and may lead them to find a job more quickly when conditions improve.

Nevertheless, the temporary extensions of unemployment benefits could become a drag on employment as the recovery proceeds, the pool of unemployed workers becomes less full and reduced job search intensity has a greater effect on the rate at which jobs get filled. As a result, a gradual reduction in the maximum duration of unemployment benefits to pre-recession levels as the labour market improves, as has occurred in past recessions, would reduce the likelihood of continued high unemployment in the long term.

Continuing lengthy unemployment benefits once the labour market has returned to normal may result in "hysteresis" – when an upsurge in unemployment is not fully absorbed during the ensuring recovery and a large class of long-term unemployment becomes an extended feature of the labour force landscape (Ball, 2009). Hysteresis has not been a feature of the US labour market in the past, unlike many other OECD nations – a result that is likely to be partially due to the US practice of providing unemployment benefits for only a short time (although they are extended during recessions). This feature is relatively rare among OECD countries. The changing length of unemployment benefits adds to the flexible nature of United States labour markets, which in turn leads to quicker recoveries following shocks (OECD 2004, OECD 2010c). Given the current fiscal climate in the United States, it appears unlikely that temporary unemployment benefits will be continued to the point where they become a significant drag on employment, and, if anything, the benefits are likely to be removed too early, when they are still boosting employment (Box 1.4).

Box 1.4. **Measures to increase private employment***

The labour market recovery seems to be getting underway. However, since the unemployment rate is expected to remain high for an extended period of time, programmes to support the labour market may be useful and necessary. Administration estimates suggest the primary fiscal stimulus package passed in early 2009 raised the level of employment in the second quarter of 2010 by 2½ to 3½ million jobs from what it would otherwise have been (CEA 2010b). Direct Federal government hiring and aid to state and local governments can be effective methods of increasing employment (or avoiding layoffs for areas with a balanced budget requirement). Programmes to support the private labour market include extensions of unemployment benefits, increases in job training, implementing short-time work policies, and tax and hiring credits.

Box 1.4. **Measures to increase private employment*** *(cont.)*

Extensions of Unemployment Benefits – Extensions of unemployment insurance benefits, which have been prominent in the fiscal stimulus, are likely to provide the largest increase in employment for dollar of government revenue spent during the current period of economic slack and low interest rates (Congressional Budget Office, 2010b). Since unemployed individuals save very little, benefit extensions have a large multiplier effect, even though they may also reduce incentives to take a job, were one to be offered. Indeed, disincentive effects will become more important as activity picks up and job offers rise.

Job training – As the economy recovers and fiscal stimulus is withdrawn, skills of the unemployed may have become degraded from long periods of disuse or may no longer match the skills demanded by employers. Job training during long periods of unemployment may mitigate these problems, particularly for younger and less educated job seekers. Training programmes have had a mixed history in the United States, but they are likely to be more effective during recessions because they help jobseekers to shift from declining to growing sectors and keep potential workers attached to the labour market. Support for job training and post-secondary education, particularly community colleges which traditionally have been a primary source of job training in the US, provided under the stimulus programme has been important in maintaining these resources at a time of tight state budgets. However, funding has not kept pace with demand, and lack of available training and education may slow the process of restructuring and adapting the labour force to the post-recession employment structure. To overcome this risk, additional support for job training and enhanced education may be helpful to reintegrate workers whose skills have become degraded from long periods of unemployment or that do not match up with the needs of employers.

Short-time work policies – Short-time work schemes involve government subsidization to reduce layoffs. They have been used in a variety of OECD countries in the current recession, as well as 17 US states. They have been found to be especially useful in Germany where there have been few job losses. By design these schemes promote changes in hours over changes in employment and they may therefore impede the reallocation of labour to more efficient uses and slow the recovery. Since the purpose of short-time work schemes is to avoid layoffs, rather than create hiring, they are most useful while output and employment is declining and should be phased out during the recovery.

Tax or hiring credits – Tax reductions which reduce unit labour costs to encourage private sector hiring have been used in a number of OECD countries: reductions in the employer social security contributions (Germany, Japan, Portugal, and Hungary), targeted labour tax cuts for new hires (France, Spain, Ireland, and Portugal), and expanded gross hiring subsidies targeted at specific groups such as the long-term unemployed (Austria, Korea, Portugal, and Sweden). The passage of the HIRE act in the United States in March 2010, which cut employer social security contributions for hiring workers unemployed more than 60 days and provided an additional USD 1 000 tax break if those workers remain employed a year later, is significant step toward adjusting the US tax structure towards encouraging hiring during the recovery.

* For a more complete treatment of potential labour market policies, see OECD (2010d).

Notes

1. Andre's methodology probably represents an upper bound. Evidence from reduced form regressions estimates of the effects of interest rates on housing prices, such as Shiller (2007), is mixed.
2. An alternative view of the mortgage interest deduction is to treat the house as a business. In this view the subsidy is not from the deduction of interest, but instead from not taxing the imputed rental income.
3. For a more in depth overview of the economic literature on the mortgage interest deduction see pages 2 through 5 of Toder *et al.* (2010).
4. Duke (2009) citing data from National Association Realtors Profile of Homebuyers and Sellers.
5. Given that the GSEs may be relatively ineffective at lowering mortgage interest rates, their role in encouraging household leverage may be minor.
6. The US Administration has announced that reform plans for the GSEs will be released later this year.
7. See Hendershott *et al.*, (2003) for a more in depth treatment of the deleveraging of UK households as a result of the ending of mortgage deductibility.
8. Kamin and DeMarco (2010) suggest that the US housing slump was not a direct cause, but merely an indirect trigger, to the broader global crisis.
9. The role of monetary policy is a point of considerable dispute even among highly regarded economists. Among the differing viewpoints see Bernanke (2010) and Taylor (2010).
10. A key feature in creating an atmosphere where financial firms could raise funds during the crisis was government readiness to support undercapitalized banks if they could not raise capital on their own. Under normal circumstances such extraordinary government backing would be less necessary.
11. The government's role in LTCM was organizing a group of creditors and no government money was used. On the other hand, the Federal Reserve assumed the risk of some of Bear Stearn's less liquid assets to assist in the sale of Bear to J.P. Morgan. A notable exception of stepping in for too-big-to-fail firms was allowing Lehman Brothers to fail.
12. For example, former Securities and Exchange Commission (SEC) Chair Arthur Levitt has called for a merger of the SEC and the Commodities Futures Trading Commission (CFTC) since 2008.
13. Note that this implies the median length of a spell of unemployment from start to finish will be considerably above half a year.

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ANNEX 1.A1

Housing choice with a changing interest rate in a two period optimization problem

Assume an individual gets utility from housing, H, and an aggregate consumption good, C, in the current period and the next period. Housing is a durable good which lasts both periods, while the aggregate consumption good is a nondurable good that must be purchased in each period. Thus $U = U_1(H, C_1) + \beta U_2(H, C_2)$ where β is the rate of subjective time preference, with $0 < \beta \leq 1$. A unit of housing costs P_H, and can be paid off with a down payment, D, in period one with the rest of the amount being financed and paid in the second period subject to an interest rate, i, on the financed amount. A unit of consumption in period 1 costs P_1 and a unit of consumption in period 2 costs P_2. The individual receives a wage in each period, $W1$ and $W2$. Thus the individual's budget constraint in period 1 is $DH + P_1C_1 = W_1$, and in period 2 it is $H(1 + i)(P_H - D) + P_2C_2 = W_2$.

Taking the derivative of the utility function and the budget constraints with respect to the choice variables, H, D, C_1, and C_2, and rearranging leads to the first-order conditions:

$$\frac{\frac{\delta U_1}{\delta H} + \beta\frac{\delta U_2}{\delta H}}{(1+i)P_H} = \frac{\frac{\delta U_1}{\delta C_1}}{(1+i)P_1} = \frac{\beta\frac{\delta U_2}{\delta C_2}}{P_2}$$

Assuming declining marginal utility, these first order conditions imply lowering the interest rate will increase consumption of housing and the period 1 aggregate consumption good relative to the period 2 aggregate consumption good.

To go further, a functional form for the utility function is helpful. Therefore assume $U_t = ln(H) + ln(C_t)$. Using this form the first-order conditions become:

$$\frac{1+\beta}{(1+i)P_H H} = \frac{1}{(1+i)P_1C_1} = \frac{\beta}{P_2C_2}$$

Or

$$\frac{P_1C_1}{P_H H} = \frac{1}{1+\beta}$$

$$\frac{P_2C_2}{P_H H} = \frac{(1+i)\beta}{1+\beta}$$

Thus, decreasing the interest rate shifts nominal expenditure away from the period 2 aggregate consumption good and toward housing and the period 1 aggregate consumption good.

Further, substituting these into the budget constraints leads to:

$$H = \frac{1}{2P_H}\left(W_1 + \frac{1}{i}W_2\right)$$

Thus decreasing the interest rate leads to greater real housing consumption. Also,

$$\frac{D}{P_H} = \frac{2}{1 + \frac{W_2}{iW_1}} - \frac{1}{1+\beta}$$

Decreasing the interest rate leads to a smaller share of the housing price being a down payment, hence more is financed.

The key assumptions for the main results presented here are a durable good, a nondurable good, and declining marginal utility in each item and in each time period. Forms that are more general than this simple example, but include these key assumptions, should lead to the same basic results.

Chapter 2

Restoring fiscal sustainability

The United States faces challenging budgetary prospects, as do most other OECD countries. The federal budget deficit widened considerably during the recession, reaching about 10% of GDP in both 2009 and 2010, reflecting the operation of automatic stabilizers and the policy response to the crisis. Consequently, public debt now stands at its highest level since the early-1950s. The Administration has proposed the objective of stabilising the debt-GDP ratio by 2015, which is realistic in scope and ambition, though it requires fiscal tightening measures which are yet to be identified. In the next decade, the effects of population ageing on entitlement spending will be increasingly felt and the fiscal situation could deteriorate significantly in the absence of structural reforms of pension and, especially, health-care programmes.

The US federal fiscal deficit widened sharply during the recession, as did government budget deficits in most other OECD countries. In addition to the adverse budgetary implications of the automatic stabilizers, the stimulus package (the American Recovery and Reinvestment Act) implemented to support the economy has increased the deficit in both 2009 and 2010, as did the financial rescue measures introduced to shore up market confidence. While an early withdrawal of fiscal support could endanger the recovery, running large budget deficits during an extended period of time would lead to rapid debt accumulation, which could limit the ability to use fiscal policy in the future and eventually trigger an adverse reaction of bond-market participants (though there is no evidence so far of concern in the market regarding the ability of the US government to fund its debt). This chapter discusses these fiscal challenges and presents possible pathways to sustainability.

After the crisis: dealing with large fiscal imbalances

Although the current federal deficit is mainly explained by the effects of the recession and the policy response to it, US public finances were already in deficit at the peak of the previous upswing, reflecting past policy choices, notably large income tax cuts and spending increases. The operation of automatic stabilizers, the implementation of the fiscal stimulus and other supportive measures sharply increased the federal deficit in 2009 and will keep it above 10% of GDP in 2010. Thereafter, the budget deficit will start to improve as anti-crisis policies come to an end, the economy recovers and some of the past income tax cuts are allowed to expire.

Pre-crisis policies already widened the federal fiscal deficit

The federal budget deteriorated during 2001-07 from the surpluses of the late 1990s (Table 2.1 and Figure 2.1). Initially, this reflected the bursting of the dotcom bubble and the response to terrorist attacks in 2001 (Lenain, Bonturi and Koen, 2002). But more fundamentally, widening fiscal imbalances resulted from policy choices. Tax rate reductions under the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) and the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) contributed to a fall in revenue. Broadly, EGTRRA cut individual income tax rates, increased the child tax credit, phased out the estate tax, raised deductions for joint filers, increased benefits for pensions and individual retirement accounts, and created additional benefits for education. JGTRRA mostly reduced business taxes. Barring legislative initiative to extend their provisions, both EGTRRA and JGTRRA expire at end-2010, as would the Making Work Pay tax credit. The temporary relief from the Alternative Minimum Tax (AMT) via inflation-indexation of its parameters expired at end-2009. The Administration has proposed to extend these tax reliefs for most taxpayers.

While revenue began to recover during 2004-07, largely due to the buoyancy of the economy and financial market, spending rose relentlessly, reflecting increased outlays on homeland security and defence (military interventions in Afghanistan and Iraq) and the introduction of the Medicare Part D prescription drug programme for the elderly. A key

Table 2.1. **United States – General government account**[1]

Percentage of GDP, calendar years

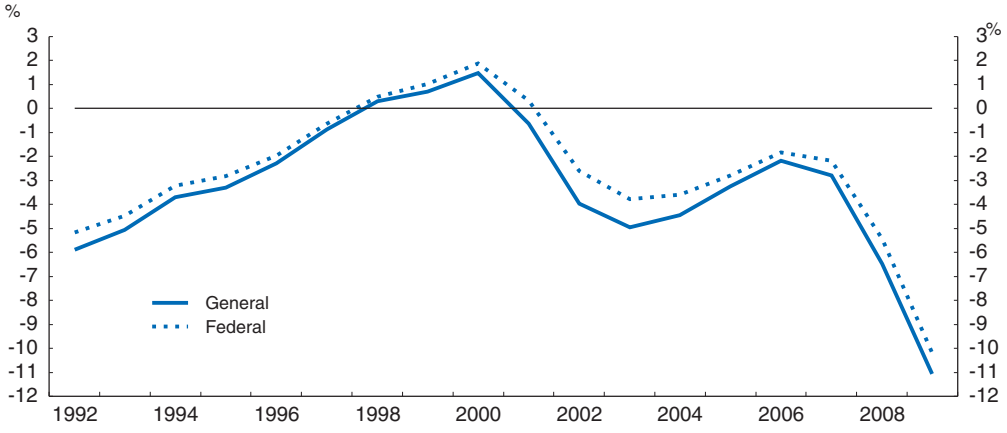
	95-2000	2001-07	2008	2009	2010(f)	2011(f)
Total current receipts	**34.3**	**32.6**	**32.1**	**30.2**	**30.7**	**31.8**
Household direct taxes	11.3	10.0	9.9	7.7	8.0	8.6
Corporate direct taxes	2.7	2.5	1.8	2.0	2.6	3.1
Indirect taxes	7.3	7.3	7.3	7.2	7.1	7.1
Social security contributions	7.1	7.0	6.9	6.8	6.7	6.9
Other receipts	5.8	5.8	6.2	6.5	6.3	6.1
Total current outlays	**34.3**	**34.6**	**36.8**	**39.0**	**39.7**	**39.3**
Government consumption	14.7	15.5	16.5	17.0	17.0	16.7
Social security benefits	11.1	11.8	12.9	14.6	15.0	14.5
Interest/property income paid	4.3	2.8	2.7	2.7	3.0	3.4
Other current outlays	4.2	4.5	4.7	4.7	4.8	4.7
Gross saving	**0.0**	**–2.0**	**–4.7**	**–8.7**	**–9.0**	**–7.5**
Net lending	**–0.7**	**–3.2**	**–6.5**	**–11.0**	**–10.7**	**–8.9**
Memorandum items						
Underlying net lending	–0.9	–3.4	–5.9	–8.5	–8.9	–8.1
Federal budget balance (OMB)	0.2	–1.9	–4.7	–10.3	–10.6[2]	–8.3[2]
Federal net lending (NIPA)	–0.3	–2.4	–5.4	–10.2	–10.4	–9.0
Capital transfers and payments[3]	0.0	0.2	0.7	1.2	0.7	0.5
Fixed capital formation	3.1	3.2	3.4	3.6	3.4	3.4
General government gross debt[4]	64.5	59.5	70.4	83.0	89.6	94.8
General government net debt[5]	45.8	40.1	47.0	58.2	66.6	72.6
Federal debt held by public[6] (OMB)	36.6	36.5	44.1	54.8	63.6[2]	68.6[2]

1. Following OECD practices, the fiscal position of the government is measured in this table in terms of general government (*i.e.*, administrations at the level of the federal government, states, municipalities and social security trust funds).
2. Fiscal years.
3. Includes the net cost of the financial stability plan and the GSE rescue.
4. Government debt is presented on a consolidated basis with holdings of Treasury securities by the social security trust funds and other government agencies netted out.
5. Net of financial assets held by the federal government.
6. Net of debt held by government accounts.

Source: OECD (May 2010), *OECD Economic Outlook* No. 87.

Figure 2.1. **US budget balances were already in deficit when the crisis struck**

In per cent of GDP



Source: OECD, *National Accounts Database*.

StatLink http://dx.doi.org/10.1787/888932325558

factor contributing to the weakening of the fiscal position was the abandonment in 2002 of pay-as-you-go (PAYGO) budgeting strictures requiring deficit-neutrality for any new tax or spending initiative. PAYGO rules were introduced with the Budget Enforcement Act of 1990, which superseded previous disciplining mechanisms spelled out in the Balanced Budget and Emergency Deficit Control Act of 1985 (referred to as Gramm-Rudman-Hollings). Under PAYGO rules, the focus of discipline shifted away from fixed deficits to discouraging Congress from passing new legislation that would increase the deficit. Albeit imperfect, not least in terms of its inability to restrain tax expenditures (Kleinbard, 2010), PAYGO was a reasonably effective institutional constraint on spendthrift policymakers.

As a result of these policy choices, the United States was still running a budget deficit[1] of close to 3% of GDP in 2007 (the federal budget deficit was 1.2% of GDP), at the peak of the cycle, even as budgets in many other OECD countries were either in surplus (Australia, Canada, Denmark, Finland, Iceland, Ireland, Korea, Luxembourg, Netherlands, New Zealand, Norway, Slovak Republic, Spain, Sweden, Switzerland), in balance (Belgium, Germany) or improving significantly (Italy and Japan).

Large fiscal interventions were made during the recession

The government responded to the financial crisis and the ensuing economic recession with extraordinary fiscal interventions (Box 2.1). As noted in the previous chapter, the government provided support to two government-sponsored enterprises (Fannie Mae and Freddie Mac) in the form of preferred stock purchase agreements and coverage of losses. Massive budgetary funds were also injected into the financial sector to shore up confidence and support distressed private financial firms, mostly through the Troubled Asset Relief Program (TARP). The 2009 American Recovery and Reinvestment Act (ARRA) and its extensions provided a large countercyclical fiscal stimulus, consisting of tax cuts and spending increases, with an impact on the budget of about 2% of GDP in 2009 and 2¼ per cent of GDP in 2010 (Council of Economic Advisers, 2010).

Box 2.1. **The budgetary costs of fiscal interventions during the crisis**

Federal fiscal interventions during the crisis have been unprecedented in their level and scope. This response reflected a broadly shared view among policymakers that there was an exceptionally high risk of a collapse of the financial system under the weight of troubled assets, and that the pace of the unfolding crisis at end-2008 and in early 2009 and the ongoing recession could lead to a repeat of the Great Depression. The most prominent responses of the federal government since the onset of the crisis include the placing of the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) into conservatorship in September 2008, the creation of the USD 700 billion Troubled Asset Relief Fund (TARP) in October 2008 and enactment in February 2009 of the stimulus bill, providing funding authority for up to USD 787 billion of tax relief and spending measures to boost the economy.

Fannie and Freddie

In placing Fannie and Freddie into conservatorship, the US Treasury obtained, through its new majority ownership status, rights to eventual compensation in various forms (notably potential gains from the use of warrants to purchase common stock) in exchange for injections by the federal government to ensure the solvency of the two government-owned enterprises (GSEs). In its accounting of the support of the GSEs, the Administration

Box 2.1. **The budgetary costs of fiscal interventions during the crisis** *(cont.)*

treats these entities as nongovernmental bodies, recording only cash infusions on the budget. On this basis, in fiscal year 2009, the cost was USD 91 billion, and the Administration projects a further cost of USD 57 billion in 2010. By contrast, the Congressional Budget Office (2010a), following treatment guidelines prescribed in the 1967 Report of the President's Commission on Budget Concepts, classifies the GSEs as legally part of the government. In turn, the budgetary costs are calculated as the net present value of anticipated cash flows, using a discount rate that reflects their riskiness. Under this treatment, and on the basis of CBO's projections of the GSEs' assets and liabilities over the long run, the CBO estimates that ownership of Fannie and Freddie raised the federal deficit by USD 291 billion in 2009. The total budgeting cost for the period 2010-20 is currently estimated at around USD 100 billion.

TARP

The Troubled Assets and Relief Programme (TARP) comprise several sub-programmes. Under the Capital Purchase Program, the Treasury was authorized to give direct support to financial institutions through the purchase of preferred stock. Of disbursements totalling USD 205 billion, USD 73 billion remained outstanding as of mid-February 2010. In addition, support totalling USD 45 billion was provided to Citigroup and Bank of America under the Targeted Investment Program and through asset guarantees, of which only USD 5 billion was outstanding at end-2009. Additional disbursements to AIG, the American automotive industry, for the Term Asset-Backed Securities Loan Facility, for the Public-Private Investment Partnership and for the Home Affordable Mortgage Program totalled USD 231 billion, roughly 95% of which remains outstanding. TARP legislation requires that the budgetary costs be calculated not on the basis of gross cash outlays, but instead as the net cost to the government, defined as the purchase price minus the present value (using a discount rate that reflects the risk of the assets) of the estimated future earnings from holding the assets, plus the proceeds from their eventual sale. CBO (2010b) estimates the budgetary cost of TARP over the life of the program at USD 109 billion.

ARRA

The American Recovery and Reinvestment Act of 2009 provides sustained fiscal stimulus over the period 2009-19, with about half of the cumulative impact taking place in 2010 (Table 2.2). The legislation provides revenue and spending initiatives designed to transfer funds to states and local authorities to: benefit a wide range of programmes, including Medicaid, higher education, and local transportation; support people in need, including through the Supplemental Nutrition Assistance Program and expanded and extended unemployment insurance benefits; purchase goods and services; and provide temporary tax relief to both individuals and businesses. Budget authorization was originally for USD 787 billion, but the legislation is now estimated by the CBO (2010c) to add USD 862 billion to cumulative 2009-19 deficits. ARRA provided a total direct injection (outlays plus revenues measures) of USD 200 billion (1.4% of GDP) in 2009, slightly over half of which was in spending. Over 80% of ARRA spending in 2009 was for five programmes: Medicaid; unemployment compensation; Social Security; the State Fiscal Stabilisation Fund; and student financial aid. On the tax side, the Make Work Pay tax credit (which provides tax relief for people below certain income levels) had the single greatest impact (USD 29 billion) on reduced revenues in 2009, followed by corporate tax relief via more generous depreciation provisions. The ARRA injection in fiscal year 2010 is almost double the amount of 2009.

Table 2.2. **ARRA provides a large stimulus in 2010**
In billions of US dollars

	Actual 2009	2010	2011-19	2009-19
Outlays	112	224	289	625
Department of Health and Human Services programs				
Medicaid	32	42	19	93
Other	1	12	27	40
Refundable tax credits	2	33	36	71
Unemployment compensation	27	31	2	60
Supplemental Nutrition Assistance Program	5	11	39	55
Department of Health and Human Services programs				
State Fiscal Stabilization Fund	12	31	10	53
Other (Including Pell Grants)	9	19	17	45
Department of Transportation programs	4	15	28	47
Department of Energy programs	1	5	36	42
Build America Bonds	0	2	28	30
Social Security	13	*	1	14
Other	7	23	46	76
Revenues	–88	–180	31	–236
Total direct effect on the deficit	200	404	258	862

Source: Congressional Budget Office (2010c).

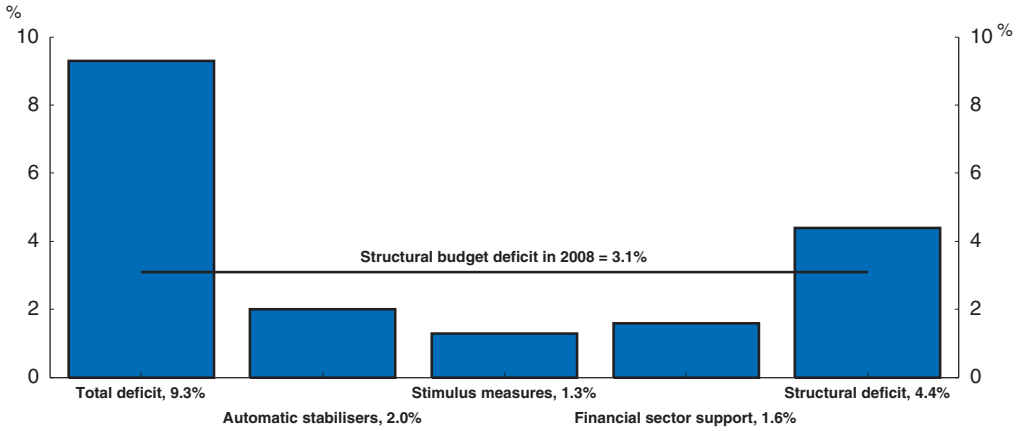
The large size of the federal budget deficit is partly explained by the effects of the cyclical downturn, but its origin is mainly structural reflecting, as mentioned, the weakening of fiscal trends before the crisis and the large government interventions thereafter. The federal deficit of fiscal year 2009, which represents 9.3% of potential GDP, can be decomposed into several components, following CBO methodology (CBO, 2010d): a relatively small contribution of automatic stabilizers (2% of potential GDP), consistent with their relatively limited role in the United States (Van den Noord, 2000); the measures introduced to support distressed financial firms, through TARP and GSE support (1.6% of potential GDP); the fiscal stimulus package implemented in 2009 estimated by the CBO at USD 200 billion (1.3% of potential GDP); and a structural deficit unrelated to anti-crisis policies (4.4% of potential GDP), which would persist even as economic activity normalizes and the extraordinary fiscal measures are withdrawn (Figure 2.2). The recession also substantially weakened the budgets of states and local governments (Box 2.2), which contributed to raising the overall general government deficit to 11% of GDP in 2009 (in terms of net lending).

The government aims to stabilise the debt-GDP ratio

The federal deficit is projected to exceed 10% of GDP in 2010, reflecting the implementation of the ARRA stimulus package, higher net interest costs and other spending increases. Budget deficits of this size result in a pace of debt accumulation that cannot be sustained for long. The deficit will therefore have to be reduced towards a level consistent, at least initially, with stable public indebtedness. The Administration has taken a step in this direction by proposing the goal of balancing the federal primary budget (*i.e.* receipts minus non-interest outlays) by 2015, which should result in a stable debt-GDP ratio. As a rule of thumb, a deficit will stabilise the debt-GDP ratio when it reaches a level equivalent to the product of the debt-GDP ratio and the nominal GDP growth rate. In the government's proposal, the federal deficit would be reduced to 3% of GDP, which would be

Figure 2.2. **The federal deficit has a substantial structural component**

2009 in per cent of potential GDP



Source: CBO (2010d) and OECD calculations.

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Box 2.2. **Impact of the recession on state budgets**

State legislatures have had to fill fiscal gaps totalling more than USD 300 billion since the start of the recession, USD 53 billion of which was made possible by federal funds provided under ARRA (PEW Center on the States, 2010a). State budget authorities report that the recession has contributed to historically large revenue declines, largely due to the exceptional severity of the downturn, and a large majority anticipate only slow and weak budgetary improvements as the recovery takes hold (National Conference of State Legislatures, 2009). Thus, large projected budget gaps will continue to pose challenges to states in the near term, at the same time as ARRA support is tapering off. Given balanced-budget constraints, states must draw down reserves, raise taxes or cut spending, with attendant pro-cyclical risks, or turn to the federal government for more assistance. According to GAO estimates, states and local governments will face deficits of USD 39 billion in 2010 and USD 124 billion in 2011 (GAO, 2010).

consistent with stabilizing the federal debt held by the public, net of financial assets owned by the federal government, at 66% of GDP, assuming trend nominal GDP growth of 4½ per cent (66% x 4.5% = 3%). Assuming that the effective nominal interest rate on the federal public debt is 4.5%, this would imply balancing the primary federal budget.

The Administration's goal would involve reducing the federal deficit from 10.6% of GDP in fiscal year 2010 to 3% of GDP in fiscal year 2015. This is an ambitious goal, yet a necessary and realistic one, which should be implemented in full, to reap benefits in terms of retaining financial market confidence.

Deficit reduction would stem from the following developments:

- The winding down of the fiscal stimulus package as ARRA expires (about 2% of GDP).
- The exit from financial rescue measures (about 1½ per cent of GDP).
- The favourable impact of automatic stabilizers: for instance, the CBO projects that the output gap will fall from 6½ per cent of potential GDP at the end of 2009 to zero per cent by the end of 2014, from which it can be inferred that fast economic growth is projected on average over this period; this would reduce the deficit by 2% of GDP.

- Deficit reduction measures outlined by the Administration in the fiscal year 2011 budget proposal, which would cut the deficit by about 1% of GDP (Orszag, 2010). In particular, the tax cuts introduced under EGTRRA and JGTRAA would not be extended for top-income taxpayers and non-security discretionary spending would be frozen (Box 2.3).
- Additional, measures which are still to be identified would reduce the deficit from 4% of GDP to 3% by 2015. The President appointed a "National Fiscal Commission on Fiscal Responsibility and Reform" with a mandate to identify such measures.

Box 2.3. **Measures proposed in the FY 2011 budget of the US government**

The principal policies put forward in the proposed budget include:

Revenue

- Permanently extend EGTRRA and JGTRAA for joint taxpayers with income under USD 250 000 (USD 200 000 for single taxpayers), making permanent the 0 and 15% rate on dividends and capital gains, respectively, for those same taxpayers.
- Increase the top income tax rates on joint taxpayers with income over USD 250 000 (USD 200 000 for single taxpayers) to pre-2001 levels; for these taxpayers, the tax rate on dividends and capital gains would increase from 15 to 20%.
- Freeze thresholds of the Alternative Minimum Tax at 2009 levels and index by the CPI.
- Return the estate tax to its 2009 rate of 45% with an exemption of USD 3.5 million.
- Extend the USD 1 000 child tax credit enacted under EGTRRA and the reduced qualifying income thresholds introduced under ARRA.
- Extend the making work pay tax credit and expand the earned income tax credit.
- Increase the Medicare payroll tax rate from 2.9% to 3.9% for joint taxpayers with income over USD 250 000 (USD 200 000 for single taxpayers), and extend the full tax to interest income, dividends and capital gains.
- Introduce a financial responsibility fee of 0.15% on the value of liabilities of large financial institutions.

Spending

- Expand health insurance coverage.
- Increase spending on education via the Pell Grant programme.
- Reduce Medicare reimbursement rates to physicians.
- Extend and expand the Build America Bonds program.
- Increase outlays on unspecified job creation programs.
- Extend unemployment insurance benefits and provide a one-time USD 250 benefit to each social security recipient.
- Freeze non-security discretionary spending for three years.

Fiscal options beyond 2015

Assuming that the Administration's fiscal plan is successfully implemented, US federal debt held by the public, net of financial assets owned by the government, would stabilize at about 66% of GDP in 2015 if the budget deficit were to remain at 3% GDP. This level of net federal debt would be roughly equivalent to gross federal debt held by the public

of 73% of GDP (Budget for FY 2011, *Summary Tables*). However, because current proposals do not yet include the last 1% of GDP intended to be cut based on the recommendations of the Commission, they are clearly not sufficient to keep the federal deficit at this level after 2015.Thus, in the absence of fiscal measures going beyond those already proposed, public debt would continue to increase. This is illustrated by CBO analysis of the President's budgetary proposals, which suggests that the deficit is likely to widen once again after 2015, putting the federal debt-GDP ratio back on a rising trend (CBO, 2010c). In the CBO projection, gross federal debt held by the public continues to increase after 2015 and reaches 90% of GDP in 2020. To put this in an international perspective, financial liabilities of lower levels of governments need to be added, following OECD practice. Assuming that the difference between the two measures of debt remain constant in relation to GDP, this would imply that gross general government debt would reach about 100% of GDP in 2015 and about 120% of GDP in 2020. It should be noted, however, that state and local governments mostly borrow to finance their capital expenditure and that these local debts are not federally guaranteed.

Although the US government has been able to borrow so far at attractive rates, reflecting its strong reputation in the bond market, an increase of government debt towards this high level could trigger some concern in the investor community, who could then demand a higher risk premium, though there is no evidence of this so far and, in fact, bond yields on government are near record lows. In addition, large issuance of government debt, both by the central and local governments, could lead to higher interest rates as the economic recovery develops, potentially resulting in lower levels of business investment and trend growth of GDP per capita (CBO, 2009b, Auerbach and Gale, 2009, and Cecchetti *et al.*, 2010). Prospective large fiscal deficits and rising debt levels could cause counterveiling reactions by private-sector agents. In effect, households and business could see the deterioration of fiscal trends as a sign of upcoming tax increases, increasing saving in anticipation, which would reduce the risk of growing mismatch between the supply of saving and the demand for credit. But recent empirical work suggests that the private saving offset is less than 30% in the United States (*i.e.*, an increase of 1% of GDP of the government deficit is offset by increase of private saving of 0.3%), slightly less than in the entire OECD area (Röhn, 2010). Thus, the effect would mitigate, but fall well short of fully offsetting, the crowding out of private borrowers.

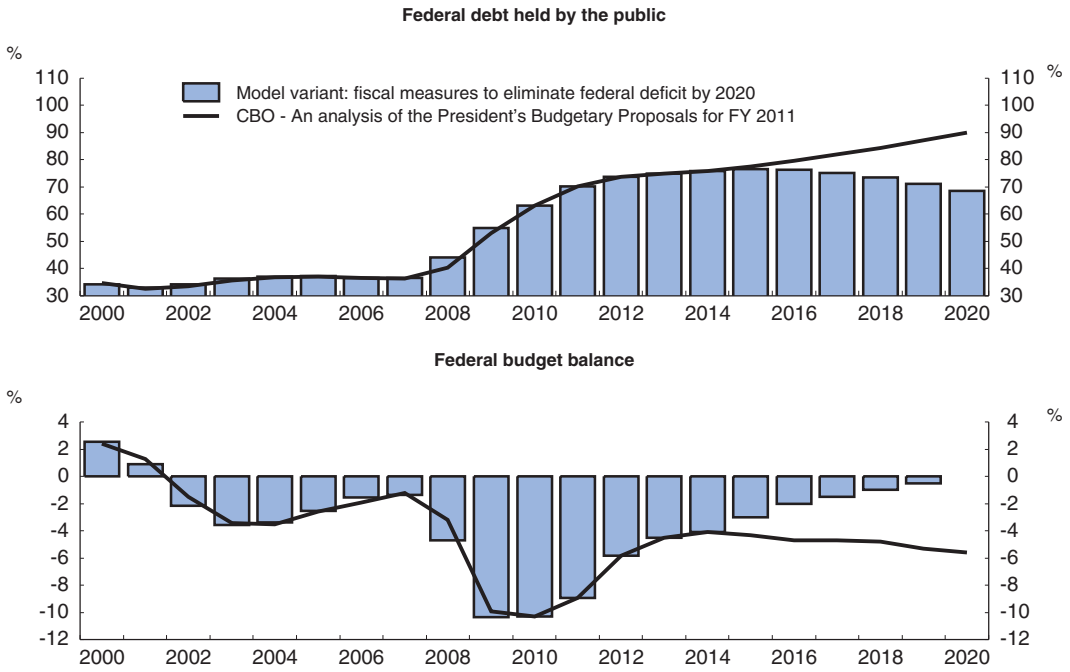
If these projections are realised, the United States would be approaching the period when the ageing of baby-boomer cohorts will boost the trend of mandatory outlays of Social Security and Medicare with a high level of public debt, making sustainability even more challenging to achieve. In addition, such a high debt level would leave little room for manoeuvre for counter-cyclical fiscal policy, should another economic recession or financial crisis occur. If the Administration reaches its budgetary goals described above, the results would be better than those projected by the CBO.

In view of these considerations, the plan to stabilize the debt-GDP ratio in 2015 should be followed by a policy to put the federal debt ratio on a downward path during the second half of the decade, although the actual pace of reduction should depend on economic circumstances. Not only would this re-create fiscal room for manoeuvre to respond to unexpected contingencies, it would also help to prepare for the long-run budget effects of population ageing. Achieving this goal would require the federal government to aim at running primary surpluses after 2015. This is arguably a challenging undertaking as it would require deficit-reduction measures going beyond those that the Fiscal Commission

has yet to identify. For illustrative purposes, a small model was simulated to explore possible public finance pathways to eliminate most of the federal deficit by 2020. Although extremely simple, the model is based on behavioural equations and traditional rules of thumb conventionally used in larger models; it also includes a small endogenous financial sector, with the risk premium reacting to the level of public debt expected for the future, with a feedback effect on the economy through a Financial Conditions Index (see Annex 2.A1). The model was simulated to examine the impact of policies seeking to eliminate most of the federal budget deficit by 2020 (Figure 2.3). In the simulation, a fiscal policy reaction function represents the behaviour of a fiscal policymaker seeking to eliminate most of the federal deficit by 2020. As a result, the federal budget deficit is eliminated instead of increasing to 5.6% of GDP in 2020 as projected by the CBO (2010d) based on the Administration's proposed budget. Instead of rising to 90% of GDP, gross federal debt held by the public declines after 2015 and falls to just below 70% of GDP by 2020. Putting debt on a downward trend can result in a virtuous circle. Lower public debt would keep long-term interest rates lower than otherwise, as bond-market participants would be content with a lower risk premium (Laubach, 2009). In the simulation, net interest costs are lower than in the baseline scenario (where the debt ratio remains unchanged) reflecting both the effects of a lower debt stock and a reduced risk premium. Of course, in reality, risk premia can hardly be lower than they are currently, so fiscal consolidation will not provide a boost in this way, though it may help prevent an increase in interest rates in the future.

Figure 2.3. **United States – Eliminating the federal deficit by 2020 would bring down the debt ratio**

In per cent of GDP



Note: The model variant incorporates the reduction in the federal budget deficit by 1% of GDP through measures to be identified by the fiscal commission, bringing the deficit down to 3% of GDP by 2015, whereas the CBO analysis of the President's budgetary proposals does not.

Source: Congressional Budget Office (2010d) and OECD calculations.

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Reducing the federal deficit from 3% of GDP in 2015 (as targeted by the Administration) to 0% in 2020 would imply an annual pace of deficit contraction of 0.6% per year. This would negatively impact on GDP growth in the short term, although monetary policy would be able to offset the fiscal contraction with lower interest rates if it has moved away from the zero bound in the meantime. The long-term effect would depend on the evolution of potential output.

Pathways toward fiscal stability

In order to establish political consensus on the modalities of fiscal consolidation, the President created by executive order a bipartisan "National Commission on Fiscal Responsibility and Reform".[2] Its mandate is to "… *identify policies to improve the fiscal situation in the medium term and to achieve fiscal sustainability over the long run*". More specifically, the Commission is asked to identify policies that will eliminate the primary deficit by 2015, including specific tax and spending measures to reduce the projected deficit from 4% of GDP to 3%. The Commission will issue its recommendations by December 2010.

Spending needs to be restrained

In moving forward with consolidation, empirical research and experience in some other OECD countries suggests that spending reductions should be given priority over tax increases (Perotti, 1999; Alesina and Perotti, 1997), though the substantial fiscal consolidation in the United States in the 1990s took place with both spending restraint and tax increases.

Restoring fiscal discipline, through more efficient spending, is an important component of Administration's policy. In addition to proposing a freeze on non-defence discretionary spending, the government is taking steps to move towards best practices in the management of its public agencies. In particular, the authorities have reviewed past policies increasing the contracting out of public services to private-sector suppliers and decided to strengthen the management and oversight of these contracts, so as to get more value for money and reduce wasteful spending on ineffective contracts. In the area of defence, the government seeks to cut back the use of outside contractors in the battlefield and has taken steps to reduce the cost of weapons procurement, with an outright cancellation of acquisition programmes when deemed outdated or made unnecessary by new strategic orientations. New procurement guidelines also seek to move to fixed-price contracts rather than "cost-plus" contracts, which have led to slippages and cost overruns. As well, a new effort is underway to more rigorously evaluate the performance of public programmes, notably by formulating policy based on evidence-based analysis regarding the attainment of final outcomes. Agency leaders are increasingly being held accountable for achieving specific goals: the policy requires that agency heads commit to a limited number of priority goals that matter, with ambitious targets to be attained without the need for new resources or legislation, and have received well-defined outcome-based measures of progress.

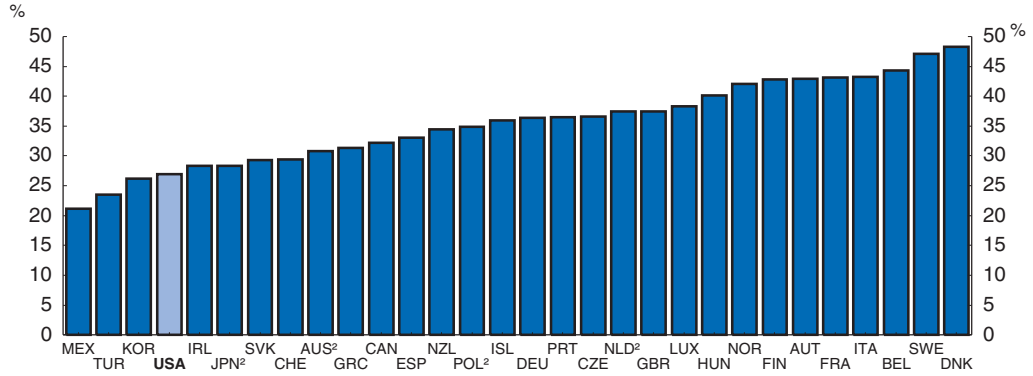
Tax revenue will likely have to increase

The measures implemented by the government to restrain spending are helpful, but it would take a long time before significant effects on budget balances are felt. In the meantime, higher revenues are likely to have a role to play. Given that the tax-to-GDP ratio

in the United States is among the lowest in the OECD area, even including taxes at the levels of state and municipalities, modest tax increases could be made while keeping the overall tax burden at a relatively moderate level (Figure 2.4). A variety of options is available to raise tax revenue, which are discussed below. Combined, they have the potential to raise considerably more revenue than is required to close the fiscal gap by 2015. Hence, any fiscal package would only need to include some of these options, not all of them. The advantage of relying on a package of measures is that the increase in taxation faced by individual groups is more limited than otherwise, reducing incentives to mobilise to oppose the tax increase, and may appear to be more equitable as other groups are also facing tax increases. A package of reforms could also enable the most vulnerable and lowest income groups to be compensated for any losses. The tax increases that are made should be done in ways that are least harmful to growth, notably by reforming aspects of the tax system that are particularly inefficient and cause large distortions. The focus should be on base-broadening rather than rate increases, and on reducing the most detrimental distortions. Indeed, the present fiscal challenge provides an opportunity to reform the US tax system in ways that hold promise of improved efficiency, greater horizontal and vertical fairness, and increasing revenue. Additional revenue should also be derived from internalizing the cost of various practices that have negative social effects, such as the cost induced by the emission of greenhouse gases.

Figure 2.4. **The US tax-GDP ratio is low by OECD standards**[1]

In per cent of GDP, 2008



1. The Revenue Statistics database contains data provided by the national tax authorities, which are generally based on standard national accounts definitions and methodologies. However, divergences with the national accounts exist in some areas. The differences are small for most countries and in most years, but are substantial in some cases. The most frequently used measure of the tax burden is shown in the figure (total taxes plus social security contributions as a percentage of GDP).
2. 2007 final data, provisional 2008 data not available.

Source: OECD, *Revenue Statistics Database*.

StatLink http://dx.doi.org/10.1787/888932325615

The tax base should be broadened and a more balanced tax structure sought

Another distinguishing feature of the US income tax system is the scale and scope of tax expenditures, which reduce the tax base and substantially complicate compliance. The major 1986 tax reform reduced considerably the number and value of tax expenditures and lowered statutory tax rates for both the personal and corporate income tax. Since then, however, the number of tax expenditures has resurged: their number grew more since 2000 than during the previous decade (Kleinbard, 2010). According to the Congressional

Research Service (2008), there were 247 tax expenditures affecting personal and corporate taxes in 2008, with a value of USD 1.2 trillion, 90% of which pertained to personal income taxation. To give a sense of magnitude, the value of tax expenditures roughly equalled total collections of federal personal income taxes that year.[3] Relative to countries for which recent and comparative data are available, only in Canada are tax expenditures higher than in the United States relative to central government personal income tax receipts (Table 2.3).

Table 2.3. **Tax expenditures in personal income tax: international comparisons**
As a per cent of central government personal tax receipts

	Canada (2004)	Germany (2006)	Korea (2006)	Netherlands (2006)	Spain (2008)	United Kingdom (2006)	United States (2008)
Total	32.97	2.91	10.09	2.74	3.86	13.47	29.36
of which							
Retirement	10.72	0.05	0.10	0.16	0.46	6.38	5.77
Health	1.70	0.00	1.67	0.00	0.00	0.00	5.38
Housing	1.29	2.01	0.29	0.12	1.12	3.30	5.90
Intergovernmental	9.94	0.30	0.00	0.00	0.00	0.00	3.54
Other	9.32	0.55	8.03	2.46	2.28	3.79	8.77

Source: OECD (2010), Tables 29 and 30.

To be sure, not all tax expenditures are undesirable, because they are meant to promote public policy. But many are distorting and poorly targeted. A scaling back of many tax preferences would raise revenue, be more conducive to economic growth and improve fairness. Tax preferences that should be eliminated or reformed in the interest of efficiency and fairness include those affecting owner-occupied housing, employer-provided health insurance, and state and local taxes. Table 2.4 lists a number of tax expenditures that hold the most potential for base-broadening along with estimates by the CBO of the possible yields from the measures:[4]

- *Reduce the mortgage interest deduction*: The tax code provides very favourable treatment to owner-occupied housing by allowing the deduction of mortgage interest and property taxes from adjusted gross income without, however, including the rental income implicitly accruing to the owner-occupant. The deduction is presently limited to interest on mortgages up to USD 1.1 million. It would be preferable to replace the mortgage interest income tax deduction by a homebuyer savings account scheme where the government provides matching contributions to encourage access to homeownership (see Chapter 1). The policy could be phased in during 2013-18 as the housing market stabilises. By reducing the preferential treatment of owner-occupied housing, this policy would likely boost the amount of capital flowing to other sectors of the economy.
- *State and local taxes*: Taxpayers itemising deductions can subtract from adjusted gross income the totality of state and local income taxes, as well as real estate and personal property taxes.[5] This essentially represents a federal subsidy for state and local public services. Moreover, the deduction represents a higher value to the rich, as they tend to itemise deductions and face higher tax rates. Another concern is that the deduction discourages sub-national governments from financing local services from more efficient taxes (such as consumption taxes, which would not be deductible under present rules) and user fees. Eliminating or reducing the value of the deduction would lower these

Table 2.4. **Options for reforming tax expenditures**

Measure	Revenue gain (billions)		Comments/Advantages
	2010-14	2010-19	
Homeownership:			• If phased in during 2013-18, would allow housing market to recover. • Improves efficiency by reducing tax-favoured treatment of owner-occupied housing, raising capital to other sectors. • Reduces incentives to consume through tax-reduced interest costs. • Would reduce home ownership. • Option 2 equalizes interest rate subsidy across income levels.
1. Gradually reduce mortgage on which interest can be deducted, from USD 1.1 million to USD 500 000.	2.3	41.1	
2. Convert deduction to 15% tax credit	64.3	387.6	
State and local taxes:			• Reduces Federal subsidy to states and local governments. • Raises incentives to introduce user fees at state and local levels.
• End the current itemized deduction	342.6	861.9	
• Cap deduction at 2% of adjusted gross income	248.6	625.7	
Limit itemized deductions to 15%.	524.2	1 320.7	• Provides more equal treatment across taxpayers. • Improves allocation of resources to the extent some items have lower marginal social value.
Curtail deduction for charitable giving.	90.8	221.5	• Would limit deduction to excess of 2% of adjusted gross income • Unlikely to reduce significantly overall giving, especially for large donations.
Include in taxable income employer-paid premiums for income-replacement insurance.	96.1	225.9	• Equalizes treatment across income-replacement schemes. • Spreads tax burden across all covered workers.
Eliminate tax exclusion for employer-provided life insurance.	11.6	25.2	• Eliminates subsidy for life insurance. • Increases fairness.
Include investment income from life insurance and annuities in taxable income.	117.9	265.0	• Equalizes treatment of investment income from life insurance/annuities and income from other forms of financial gains.
Include in taxable income all income earned abroad.	28.3	71.2	• Equalizes tax treatment of earned income wherever earned. • Eliminates subsidy to corporations employing US citizens abroad. • Lessens complexity of tax code.
Increase the maximum taxable earnings for social security payroll tax:			• Makes payroll tax less regressive. • Improves long-term social security finances.
1. Tax 92% of earnings.	281.5	688.5	
2. Tax 91% of earnings.	250.8	588.5	
3. Tax 90% of earnings.	216.7	503.4	
Reduce the tax exclusion for employer-provided health insurance and the health insurance deduction for self-employed individuals	108.1	452.1	• Reduces incentives to purchase overly generous plans. • Reduces excess demand for health services.

Source: CBO (2009c).

distortions and yield very substantial revenues; therefore this deserves serious consideration.

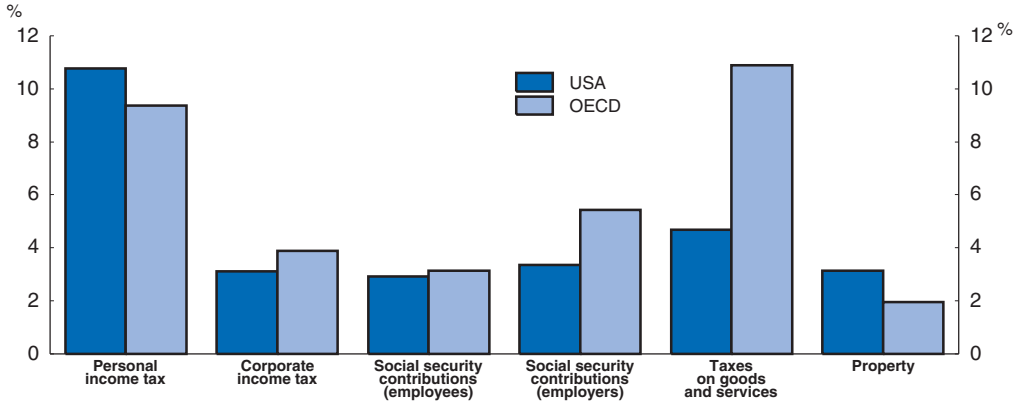
- *Limit the tax rate for deductions*: Given that the value of itemized deductions increases with the tax rate, the implied subsidy (for the deductible activity) is greater for taxpayers facing higher marginal tax rates. In turn, lowering the tax rate at which deductions can be applied yields a more uniform pattern of subsidies across households, with attendant efficiency and fairness gains. The proposal by the President to limit to 28% the tax rate applicable to deductions could be further lowered. For instance, estimates by the CBO suggest that reducing the rate to 15% would bring about USD 1.3 trillion of additional tax revenues over 2010-19.
- *Tax employer-provided health insurance premiums*: Under current law, employer-provided health insurance premiums are excluded from taxable income (and payroll contributions). This encourages employer-provided health insurance, but also the purchase of policies that have little cost sharing, accentuating problems of moral hazard (Carey *et al.*, 2009). This effect arises because employer-sponsored health insurance is purchased with pre-tax income whereas out-of-pocket expenses are paid with after-tax

income. While the recent health reform legislation partly reduces the importance of this exclusion by introducing in 2018 an excise tax on so-called "Cadillac" plans, the exclusion has been left largely intact. In view of the risk that this exclusion contributes significantly to excess growth of health care costs, and of the substantial potential revenue gains, the government should reduce this tax expenditure as part of a broader revenue mobilizing effort.

Compared to other OECD countries, the US tax system relies much less on consumption taxation (Figure 2.5). Some features of the personal income tax favour capital income, such as the exclusion from taxable personal income of pension-fund earnings, moving the personal income tax system close to a consumption tax. One estimate puts at one-third the share of income on household savings that is effectively taxed in this way (President's Advisory Panel, 2005). On balance, however, US taxation remains less oriented toward consumption taxation than elsewhere. Raising consumption taxes to address fiscal challenges instead of raising personal income taxes has the advantage of not reducing the after-tax rate of return on saving. This could have a beneficial effect on the rebalancing of the US growth pattern, notably by helping to narrow the structural saving-investment gap. For this purpose, one option would be to introduce a broad-based federal value-added tax (VAT). To be sure, introduction of a VAT would not be without controversy, as was the experience elsewhere, such as in Japan and Canada when these countries introduced national consumption taxes. Several issues are of particular importance in the debate over the introduction of a VAT in the US tax system. First, some are concerned that it is regressive. Second, many worry that a VAT, as a "money machine", could fuel the growth of government spending precisely at a time when restraints on outlays are needed. Third, there are worries that introduction of a VAT would be inconsistent with or pre-empt state and local governments' retail sales taxes. A fourth concern is administrative complexity and associated costs.

Figure 2.5. **The United States relies less heavily on consumption taxes**

In per cent of GDP



Source: OECD, *Revenue Statistics Database*, 2008.

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That these are relevant concerns is reflected in the inability of the President's Advisory Panel in 2005 to reach consensus to recommend the introduction of a VAT as either a full or partial replacement of the current income tax. Nevertheless, the Panel demonstrated

how a partial replacement VAT (*i.e.*, introduction of a VAT accompanied by offsetting cuts in income taxation) could be structured in a way that addresses some of the concerns. Recognizing that an extremely high rate of 15-20% would be needed to fully replace the current income tax system, the panel considered that a lower rate that facilitated lower top marginal income tax rates and financed refundable tax credits for low income households would improve overall efficiency while broadly preserving the progressivity of the system.

With respect to the political economy worry of some – that a VAT would fuel the growth of government – it was recognized that empirical evidence is inconclusive. The simple observation that the share of government is greater in countries with VATs does not address the direction of causality. Indeed, studies that control for additional factors are inconclusive on the matter of causality. Moreover, recent US fiscal history demonstrates in part that independent forces drive federal revenue and spending policies, with little causality linking the two, absent strong and effective disciplining mechanisms (such as PAYGO rules). Tax rate increases during the 1990s were accompanied by reduced spending (admittedly facilitated by the ending of the Cold War) while rate reductions during the 2000s were accompanied by rising federal spending (admittedly due in part to the war on terrorism).[6]

Matters of fiscal federalism and administrative burdens are not without merit. The President's Panel recognized the complexities posed by the pre-existence of state and local retail sales taxes, noting in particular the difficulties posed to some Canadian provinces following introduction of its Goods and Services Tax in 1997. Some analysts, however, have a more favourable assessment of Canada's experience and its implications for the feasibility of a VAT in the United States (Bird and Gendron, 2009). On administrative costs, evidence suggests that a VAT can be much less costly per dollar of tax receipts than the current income tax, given the very high compliance costs borne by income-taxpayers (President's Advisory Panel, 2005). Introduction of a VAT without abolishing personal income tax, however, would add to compliance costs, absent substantial accompanying simplification of the income tax.

A balance of considerations argues in favour of an eventual introduction of a VAT, absent a strong and concerted effort to transform the existing income tax into an outright expenditure tax. The rate at which a VAT would be introduced cannot be determined in isolation, and would depend on a host of factors, not least of which would be the residual fiscal gap once the maximum politically tolerable spending cuts and revenue enhancements to the existing federal tax system have been agreed. Moreover, VAT could be introduced at a low, single rate, with increases phased in over time if institutional reforms and/or political will are insufficient to dramatically reduce the rate of growth of entitlement spending.

In the event that it proves not to be politically feasible to raise significant extra revenue from broadening the tax base, it will likely be necessary to increase taxation of personal incomes to achieve the requisite reduction in the federal budget deficit. Such increases should occur when the economy is back on its feet and should be done in such a way as not to unduly blunt incentives to work. In this regard, tax hikes on secondary earners should be avoided as their labour supply decisions are more responsive to changes in tax rates than are those of primary earners (CBO, 2007). Similarly, persons in the low-income deciles should be spared as their labour supply decisions are also more responsive to changes in after-tax income than are those of people in the top deciles.

Adopting transparent fiscal rules and debt objectives can help to sustain fiscal tightening

The reinstatement of pay-as-you-go rules in January 2010 aims to ensure that all new spending and tax legislation be fully paid for. It requires the Congress to fully offset the costs of any entitlement increases or tax cuts by finding savings elsewhere – a critical approach to achieve expenditure restraint. The legislation is not foolproof, however. It excludes temporary measures to address the so-called "economic crisis or emergency situations". Recent emergency spending requests include USD 5.1 billion to replenish dwindling balances in the Federal Emergency Management Agency's disaster relief fund; USD 33 billion war supplemental budget to fund military operations in Afghanistan and Iraq; and USD 8.4 billion requested by Fannie Mae to cover higher-than-expected first-quarter losses. Notable improvements to PAYGO would include tightened rules applying to "emergency" exceptions and present-value calculation of offsets.[7] Also critical is the need to tighten constraints on the use of tax expenditures, which are subject to much more lax review and control (Kleinbard, 2010).

Experience in a number of OECD countries suggests that it may be important to adopt longer-term objectives for public debt than those of the Administration, which are to stabilise the publicly-held federal debt-to-GDP ratio by 2015, for putting public finances on a sustainable path. Such objectives, which may be qualitative *(e.g.,* stabilisation by a certain date, falling thereafter) and should remain flexible in the face of changing economic circumstances, make clear the implications of short-term budget decisions for the sustainability of public finances. Drawing on the example of legislation protecting central-bank independence, Australia and New Zealand passed legislation in the 1990s requiring budgets to be formulated taking into account their long-term consequences and, when budgets departed from a prudent long-term path, requiring government to indicate how fiscal policy would be returned to such a path. The idea behind this legislation was that while future governments could repeal these laws, doing so would be unattractive as it would entail a political cost to the government's reputation for sound economic management. Both countries have had considerable success in improving their net government debt positions.

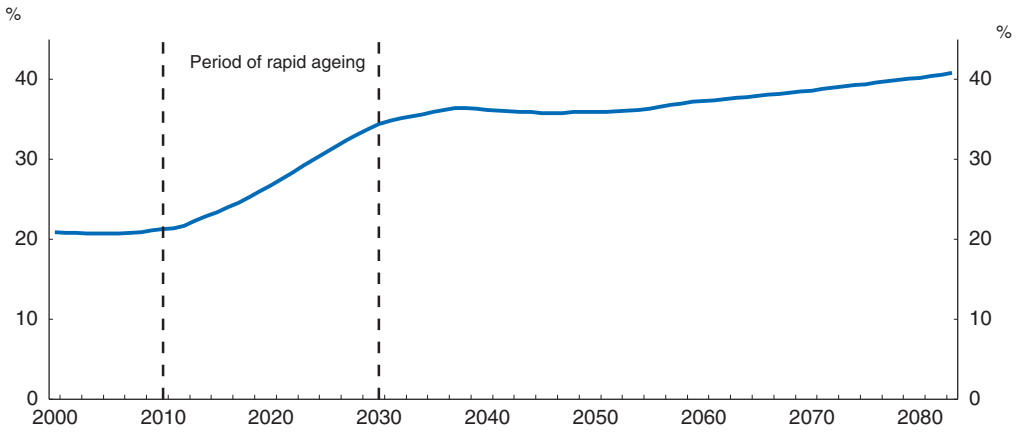
Adopting medium-term targets for the federal government debt-to-GDP ratio and the associated budget balances needed to achieve these ratios would create an environment more conducive to fiscal responsibility. To fix these targets, it would be helpful to determine an agreed legislative framework that provides guidance, as in Australia and New Zealand. For example, one element of putting public finances on a sustainable path is likely to be reducing the government debt-to-GDP ratio before the retirement of the baby-boom generation increases entitlement spending. Once medium-term debt targets have been fixed, there would be an envelope that fixes the range of compatible annual budget paths: larger deficits in the short term would need to be offset by subsequent smaller deficits. For these arrangements to be effective, there would need to be transparent reporting (preferably by an independent organisation, such as the CBO) on whether annual budgets are compatible with the medium-term debt targets and if budgets are not compatible, rules that determine how they will be made so. It is also important, though, that such goals include appropriate escape clauses contingent on economic circumstances such that these goals do not become destabilizing forces in the event of an economic setback, when fiscal policy may need to be used to help to stabilize the economy.

The long-term fiscal outlook is challenging

The US long-term fiscal outlook is dominated by growth in health-care entitlements and, to a lesser extent, pension entitlements. Population ageing (Figure 2.6), reflecting the ageing of the large cohorts of post-war baby boomers and rising life expectancy, *per se,* will boost expenditures on social security pension benefits and on Medicare and Medicaid (Figure 2.7), the federal government's two main health-care programmes, as the proportion of the population qualifying for these entitlements grows rapidly. Growth of Medicare and Medicaid outlays will be additionally and mostly boosted by rapid growth of health care costs per recipient. At the same time, given the relatively slower growth of the labour force and, hence, the social security contributor population, revenue sources will not keep pace with outlays.

Figure 2.6. **The share of the elderly (65 years or over) in the total population is set to rise rapidly over coming decades**

In per cent



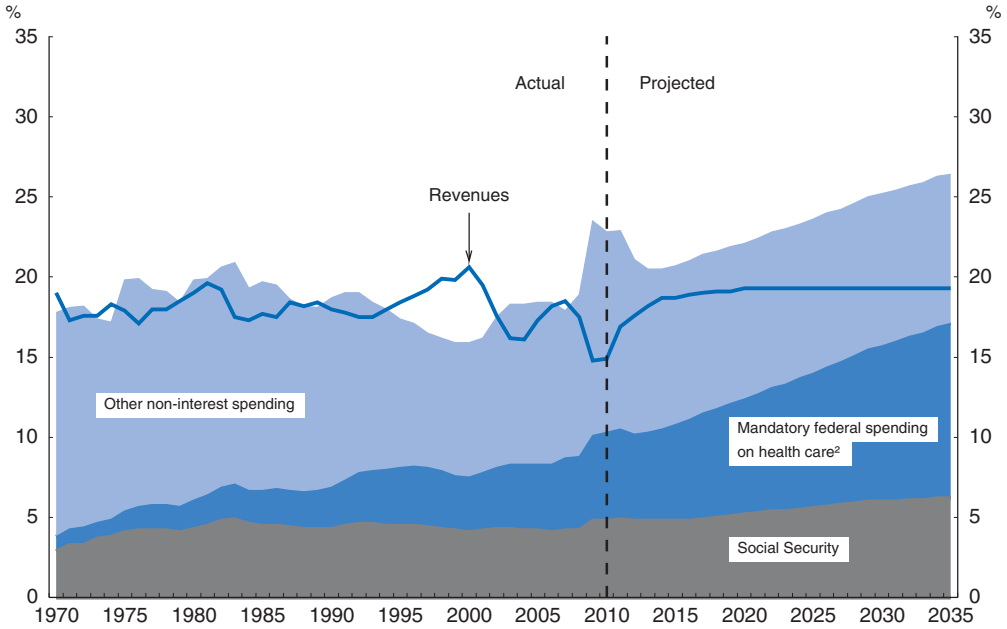
Source: Congressional Budget Office (2009b).

StatLink http://dx.doi.org/10.1787/888932325653

While the measures in the March 2010 health-reform legislation[8] to expand health insurance coverage will increase some areas of federal health-care spending, this effect is expected to be compensated by other measures in the legislation that reduce overpayments, waste, fraud, and abuse in Medicaid and Medicare. Indeed, mandatory federal health care spending could well turn out to be lower than in the CBO's alternative fiscal scenario projections shown in Figure 2.7, which reflect the CBO's assessment of current policy, because it did not score various cost-saving measures in the reform owing to uncertainty about the scale of their effects (this also applies to CBO's extended baseline projection, which reflects the implications of current law) and assumes that other cost-saving measures in health reform will be rolled back by Congress starting in 2020 (increasing health-care expenditures by 0.8% of GDP by 2035 compared with the extended baseline scenario). Furthermore, revenues would be higher over the long-run than shown here if fiscal drag (the increase in tax revenues from leaving tax rates, brackets and other features of the tax system unchanged in the face of rising nominal incomes) were not to be offset after 2020. In the projection shown here, CBO assumes that revenues remain constant near their historical average of 19% of GDP after 2020, whereas, without the enactment of new tax cuts, revenues would tend to rise naturally as real income growth

Figure 2.7. **Long-term fiscal trends are challenging**[1]

In per cent of GDP



1. The scenario depicted is the CBO's alternative fiscal scenario, which incorporates several changes to current law (shown in the extended baseline scenario) that are widely expected to occur or that would modify some provisions that might be difficult to sustain over a long period. (For details, see CBO (2010e), Table 1.1, p. 3). As discussed in the text, the CBO heavily discounted many new health care cost containment and revenue provisions after 2020.
2. Mandatory federal spending on health care includes Medicare, Medicaid and CHIP and, for the projection period, Exchange Subsidies.

Source: Congressional Budget Office (2010e).

StatLink http://dx.doi.org/10.1787/888932325672

produces higher average tax rates under the graduated income tax and as the tax base subject to the health reform's new excise tax on high-cost insurance expands (these factors increase revenue in the CBO's extended baseline by 2.6% of GDP by 2035).

Public pension spending is set to rise

Actions taken during the 1980s postponed but did not eliminate the long-run challenge of ensuring the financing of social security benefits. Social security contribution rates that have remained above rates strictly needed on a pay-as-you-go basis have provided a substantial degree of pre-funding of benefits through the Social Security Trust Fund (Social Security Administration (SSA), 1983). Invested exclusively in non-marketable US Treasury securities, however, this pre-funding is more virtual than real from a general government perspective: the US Treasury will have to issue debt to the public as the Trust Fund runs down its assets to settle pension promises. The reforms of the 1980s also provided for a phased-in increase in the statutory retirement age from 65 to 67 during the first two decades of the current century. Together with other measures, this postponed eventual deficits for several decades. Similar solutions could be used again to raise more revenue and contain expenditures. Linking the age of social security eligibility to active life expectancy so as to hold the ratio of work life to active retirement stable would be one such solution. Now that the health reform has passed (see below), extending health insurance coverage to almost the entire legally-resident population, it would also be feasible to

reduce Medicare outlays by making the age of eligibility the same as for full social security benefits.

The growth of health care spending is projected to outstrip GDP growth

Prospective growth of spending on Medicare and Medicaid presents a much greater challenge than that of the pension system. Medicare and Medicaid spending has grown markedly as a share of GDP in recent decades and, together with other federal health-care programmes, is projected to continue doing so, rising from about 5% of GDP in 2009 to 11% by 2035 and 20% by 2080 in the CBO's alternative fiscal scenario, although it should be recognised that such long-term projections are subject to considerable uncertainty (Figure 2.7). Most of this growth is attributable to "excess cost growth", which measures the extent to which the growth in health-care expenditure per enrolee exceeds that in GDP per capita after adjusting for changes in the age structure of the population. Excess-cost appears to be driven mainly by technological progress making new, expensive treatments available. Population ageing is the other main factor explaining the projected rise in government health-care expenditures, accounting for 45% of the increase up to 2035, but only 30% of the long-term increase. Slowing growth in total health-care expenditures by increasing value for money is the most important health-policy challenge for the United States. The comprehensive-health-reform legislation should contribute to the achievement of these goals by reducing the growth rate of public health care spending, but, as noted above, the CBO does not allow for these effects in the alternative scenario shown in Figure 2.7.

The CBO assumes for these projections that the private sector will take steps to restrain excess-cost growth so that the annual increase in health-care expenditure converges to the total annual increase in consumption expenditure (*i.e.*, excess-cost growth converges to zero) by 2084. Such steps would probably entail households facing increased cost sharing, new technologies being introduced and diffused more slowly, and more treatments or interventions not covered by insurance. State governments, which pay half of Medicaid costs, could respond to growing costs by limiting the services they cover and by tightening eligibility criteria. Such a slowdown in excess-cost growth would affect Medicare, which is integrated with the rest of the health-care system, through the spread of lower-cost "patterns of practice". The CBO assumes that Medicare's excess-cost growth will decline linearly from 1.7% in 2020 to 1.0% in 2084, one third of the reduction assumed for non-Medicare spending. The CBO also assumes for the "alternative scenario" shown in Figure 2.7 that Medicare payments to physicians grow with the Medicare economic index rather than at the lower rates of the "sustainable-growth-rate" (SGR) mechanism, which would entail an immediate 21% cut in payment rates if applied; it has not been possible to implement the SGR because it would result in an untenable increase in the discrepancy between provider fees for Medicare- and other patients.

The recent health-care reform may curb rising spending

The recent health-care reform approaches universal health insurance coverage, which exists in almost all other OECD countries, but also raises taxes and cuts some spending items. In its official scoring of the bill, the CBO projects that the reform will barely reduce the budget deficit over the coming decade (savings of USD 143 billion) but will have a considerably larger effect in the following decade (savings of USD 1 trillion in the extended-baseline scenario), although it should again be recognized that such long-term

projections are uncertain. The largest sources of financing are a 0.9 percentage point increase in the Medicare payroll tax rate for high-income households (individuals with income of more than USD 200 000 per year and married couples with income exceeding USD 250 000 per year) to 3.8% and the extension of this tax to high-income households' unearned income, a reduction in Medicare fee-for-service (FFS) market-based price updates for hospitals by 1% per year (reflecting economy-wide productivity growth) for the next decade, and a cut in overpayments to Medicare Advantage (private) plans, which cost more than the traditional FFS-Medicare programme (Table 2.5).

Table 2.5. **The CBO estimates that the recent health reform will reduce the federal budget deficit slightly over 2010-19**

	USD billion
Net change in the deficit	**–143**
Net cost of coverage provisions	**788**
Medicaid and CHIP outlays	434
Exchange subsidies and related spending	464
Small employer tax credits	40
Penalty payments by uninsured individuals	–17
Penalty payments by employers	–52
Excise tax on high-premium plans	–32
Other effects on tax revenues and outlays	–48
Reductions in health-care spending	**–511**
Provider payment updates	–157
Medicare Advantage Payments	–136
Community living assistance	–70
Medicare prescription drug coverage	–38
Independent Payment Advisory Board	–16
Other	–94
Revenue-raising provisions	**–420**
Tax increases	–210
Fees on certain manufacturers and insurers	–107
Other	–103

Source: Congressional Budget Office (2010f).

For these budget savings to be realised, Congress will need to refrain from subsequently overriding the relevant provisions of the legislation. It should not be too difficult for Congress to hold the line on the reduction in hospital price updates over the coming decade, as studies indicate that there is considerable scope for productivity improvements and the hospitals association publicly agreed to this measure to support passage of the health-reform bill, which will benefit its members through increased activity. Similarly, the reduction of overpayments to Medicare Advantage plans should not be too difficult to sustain, because beneficiaries could obtain the same services through traditional FFS Medicare. On the other hand, the absence of indexation of the income thresholds for the tax on unearned income and the indexing of both subsidies offered in the new health insurance exchanges and the threshold for the new excise tax on high-cost ("Cadillac") plans at rates lower than medical inflation may be politically difficult to sustain in the long run. These arrangements would result in a growing proportion of households having to pay the higher rate of Medicare tax on earned income and the Medicare tax on unearned income, the threshold for plans to be classified as high cost becoming progressively more restrictive, and rising prices for health-insurance plans bought on the

new health insurance exchanges. If Congress nevertheless maintains these provisions in the bill as passed into law beyond 2020, as assumed in the CBO's extended baseline but not in the alternative fiscal scenario, and if these measures have the intended effects, the long-term budget outlook will be substantially better than shown in Figure 2.7.

The legislation also includes measures that could significantly reduce government health care outlays in the long term, but for which the CBO was generally unable to estimate budget effects owing to uncertainty regarding their effectiveness or how they could be scaled up. The effectiveness of these provisions may be a critical part of containing long-run health costs. A potentially important measure in this regard is the creation of a Centre for Medicare and Medicaid Innovation, within the Centres for Medicare and Medicaid Services, to test provider-payment reforms that move away from the current FFS model. These reforms, which concern medical homes,[9] accountable-care organisations[10] and hospitals (bundled payments for hospital and post-acute care, remunerating such care as a single episode of treatment), have considerable potential to slow growth in health-care outlays by better aligning health providers' incentives and patients' interests. This is particularly important for episodes of treatment that include hospital treatment and ambulatory care, which is the fastest growing component of US health-care expenditure. For example, Hussey *et al.* (2009) estimate that bundling payments for chronic diseases and elective surgeries could reduce medical spending by 5.4% through 2019. The plan is to roll out widely those reforms that are found to be effective in reducing costs without compromising quality of care.

In another provision, the newly created Independent Payment Advisory Board (IPAB) would be required to make recommendations to reduce growth in Medicare spending if projected growth per beneficiary exceeded the rate of growth of national health expenditures per capita or the average of the growth rates of the CPI for medical services and the overall CPI. This is potentially a very powerful tool because the recommendations would go into effect automatically unless blocked by subsequent legislative action, which would be subject to presidential veto, like all legislation. There is also a variety of other cost-saving proposals in the legislation, including value-based benefit design, funding for comparative effectiveness research, which analyses the effectiveness of treatments (and could be important for deciding prices to pay for new drugs) and incentives for hospitals to reduce hospital-acquired infections. The legislation is also funding demonstration projects to reduce the practice of defensive medicine, thought to be caused by high medical malpractice awards, by finding routes other than litigation to resolve disputes. Despite the potential importance of the IPAB and other deficit-reduction measures, the CBO assumes in the alternative scenario shown above that they are curtailed by Congress after 2020, whereas if implemented as enacted, the long-term fiscal outlook would be significantly improved.

Local governments also face long-term fiscal challenges

Many state and local governments also face a challenging long-run fiscal outlook. The Government Accountability Office (2010) estimates that, on unchanged policies, the 50-year fiscal gap facing states and local governments could be as high as 12% of GDP. The principal drivers of the widening operating budget gap are pension and health care costs for public employees. Pew Center on the States (2010b) puts the scale of the unfunded pension liability at end-June 2008 (the end of most sub-national governments' fiscal year) at around USD 1.1 trillion. The gap is likely to be much higher, however, due to two factors.

First, since most of the substantial decline in equity markets was in the second half of 2008, the brunt of the collapse of the stock market is not reflected in this estimate. Second, states and localities are allowed to smooth gains and losses over several years in calculating their net position. In turn, states' funding levels still reflect more of the upswing in equity prices than they will in the period ahead. Finally, the present value of future pension liabilities could well be under-estimated due to the high rate used to discount liabilities. A much larger estimate of the unfunded liability of state pension schemes is obtained when pension obligations are discounted not by the expected rate of return on assets – as is required by state government accounting standards – but by a lower discount rate that more appropriately reflects the low risk profile of pension liabilities (there is a high degree of certainty about the payments due) (Novy-Marx and Rauh, 2009). On this basis, already-promised 2008 state pension liabilities amounted to USD 5.17 trillion, assuming that states cannot default on pension benefits that workers have already earned. Net of the USD 1.94 trillion in assets, these pensions are underfunded by USD 3.23 trillion according to this calculation. This pension debt dwarfs the states' publicly traded debt of USD 0.94 trillion. Health care costs are also projected to weigh heavily on states through their cost-sharing responsibilities for Medicaid.

Notes

1. The budget deficit is measured as the net lending position of the general government (federal, states and local governments) recorded by the national accounts, following OECD practice. The public debate in the United States focuses, however, on the federal government and measures the budget deficit as the saving balance, which excludes government capital formation, net capital transfers and non-current receipts. Reconciliation between these two concepts is provided by BEA (2009 and 2010), CBO (2009a) and OMB (2010a). Public debt is taken from the Federal Reserve's Flow of Funds (total consolidated financial liabilities of federal, state and municipal governments).
2. The Commission is composed of 18 members drawn equally from both parties. Recommendations will require agreement among 14 members. A final report is expected by early December 2010.
3. Strictly speaking, tax expenditures cannot simply be summed due to interactive effects. Notwithstanding, their aggregation gives a sense of their relative importance.
4. The table focuses on advantages, but each proposed measure of course has disadvantages as well. On balance, the former outweigh the latter on economic grounds.
5. The 1986 tax reform eliminated the deductibility of state and local sales taxes.
6. Empirical support for doubting the effectiveness of tax cuts to engender reduced spending is provided by Romer and Romer (2009), who find "[...] no support for the hypothesis that tax cuts restrain government spending; indeed, [the findings] suggest that tax cuts may actually increase spending. The results also indicate that the main effect of tax cuts on the government budget is to induce subsequent legislated tax increases."
7. Under current procedures, a billion dollar expenditure increase or tax cut today can be "offset" by a billion dollar spending cut or tax increase ten years hence.
8. The health-care reform comprises two pieces of legislation, the Patient Protection and Affordable Care Act (PPACA), and the Health Care and Education Act of 2009.
9. A Medical Home, which is also known as a Patient-Centred-Medical Home, is an approach to providing comprehensive primary care that facilitates partnerships between patients and their health-care providers.
10. An accountable-care organisation (ACO) is a group of doctors and hospitals jointly paid by Medicare to provide all the health-care needs of a group of at least 5 000 Medicare beneficiaries. Doctors and hospitals would be paid based on their ability to hold costs and meet quality-of-care indicators instead of the volume of services provided and of hospital admissions, as occurs under current Medicare FFS arrangements.

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ANNEX 2.A1

A small budget simulation model

This Annex explains the technical details of the simulation model used in this chapter. The simulation is based on a modified version of the equations used in OECD (2009a). The key equation of the simulation, the reduced form of output gap equation, uses the OECD Financial Conditions Index and includes the calibrated effect of fiscal policy. A second equation, the Financial Conditions Index equation, incorporates the effect of real short-term and long-term interest rates. The long-term interest rate is determined by the expected short-term policy rates over 10 years plus a risk premium related to expected fiscal deficits over 5 years. The simulation is completed using the Taylor-rule for short-term policy rates, a Philips curve for inflation and other government finance accounting identities. A feature of the model is the limited ability of conventional monetary policy to offset tighter fiscal policy when policy rates are zero.

The reduced form of output gap equation

(1) $\Delta GAP = C + \alpha_1 GAP_{-1} + \alpha_2 FCI_{-1} + \alpha_3 RPOIL_{-3} + (Multi_1 \Delta tax) + (Multi_2 \Delta E)$

Where

C	= constant term.
GAP	= output gap.
FCI	= financial condition index measures the impact of monetary policy on the economy (as shown in the next equation).
RPOIL	= real price of oil (logged level) measured as the price of Brent oil relative to the GDP deflator.
$Mult_1$ and $Mult_2$	= multiplier effects of changes in tax and spending, respectively, on the output gap.
Tax	= total government revenue (in % of GDP)
E	= total government spending (in % of GDP)
Δ	= the first difference operator.

This reduced form output gap equation is constructed by estimating a modified version of the equation used by Guichard *et al.* (2009) with new data and adding the calibrated effect of fiscal policy. The multiplier used for fiscal policy is consistent with Appendix 3.2 of OECD (2009a). The multiplier effect is assumed to gradually phase out in the long-term.

The Financial Conditions Index equation

(2) $FCI = FSHK - \delta_1 (r^s - r^{s^*}) - \delta_2 (r^l - r^{l^*})$

Where FSHK = other components of financial conditions including real exchange rate, corporate bond spreads, credit condition and financial and housing wealth measures. This is an exogenous variable that captures the effect of the financial crisis.

r^s = $i^s - \pi$ = real short-term policy interest rate where i^S is the nominal policy interest rate and π is the inflation rate.

r^{s*} = steady state equilibrium real short-term policy rate.

r^l = $i^l - \Sigma\pi^e$= real long-term interest rate on government bonds where i^l is the nominal interest rate on 10-year government bonds and $\Sigma\pi^e$ is inflation expectations over the next 10 years.

r^{l*} = steady state equilibrium real long-term interest rate.

The coefficients used in this equation are consistent with Guichard *et al*. (2009). The interest rate data come from the Taylor rule policy rate equation. The effect of a given change in long-term interest rates is about 3.2 times the size of the effect of a change in the short-term interest rates

The Phillips curve inflation equation

(3) $\pi = \theta_1 \pi^* + (1 - \theta_1)\ \pi_{-1} + \theta_2(GAP + GAP_{-1})/2$

Where π = inflation.

π^* = long-term expected inflation which is equal to the inflation target of the central bank.

If $\theta_1 = 0$, then inflation expectations are entirely backward looking. However, if $\theta_1 > 0$, then the central bank's inflation target provides an anchor for inflation expectations. In the simulations, $\theta_1 = 0.2$ and $\theta_2 = 1/5$, which results in a sacrifice ratio of 5 with partly backward looking inflation expectations.

The Taylor rule for policy interest rates

(4) $i^s = \pi + r^{s*} + 1.5\ (\pi - \pi^*) + 0.5\ GAP$ with a lower bound of zero.

The term structure of interest rates

(5) $i^l = \Sigma i^s + term + risk$

Where Σi^s = the sum of expected short-term nominal interest rates over the next 10 years.

term = term premium, assumed exogenous.

risk = risk premium, assumed to be a function of the expected fiscal position.

The risk premium on interest rates

(6) $risk = \lambda(b_{+5} - b)^e/5$

Where b = the level of government debt as % of GDP.

$(b_{+5}\ b)^e/5$ is the average expected change in government debt, which proxies for the average expected fiscal balance over the next 5 years. The parameter λ is 0.04 in both baseline and simulation scenarios.

Government fiscal balance (as % of GDP)

(7) $fbal = tax - E$

Where tax = total government tax revenue.

E = total government expenditure.

Net interest payments on government debt (as % of GDP)

(8) $ipay = \psi ipay_{-1} + (1 - \psi) i^{l} b$

Where ψ = the proportion of the refinanced government debt stock each year.

Government primary fiscal balance (as % of GDP)

(9) $pbal = fbal + ipay$

Government bond stock (as % of GDP)

(10) $b = [(1 + i^{l})/(1 + \pi + g)]^{*} b_{-1} - pbal$

Where g = real GDP growth = ΔGAP + ρ, where ρ is potential growth rate.

i^{l} = Long-term interest rate paid on government debt (10-year maturity)

Table 2.A1.1. **Key results of simulation model**

Deviation from baseline percentage of GDP

	2010	2011	2012	2013	2014	2015	2020	2025	2030
Federal budget, key indicators									
Federal budget balance	0.0	0.0	0.0	0.0	0.0	0.0	–3.0	–3.0	–3.0
Federal debt held by public	0.0	0.2	0.6	0.9	1.2	1.5	10.5	22.3	31.9
Primary budget balance	0.0	0.1	0.1	0.2	0.3	0.4	–2.2	–1.7	–1.1
Macroeconomic indicators									
GDP	0.0	0.0	–0.3	–0.2	–0.1	–0.1	1.6	0.1	0.1
Inflation	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1
Short-term interest (%)	0.0	0.0	–0.1	–0.1	–0.1	–0.1	1.0	0.5	0.2
Long-term interest (%)	0.0	0.5	0.6	0.7	0.8	0.8	0.6	0.2	0.0
Financial Conditions Index	0.0	–0.2	–0.3	–0.3	–0.3	–0.4	–0.3	–0.1	0.0

Note: In the baseline simulation, the federal deficit is assumed to be eliminated in 2020, then stays unchanged. In the variant, the federal deficit is reduced to 3% of GDP in 2015, then stays unchanged.

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Chapter 3

Implementing cost-effective policies to mitigate climate change

The consensus view of scientists is that the build-up of greenhouse gases (GHG) in the atmosphere is causing global warming. To reduce the probability of severe climate-change impacts and costs occurring, global GHG emissions need to be reduced substantially over coming decades. The United States agreed to a global political agreement to reduce GHG emissions that was acknowledged at Copenhagen (COP15) in December 2009 and negotiations are continuing to work towards binding emissions-reduction commitments by all countries. In view of the scale of emission reductions called for, it is vital that the United States adopt a cost-effective and comprehensive climate change policy. The current Administration is endeavouring to put such a policy package in place. Its core elements are comprehensive pricing of GHG emissions and increased support for the development and deployment of GHG-emissions-reducing technologies.

There is now much scientific evidence that the build-up of greenhouse gases (GHG) in the atmosphere is causing global warming. Climate modelling suggests that the costs of global warming are likely to be significant, but are subject to great uncertainty. The probability of severe climate-change impacts and costs being incurred can be lowered by substantially reducing GHG emissions. To be effective, mitigation action must include the United States and other major GHG-emitting countries. The United States agreed to a global political agreement to reduce GHG emissions that was acknowledged in Copenhagen (COP15) in December 2009, and negotiations are continuing to work towards binding commitments from all countries. Given the scale of mitigation envisaged by the Copenhagen Accord, it is vital that the United States uses cost-effective policy instruments. After reviewing the climate-change problem and the need for the United States to participate in a global agreement, this chapter assesses US climate-change policy in terms of its cost effectiveness. The main conclusions are that legislation needs to be passed to price GHG emissions comprehensively and that support for the development and deployment of GHG emissions reducing technologies should be stepped up further.

It would be prudent to reduce Greenhouse Gas (GHG) emissions to limit climate change

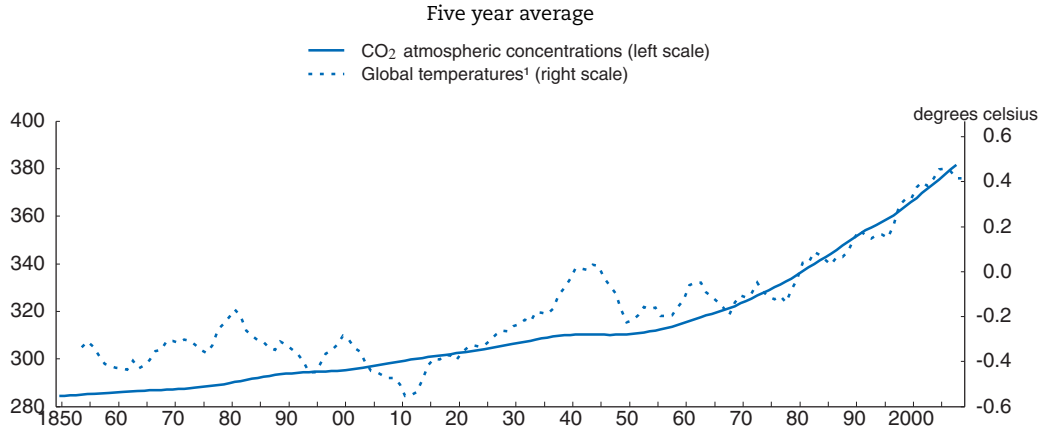
Anthropogenic GHG emissions are likely to be causing climate change

The consensus view of scientists is that anthropogenic (*i.e.,* from human activities) GHG emissions are causing global warming; they have this effect independently of their geographical origin. There have been very large increases in atmospheric concentrations of important, long-lived GHG since the beginning of the industrial era (around 1750). Atmospheric concentrations of CO_2, which is the most important of the GHG emitted by human activities, have increased markedly in recent decades, reaching around 380 ppm in recent years compared with about 280 ppm in the pre-industrial era (Figure 3.1); while the atmospheric concentration of other GHG has also increased, their warming effect has been almost neutralised on balance by the net cooling effect of aerosols that have been added to the atmosphere by humans. Global mean temperatures are estimated to have increased by around 0.7 °C since the pre-industrial era, with much of that increase having occurred since 1980. The pattern of climate change – warming in the lower atmosphere and cooling in the stratosphere – is consistent with greenhouse gases being the main cause.

Large increases in GHG emissions are in prospect

Growth in global GHG emissions has accelerated markedly in recent years, from an annual average rate of 1.7% over 1970-95 to 2.5% between 1995 and 2005 (IEA, 2009a) (Figure 3.2). This acceleration mainly reflects economic development in emerging countries, notably China. Despite this growth, GHG emissions per capita in China remain much lower than in developed countries, currently standing at only 20% of the US level. This suggests that emissions are likely to continue rising rapidly in emerging economies as they catch up economically with developed countries. Indeed, OECD (2009) projects that

Figure 3.1. **CO_2 atmospheric concentrations and global temperatures are rising**



1. Deviation from average 1961-90.

Source: World Meteorological Organisation.

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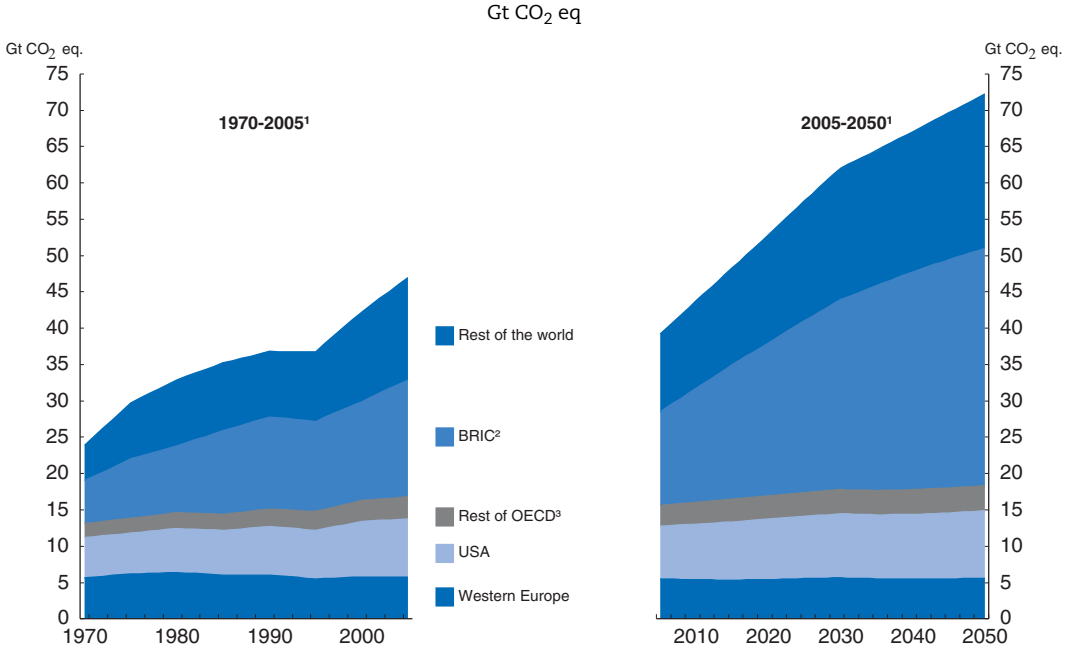
Figure 3.2. **Substantial growth in global GHG emissions is in prospect in a BAU scenario**



1. Including emissions from Land Use, Land-Use Change and Forestry before 2005 and excluding after 2005.
2. For 1970-2005: Brazil, India and China.
3. Rest of OECD does not include Korea, Mexico and Turkey, which are aggregated in Rest of the World.

Source: OECD (2009).

StatLink http://dx.doi.org/10.1787/888932325710

global-GHG emissions will increase from the 2005 level by 35% by 2020 and 84% by 2050 in a Business-As-Usual (BAU) scenario.

It would be prudent to reduce GHG emissions to limit climate change

There is much uncertainty about the effect of rising GHG concentrations. Studies suggest that the costs of inaction are likely to be significant, but could be lower if climate

sensitivity is very low. Based on the standard Intergovernmental Panel on Climate Change (IPCC, 2007) climate-sensitivity-parameter estimate, which suggests that the mean global temperature would rise by 3 °C if the atmospheric concentration of GHG were to double, OECD (2009) projects an increase in the global mean temperature of about 4 °C by 2100 on a BAU basis, but with a one-in-six chance of the increase being more than 5.8 °C and a one-in-six chance of it being less than 2.2 °C. Climate modelling suggests that damages rise much more than in proportion to the rise in global mean temperatures for increases beyond 2.0-2.5 °C (Nordhaus, 2007). Damage estimates associated with a given increase in global temperatures are also uncertain and have a probability distribution skewed towards high damages. In view of this uncertainty, mitigation action should be seen as reducing the probability of severe climate-change costs occurring rather than setting up a strict cost-benefit comparison using the expected values of benefits.

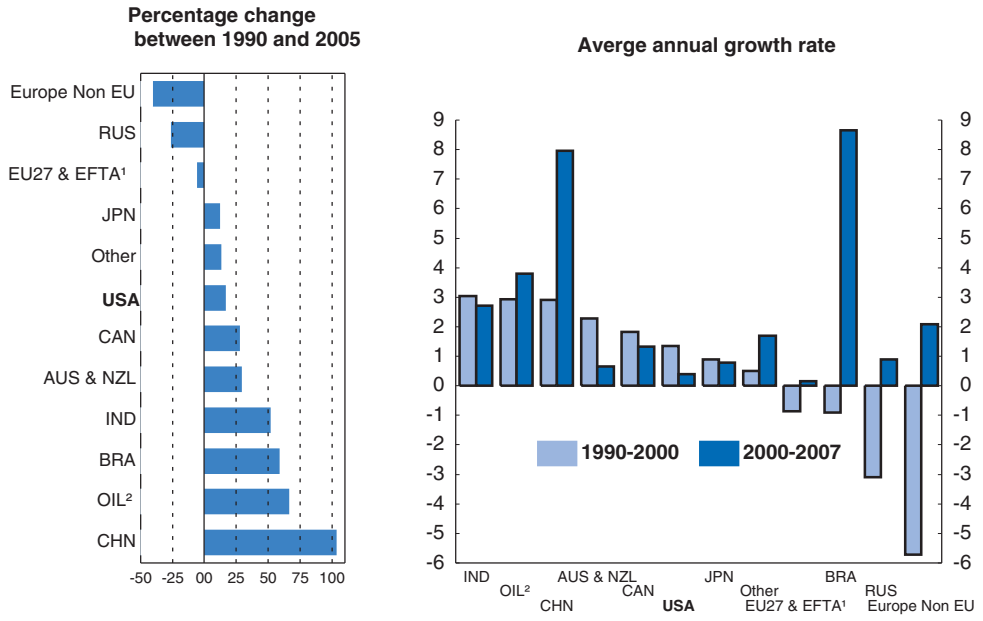
The United States is a major emitter of GHG

The United States remains a major GHG emitter, despite slowing emissions growth

Growth in US GHG emissions has slowed substantially since 2000, from an average annual rate of 1.4% over 1990-2000 to 0.4% over 2000-07, but remains higher than in the EU27 + EFTA countries and much lower than in China (Figure 3.3). GHG emissions were 17% higher in the United States in 2007 than in 1990, whereas they were 7% lower on average in the EU27 + EFTA countries, partly reflecting the collapse of heavy industry in Eastern Europe during the 1990s. This factor clearly contributed to a large decline in emissions in Germany over this period. Emissions also fell steeply in the United Kingdom, due in part to declining coal consumption following the discovery of North Sea natural gas; emissions in

Figure 3.3. **Growth in US GHG emissions has slowed, but remains higher than in European countries**

CO_2 equivalent



1. EU27, Iceland, Norway and Switzerland.
2. Indonesia, Venezuela, Middle East, North Africa, and Nigeria.

Source: IEA (2009a); OECD, ENV-Linkages model.

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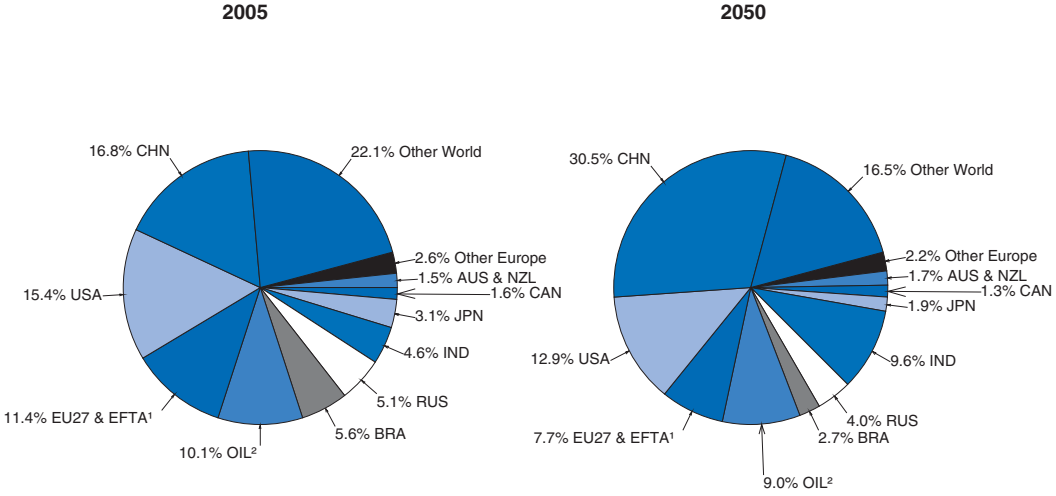
other western European countries on average grew during this period at a somewhat slower pace than in the United States, partly reflecting lower economic and population growth. The US share of current global emissions has declined in recent years to 15% in 2005 as its emissions growth has slowed and emerging countries have developed (Figure 3.4). The US share is the second largest of any country or region after China's and is significantly larger than that for the EU27 + EFTA countries, even though they have a larger population and economy. The OECD (2009) projects that US GHG emissions will increase by 28% by 2050 on a BAU basis, which, together with rapid growth in developing countries' emissions, will result in the US share of global emissions falling to 13% by 2050.

Figure 3.4. **The United States is a major emitter of GHG**



1. EU27, Iceland, Norway and Switzerland.
2. Indonesia, Venezuela, Middle East, North Africa, and Nigeria.

Source: IEA (2009a); OECD, ENV-Linkages model.

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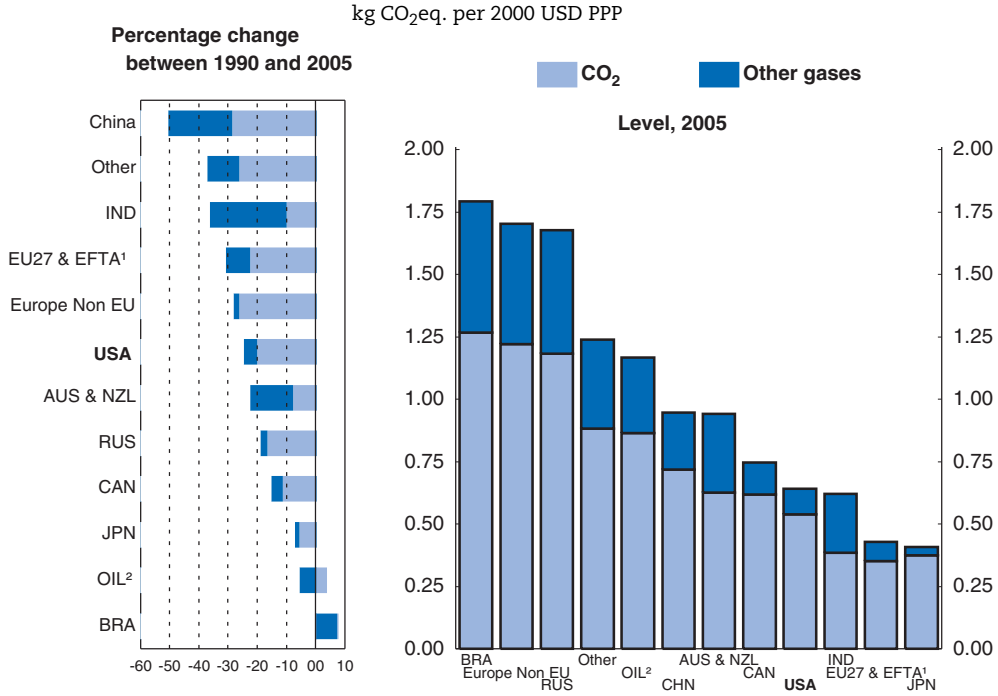
Growth in GHG emissions has been slower than economic growth both in the United States and most other countries. The GHG emissions intensity of the US economy (GHG emissions per unit of GDP in 2005 prices) fell by one quarter between 1990 and 2005 (Figure 3.5). This reduction in GHG intensity was less than achieved in EU27 + EFTA countries on average, but more than in the remaining OECD countries (GDP is converted to USD at 2005 PPP exchange rates). The GHG emissions intensity of output is higher in the United States than in the EU27 + EFTA countries on average and Japan, but lower than in Canada, and the Australia and New Zealand region.

GHG emissions are much higher in the United States than in European countries

US GHG emissions per capita in 2005 were approximately double the EU27 + EFTA level, though they were lower than in the Australia and New Zealand region. The large difference between US- and EU27 + EFTA emissions is mainly attributable to much higher CO_2 emissions from electricity and heat production and from transportation (Figure 3.6). Emissions from electricity production in the United States are relatively high owing to heavy reliance on traditional coal-fired power stations (they supply almost one half of electricity). This technology choice reflects the low cost of coal relative to natural gas in parts of the country, fuel prices that are distorted by subsidies and the absence of strong

Figure 3.5. **GHG emissions intensity of output is declining in the United States but is higher than in most OECD countries**



1. EU27, Iceland, Norway and Switzerland.
2. Indonesia, Venezuela, Middle East, North Africa, and Nigeria.

Source: IEA (2009a).

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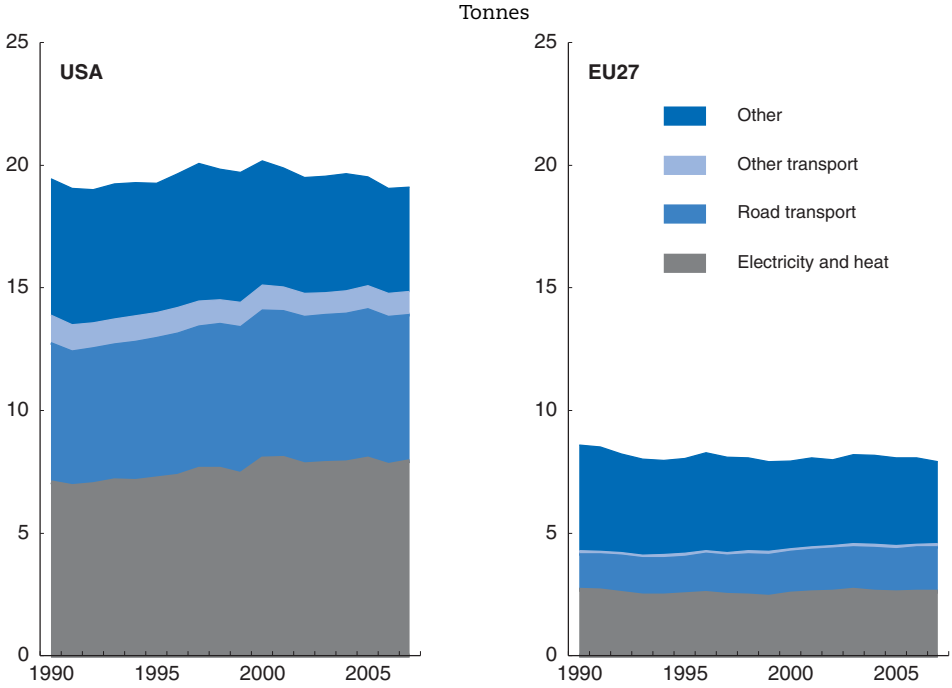
Figure 3.6. **CO_2 emissions per capita are much higher in the United States than in the EU27**



Source: IEA (2009a).

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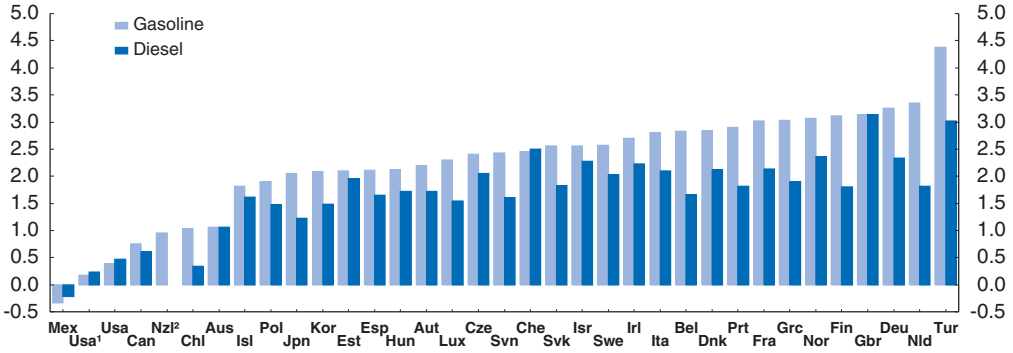
financial incentives to encourage more efficient use of fossil plants or to use cleaner fuels for power generation (IEA, 2008). Even though public-mass-transit investment and usage have been increasing in the United States, its development is still limited compared to in European countries, contributing to transport emissions. Other factors that contribute to relatively high transport emissions are the low population density and consequent long distances travelled per capita and the low mileage performance of the vehicle fleet, although US-fuel-economy standards are being raised (see below). Low fuel taxes relative to EU27 + EFTA countries may contribute to these phenomena (Figure 3.7).

Figure 3.7. **Gasoline and diesel tax rates are relatively low in the United States**

USD per gallon, 2010



1. Federal.
2. New Zealand levies road-user charges on diesel vehicles.

Source: OECD, *EEA Database*.

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Participation of the United States and other large emitters is pivotal to reaching an international agreement to reduce GHG emissions

Major GHG emitting countries must participate in global abatement efforts if they are to combat climate change effectively

Stabilising the CO_2-equivalent concentration of long-lived GHG in the atmosphere at around 550 ppm (which corresponds to a CO_2 concentration of about 450 ppm) would offer about a 50% chance of limiting the long-term increase in global mean temperature above pre-industrial levels to about 3 °C (IPCC, 2007). However, it would be difficult for a global coalition of countries and/or regions to achieve this goal by 2050 without the participation of the United States and any other large emitter as this would entail very high global mitigation costs for participants and would be impossible if neither the United States nor China participated. To achieve the 550 ppm-GHG-concentration goal by 2100, economically feasible coalitions would need to include all major emitting regions except Africa. OECD (2009) analysis using the World Induced Technological Change Hybrid (WITCH) model (Bosetti *et al.*, 2009a; and Bosetti, Massetti and Tavoni, 2007) provides theoretical support for these conclusions (Box 3.1). In the absence of a single carbon price across the coalition of emissions-abating countries and/or regions, which is probably more realistic, it would be even more difficult to achieve the target by 2050 without US participation as mitigation costs would be higher than otherwise, no longer being minimised across coalition countries, and would remain impossible by 2100. Moreover, it would be difficult to assemble a coalition of countries to take action that did not include the United States as other countries, especially developing countries, are unlikely to consider it equitable that they bear abatement burdens while the United States, which is one of the richest countries

Box 3.1. **Strategic considerations for forming a global coalition to combat climate change**

OECD (2009) analysis using the World Induced Technical Change Hybrid (WITCH) model suggests that, in the absence of participation by the United States and any other large emitter, it would be difficult to form a coalition of countries and regions capable of achieving the long-lived-GHG-550 ppm-base target by 2050 through a single (coalition-wide) feasible carbon price without mitigation costs becoming very high and would be physically impossible if neither the United States nor China participated (other countries would have to have negative emissions). Even though mitigation costs are typically low in this version of the model owing to the assumption that new technologies will emerge gradually over the coming decades (Box 5.1, OECD, 2009, and Bosetti *et al.* 2009b), economically feasible coalitions (*i.e.,* not having excessively high mitigation costs) would need to include all major emitting regions, including at least China or India to achieve the target by 2050, and all regions except Africa to achieve it by 2100 (OECD, 2009, Table 6.2).

While US participation would facilitate the formation of an economically efficient coalition of countries and regions to combat climate change, countries and regions would need to consider that it is in their interests to join. This assessment of national interest depends on three main factors:

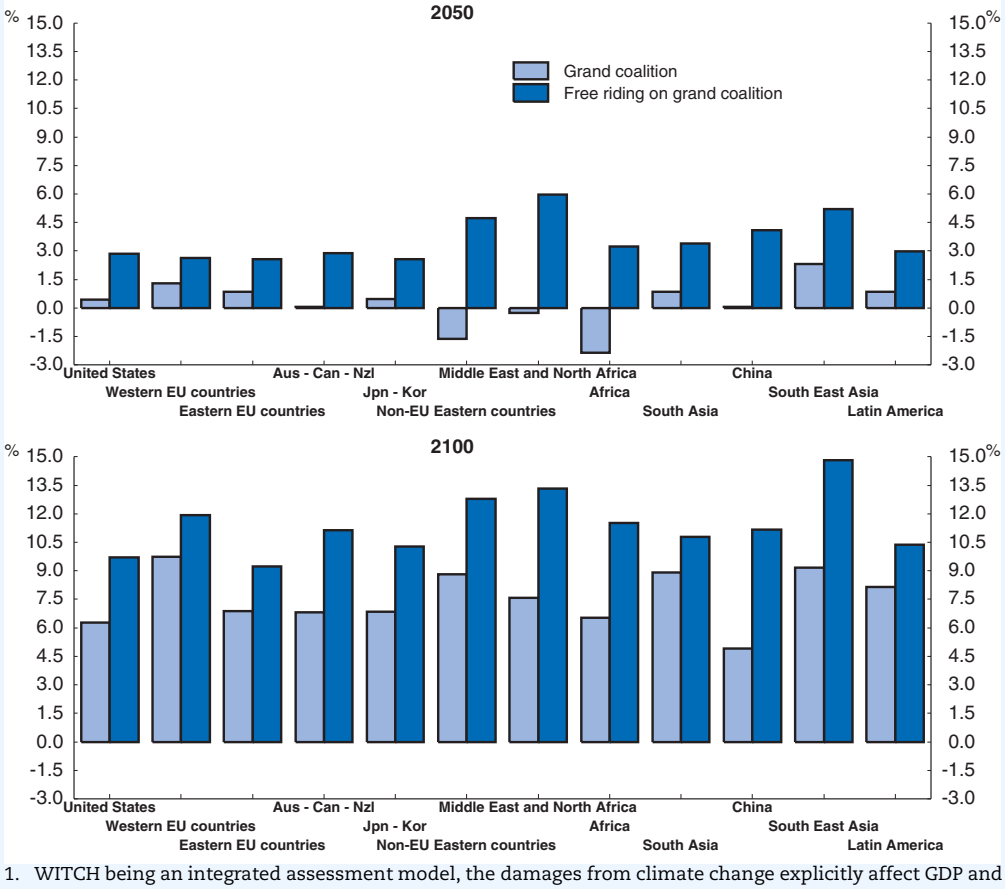
- *The expected impacts of climate change*. Developing countries are expected to be more adversely affected by climate change.
- *The influence of future impacts on current policy decisions*. How governments value these impacts has a large effect on incentives to take action. For example, the lower (higher) the discount rate used, the higher (lower) the value placed on the welfare of future generations.
- *The costs of mitigation policies*. In general, the higher the carbon intensity of a country's output, the larger will be its abatement costs under a global carbon tax (or a world emissions trading scheme (ETS) with full permit auctioning), and the smaller will be its incentive to participate in a climate coalition.

OECD (2009) analysis using the WITCH model finds that in the high damage/low-discounting case, which defines an upper bound for emission reductions, a fully co-operative welfare-maximising "grand coalition" involving all regions would cut emissions by 15% by 2050 relative to 2005 levels, and keep overall GHG atmospheric concentrations below 550 ppm CO_2-equivalent by the end of the century. All countries and regions except non-EU Eastern Europe, the Middle East and North Africa, and Africa would be better off in 2050 participating in the grand coalition than remaining in the non-cooperative BAU scenario, and all countries and regions would benefit by 2100 (Figure 3.8); in the low damage/high discounting case, which defines a lower bound for emission reductions, the grand coalition would allow emissions to rise by 75% by 2050 relative to 2005 levels (representing a cut of only 13% compared with BAU) and would not stabilise GHG concentrations. The problem is that all countries and regions would be still better off by free riding on the grand coalition, assuming that the rest of the coalition went forward with action without them. Given the assumed coalition-wide carbon tax, which equalises marginal abatement costs across countries and therefore precludes trade in emissions between coalition members, incentives to free ride are most acute for countries with flatter abatement cost curves and/or flatter marginal damage curves, because they would contribute more to the coalition's abatement effort and/or would benefit less. China, in particular, has stronger incentives than the United States, to free ride on a grand coalition.

Box 3.1. **Strategic considerations for forming a global coalition to combat climate change** *(cont.)*

Figure 3.8. **Most regions gain more from free riding than from participating in a world coalition**[1]

Percentage deviation of GDP from BAU Scenario – no international transfers, high-damage/low-discounting case



1. WITCH being an integrated assessment model, the damages from climate change explicitly affect GDP and consumption. Furthermore, not only the market, but also the non-market impacts of climate change are taken into account in the high-damage case featured here. This explains why all countries are found to gain from a grand coalition against climate change by 2100, compared with a BAU scenario.

Source: OECD (2009).

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Financial incentives for developing countries with weak incentives to participate in global mitigation efforts might therefore be required for them to join a global coalition, with the incentives needing to be higher in the high damage/low discounting case than in the low damage/high discounting case. Such incentives could be provided through the way in which emission reduction commitments are negotiated across countries in a framework where all countries adopt national emission caps. Relatively generous caps in relation to global mitigation objectives would increase incentives for these countries to participate in global mitigation actions. This would separate the issue of who takes action – ensuring that mitigation action takes place wherever it is cheapest – from who pays for that action.

and largest emitters in the world, does not. This makes US leadership vital. Indeed, some countries have made the adoption of mitigation policies dependent on US action, with this link being explicit in the case of Canada. The current Administration has clearly signalled its desire for the United States to assume its leadership responsibilities by adopting a comprehensive package of policies to substantially reduce GHG emissions, subject to Congress passing the associated legislation (see below).

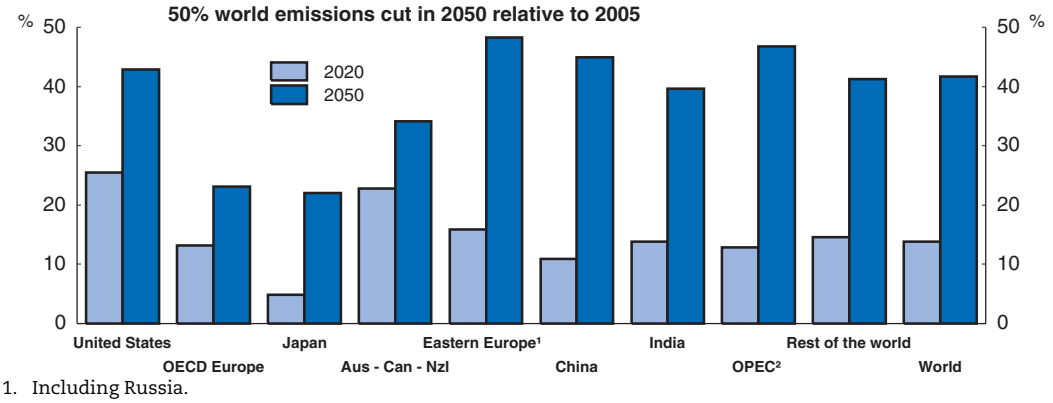
Health and energy security co-benefits would reduce the net cost of US abatement measures

In addition to reducing the exposure of Americans to the risk of high-cost climate-change events, US participation in global mitigation efforts would generate health co-benefits from reduced local air pollution (LAP) and energy-security co-benefits as dependence on oil from politically unstable regions would be reduced. There are other co-benefits of GHG mitigation policy, such as for ecosystems and biodiversity, but they are not examined here.

Bollen *et al.* (2008 and 2009) estimate that if a global carbon tax were implemented to reduce world emissions by 50% by 2050, premature deaths caused by LAP in the United States could be more than 40% lower than in a BAU scenario, which assumes that existing regulations (in 2008) to control LAP will be maintained and will become stricter over time as real incomes rise (Figure 3.9).[1] These benefits, which are higher than in most other OECD countries, are estimated to drop off sharply as the global emission reduction increases – most of the benefits are obtained from the first 25% reduction in emissions relative to BAU. Bollen *et al.,* (2008 and 2009) estimate that these health co-benefits could reduce the annual net cost of mitigation in the United States by two thirds by 2050 in this scenario, although they would remain modest as a share of GDP (about ½ per cent) (Figure 3.10). Health co-benefits in developing countries would have a smaller proportionate impact on the net cost of mitigation but would represent a significantly larger share of GDP *(e.g.,* over 3% of GDP in China). The relatively large health co-benefits as a share of GDP in developing countries reflects the facts that LAP is worse than in

Figure 3.9. **The impact of reduced local air pollution through GHG mitigation policies on the percentage of premature deaths avoided**

Differences from the baseline in %



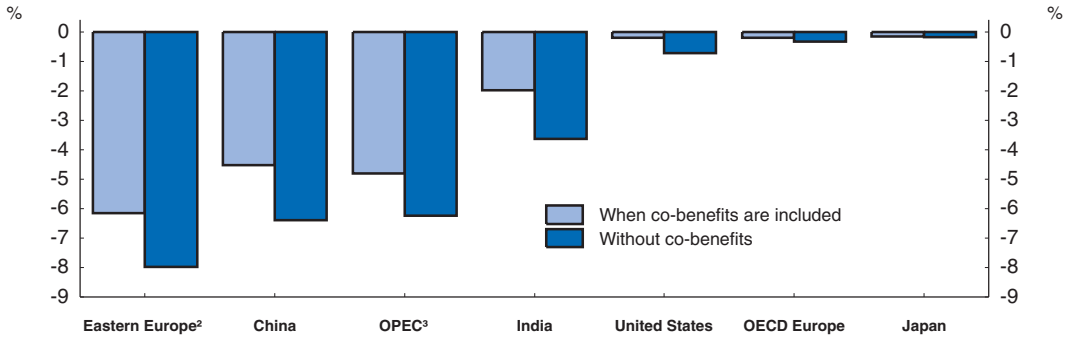
1. Including Russia.
2. Including Mexico.

Source: Bollen *et al.* (2008).

StatLink http://dx.doi.org/10.1787/888932325843

Figure 3.10. **Co-benefits only partially improve incentives for participation in a global climate-change agreement to reduce emissions by 50% by 2050**[1]

In per cent of GDP



1. "Without co-benefits" is the return from GHG mitigation policy when co-benefits are not included, or the difference between the benefits in terms of avoided global climate change and the cost of mitigation policy. "When co-benefits are included" is the return from GHG mitigation policy when co-benefits are included, *i.e* the difference between the benefit in terms of both avoided global climate change and local air pollution and the cost of mitigation policy to which the opportunity gain of not having to achieve the same level of local air pollution (LAP) reduction through direct policies is then added.
2. Including Russia.
3. Including Mexico.

Source: Bollen *et al.* (2008).

StatLink http://dx.doi.org/10.1787/888932325862

developed countries and that developing countries would make proportionately greater reductions in their GHG emissions (especially from burning coal) than developed countries given the assumption underlying this analysis of a uniform global carbon price.

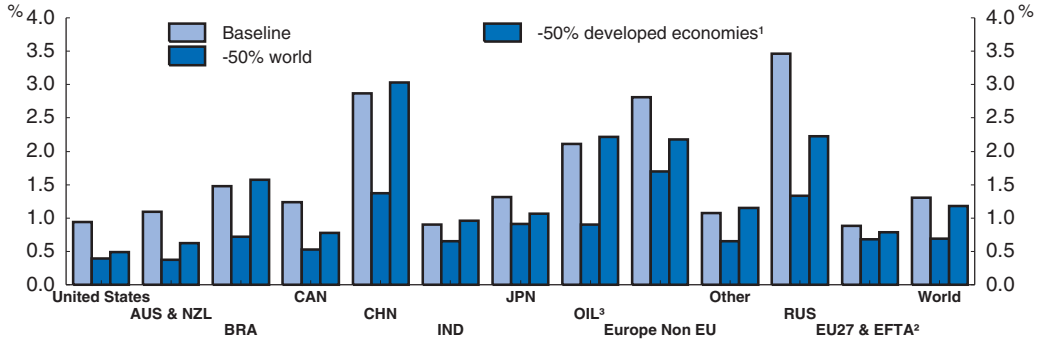
Mitigation action could also improve energy security, which can be broadly defined as a low risk of disruption to energy supply, both in terms of physical availability and price stability (Bohi and Toman, 1996). Climate change mitigation could be expected to improve long-term energy security by reducing exposure to large unforeseen oil price shocks from OPEC countries, reducing economies' energy and fossil fuel dependence and hence the macroeconomic impact of any future price shocks, and by fostering energy risk diversification. As the most significant source of energy insecurity over coming decades is the risk of oil price shocks, the major source of enhanced energy security comes from reduced oil intensity of GDP. The OECD (2009) estimates that the United States could halve its oil intensity of GDP by 2050 under various abatement scenarios (Figure 3.11). This reduction in oil intensity is similar to those in other OECD economies with relatively high GHG-emissions intensities of output (Canada, and the Australia and New Zealand region) and more than in European countries or Japan.

The United States agreed to the Copenhagen Accord and made conditional emission reduction commitments

The United States agreed to the Copenhagen Accord (noted by the United Nations Framework Convention on Climate Change, Conference of the Parties 15th session [COP15]) in December 2009. It commits signatories to cooperate to achieve the peaking of global and national emissions as soon as possible, recognising that the timing for peaking will be longer in developing countries than in developed countries. Developed countries commit to economy-wide emission targets for 2020 while developing countries commit to mitigation actions. In the context of meaningful mitigation actions and transparency on

Figure 3.11. **The United States could reduce its oil intensity by more than most other OECD countries under different mitigation policies**

Domestic demand for refined oil as a % of GDP in 2050



1. United States, China, Australia, New Zealand, Canada, Japan, India, Russia, Brazil, EU27, Iceland, Norway and Switzerland.
2. Indonesia, Venezuela, Rest of Middle East, Islamic Republic of Iran, Rest of North Africa and Nigeria.
3. EU27, Iceland, Norway and Switzerland.

Source: OECD (2009).

StatLink http://dx.doi.org/10.1787/888932325881

implementation, developed countries also commit to provide funding for developing countries to help with mitigation and adaptation. As the Accord was "noted" rather than agreed to, there are no binding commitments. Nevertheless, the Accord makes clear the broad lines of a future agreement. Developed countries will commit to emission reduction targets, and developing countries, especially the larger more advanced ones, must take ambitious mitigation actions commensurate with their capability. As noted above, all major emitters, including notably China, must participate in abatement efforts for global-climate-change goals to be in reach.

As part of the Copenhagen Accord, the US government also committed to a national target for reducing GHG emissions in the range of 17% by 2020 from the 2005 level (equivalent to a reduction of about 3% from the 1990 level), in conformity with anticipated US energy and climate legislation, recognizing that the final target will be reported to the Secretariat in light of enacted legislation.[2] The EU27 + EFTA group of countries committed to a 30% reduction from the 1990 level (equivalent to a reduction of about 25% from the 2005 level) provided that other industrialised countries make comparable commitments and that developing countries make adequate commitments, falling to a 20% reduction otherwise. OECD (2010a) estimates that the EU27 + EFTA maximum commitment and the US commitment entail comparable efforts in terms of loss of real income (around 0.7% of BAU income by 2020 below). Based on the maximum commitments made by other OECD countries, OECD (2010a) estimates that the countries with high emissions intensity (Canada, Australia and New Zealand) would incur somewhat larger income losses while Japan would incur a smaller income loss. According to OECD (2010a), the US target, taken together with the declared targets of other industrialised countries, would lead to a 12-18% reduction in GHG emissions in 2020 compared with 1990 levels. While this is significant, further reductions from industrialised countries and the more advanced developing countries would be required to achieve the reductions judged by the IPCC to be necessary by 2050 to have a 50% probability of limiting warming to 2 °C (this scenario entails stabilising the atmospheric concentration of long-lived GHG at 450 ppm

CO_2-equivalent). To reach a final agreement, it will be necessary to agree a fair distribution of abatement burdens.

In the context of the above noted commitment of developed countries to provide financial assistance to developing countries to help them with abatement and adaptation measures, the US government announced that it would contribute its share to developed country financing of almost USD 30 billion over 2010-12 (US Department of State, 2010 for this sentence and the rest of the paragraph), which would entail a substantial increase in US climate assistance. In keeping with this commitment, the FY 2010 budget provides for more than a three-fold increase in bilateral and multilateral funding for climate-related activities from the enacted funding in the previous year. Funding for US Agency for International Development (USAID) climate programmes increases by 70%, with significant new investments in mitigation and adaptation strategies that will build on USAID experience in this area. Developed countries also committed to a goal of mobilising USD 100 billion globally from public- and private-sector sources by 2020 for climate assistance, subject to meaningful mitigation actions and transparency on implementation in recipient (developing) countries.

The most cost-effective way to reduce GHG emissions is to price them and to support the development and diffusion of emission-reducing technologies

Pricing GHG emissions

Private production and consumption decisions are made without taking into account the full costs of GHG emissions. Consequently, the level of GHG-intensive production and consumption activity is higher than is socially optimal. The most cost-effective means of ensuring that these external costs are internalised is to price emissions, either through an emission tax or a cap-and-trade scheme (which sets a cap on emissions and allows trade in emission permits). This will encourage producers and consumers to exploit abatement opportunities to the extent that their marginal abatement costs are less than the price of emitting GHGs. Because the cheapest opportunities are likely to be exploited first (absent other barriers), abatement costs are minimised by the pricing of emissions. This is all the more important at the international level, where there are large differences in marginal abatement costs across countries. The power of pricing to minimise abatement costs has been amply demonstrated in the United States through experience with the cap-and-trade scheme to reduce sulphur dioxide (SO_2) emissions in the electric-power sector (and hence acid rain) introduced in 1995. It has resulted in almost a halving of these emissions and compliance costs are estimated to have been 30-40% lower than would have been incurred had the command and control regulatory approaches considered by Congress instead been adopted (Stavins, 2005 and 1998; Carlson *et al.*, 2000). Railroad deregulation increased cost savings from the cap-and-trade scheme by enabling Mid-Western electric utilities to reduce their SO_2 emissions by increasing their use of low-sulphur coal from Wyoming.

Most legislative proposals to price GHG emissions, both in the United States and in other countries, have opted for cap-and-trade schemes over a tax. A major reason for this preference is that cap-and-trade facilitates building political support through grandfathering (*i.e.*, giving permits to exiting emitters for free), which may be less transparent than recycling the revenues from a tax and more politically sustainable (subsidies have to be renewed regularly). Another reason is that cap-and-trade gives greater certainty about the amount of abatement to be achieved than does a tax, which

generates strong political support from environmentalists. However, there is more uncertainty about marginal costs than with a tax, which sets such costs directly. This is potentially an important disadvantage for cap-and-trade because the increased certainty over short-term abatement costs with a tax is likely to be more valuable than the loss of certainty about short-term abatement because the slope of the marginal environmental damage curve is flatter than that of the marginal cost curve (OECD, 2009; Hoel and Karp, 2001; Newell and Pizer, 2003; Pizer, 2002). It is possible, however, largely to eliminate this disadvantage by including in a cap-and-trade scheme features such as price floors and ceilings and banking provisions that contribute to limiting short-term price volatility (Duval, 2008), as was done in the American Clean Energy and Security Act of 2009 (ACES) passed by the US House of Representatives and the American Power Act (sponsored by Senators Kerry-Lieberman) recently submitted to the Senate (see below). In any case, as experience is gained with either taxes or cap-and-trade, it is likely that adjustments will have to be made in, respectively, tax rates (to ensure that abatement is on track to meet emission reduction targets) or the caps (to ensure that the cost of permits remains in line with the marginal social costs of emissions). Further, if free allocations are conditioned on any behaviour by recipients *(e.g.,* conditioned on facilities remaining open), attention should be paid to limiting the extent to which this may distort industry dynamics (*i.e.,* entry and exit incentives).

Supporting the move to low-GHG-emission technologies

Pricing GHG emissions would also increase incentives to invest in energy R&D to develop low-emission technologies and to deploy them. Such Induced Technological Change (ITC) would ultimately reduce emission abatement costs. OECD (2009) finds that pricing carbon to achieve stabilisation of the overall GHG concentration at 550 ppm CO_2-equivalent in 2050 would quadruple both energy R&D expenditures and investments in installing renewable power generation, although this estimate would be lower if political uncertainty about the future path of carbon prices (current governments cannot commit future governments to a climate-change policy, while future governments have incentives to ease policy once irreversible investments in R&D and new equipment have been made) were taken into account. This analysis also suggests, however, that ITC alone may only have modest effects on mitigation costs. This is because low-carbon options (nuclear and carbon capture and storage, CCS) already exist in the electricity sector, marginal impacts of R&D on energy efficiency are decreasing, and learning effects in renewable energies fade.

Even with pricing of GHG emissions and without political uncertainty about the future path of carbon prices, the development and diffusion of low-emission technologies would still be less than is socially optimal. An important reason for this conclusion is that firms investing in R&D are typically unable to appropriate all or most of the social returns they generate owing to the public-good nature of knowledge. Much of the social return on R&D investments will accrue as spillovers to competing firms, downstream firms that purchase the innovating firm's products, or to consumers (Griliches, 1992). Empirical evidence suggests that social rates of return to R&D are substantially higher than private rates of return (Griliches, 1992) and that consequently, R&D investment is below the socially optimal level. This problem, which is common to technology development in general, may be accentuated in the case of climate change by the risk of large innovation rents from any major breakthrough being expropriated to facilitate rapid diffusion given the potentially large welfare benefits of such diffusion (OECD, 2009).

A number of challenges that make the pattern of development and deployment of new technologies path dependent may temporarily aggravate underinvestment in new technologies, such as clean-energy technologies, from society's perspective. First, market-size effects encourage R&D investments in sectors where there is a relatively large market for the outputs of such investments owing to the non-rival nature of knowledge, to the detriment of green technologies (Acemoglu *et al.,* 2009). Second, learning-by-doing (LBD) effects reduce the costs of existing technologies as firms and consumers learn better how to use them, resulting in slower than socially optimal diffusion of new technologies, such as clean-energy technologies, because neither firms nor consumers take these spillovers into account when making production and consumption decisions (Arrow, 1962; IEA, 2000; McDonald and Schrattenholzer, 2001; Neij *et al.,* 2003a and 2003b); historically, costs for a particular emerging technology have declined by approximately 20% for each doubling of cumulative production volume (Major Economies Forum, 2009). Third, economies of scale and the need for inter-industry cooperation to develop new infrastructure to commercialise some new technologies, such as electric cars or renewable energy, may also slow their diffusion (Gillingham and Sweeney, 2010).

Hence, while pricing GHG emissions would increase GHG-emission-reducing RD&D (Research and Development and Demonstration) investments, subsidies for such investments may also be needed to increase them closer to the socially optimal level. Such subsidies should represent a larger proportion of expenditures to develop technologies that are far from commercialisation than of such expenditures to develop technologies that are near commercialisation because knowledge spillovers tend to be greatest the further a technology is from commercialisation. This is why fundamental research is typically funded mostly by government while other R&D as well as demonstration tends to be mostly financed by the private sector. Ensuring that intellectual property right (IPR) protection is strong would also help to reduce underinvestment in RD&D caused by knowledge spillovers, while establishing a fund to buyout breakthrough technologies to reduce GHG emissions could reduce the perceived risks of expropriation discussed above as well as speeding diffusion. Pricing GHG emissions through a cap-and-trade scheme could help to reduce the political uncertainty that undermines investment in RD&D by building a political constituency for continued enforcement. Both public financial support and regulatory changes can help to overcome a lack of appropriate infrastructure for the development and deployment of some low-emission technologies. For example, public subsidies and regulations are being used to adapt the US electricity network to handle increased supplies of renewable energy (see below).

Very large increases RD&D are likely to be required to enable backstop technologies to emerge and hence for abatement costs to fall substantially. Assuming a world carbon price scenario that targets a 550 ppm GHG concentration, OECD (2009) estimates that global energy R&D investments would need to rise approximately six-fold initially, to 0.12% of global GDP, to enable backstop technologies to emerge.[3] These technologies are estimated to reduce abatement costs substantially at longer time horizons but not to have much effect before about 2025. By 2050, abatement costs and GDP costs could be one half of the levels without such technologies; these results concord with those in other studies (Edmonds *et al.*, 2007; Manne and Richels, 1992; and Clarke *et al.,* 2006). Most of the reduction in abatement costs comes from backstop technology in the non-electricity sector, where the abatement potential of currently commercially available mitigation options is comparatively smaller than in the electricity sector (which has nuclear, CCS,

wind and solar energy options). Further simulations also strongly suggest that world spending on energy-related R&D alone, regardless of its magnitude, would not be able to tackle climate change. No global R&D policy of any size operating in isolation is able to stabilize the atmospheric concentration of GHG this century.

Using a different model that emphasizes market-size effects in the allocation of R&D, Acemoglu *et al.* (2009) find that optimal policy would entail a massive and early shift in R&D investments from GHG-emitting-technologies to clean technologies, in addition to a carbon tax, for plausible values of the elasticity of substitution between dirty-and clean-production inputs and of the discount rate. Such an approach would support the emergence of break-through technologies to reduce GHG emissions, substantially reducing future abatement costs. In this model, both the R&D subsidies and carbon tax could eventually be phased out as clean technologies became sufficiently advanced (and dominant) that research would be directed towards them without further government intervention.

An alternative approach to assessing the extent to which RD&D to develop technologies that reduce GHG emissions needs to increase is to identify spending gaps in the main technologies concerned between what would be needed to achieve global emission-reduction goals and what is currently being spent. The IEA (2009b) recently conducted such an exercise for the Major Economies Forum covering ten climate-related technologies that together address more than 80% of the CO_2 emissions reduction potential identified by the IEA: advanced vehicles; bio-energy; CCS; building-sector-energy efficiency; industrial-sector-energy efficiency; high-efficiency-low-emissions coal; marine energy; smart grids; solar energy; and wind energy. The IEA found that the total annual RD&D funding needed, for both the public and private sectors, is USD 37-74 billion. Of this total, approximately half (USD 19-37 billion) relies on public sources. The current public funding level (excluding one-time stimulus spending) is around USD 5 billion, leaving a public RD&D funding gap of USD 14-32 billion, which implies that an increase to three to six times the current level of funding is required.

Government policies implemented thus far to reduce GHG emission have been neither ambitious nor cost effective

Thus far, US governments have only adopted non-binding GHG abatement objectives

Prior to the recent Copenhagen Accord, the only international agreement to reduce GHG emissions that the US government had ratified was the United Nations Framework Convention on Climate Change (UNFCCC), under which the United States and other industrial countries made a non-binding commitment to return GHG emissions to the 1990 level by 2000 and to stabilise them at this level. The United States, like most non-European OECD countries, has not met this target while the EU27 + EFTA countries have, on average (see above), although only one half these countries individually met the target. The United States did not ratify the Kyoto Protocol through which other industrialised countries committed to reduce GHG emissions to 5.2% below the 1990 level by 2012; the US target would have been to reduce emissions to 7% below the 1990 level by 2012.

Domestically, the previous Administration unilaterally adopted the non-binding target of reducing the GHG emissions intensity of the economy by 18% over 2002-12, a reduction four percentage points greater than was projected to occur on a BAU basis (minus 14%) at the time (2002) (IEA, 2008). The previous Administration also gave some indications that

the United States was prepared to agree binding emission reduction targets for the post-2012 period in international negotiations provided that other major economies did likewise, with developed countries expected to bear a greater share of the abatement burden than developing countries. The targets referred to in this regard were to stop the growth in US missions by 2025 (a unilateral declaration made on 16 April 2008) and for global emissions to be reduced by 50% by 2050 (G8 declaration, 8 July 2008). Based on recent OECD projections of GHG emissions (Duval and De la Maisonneuve, 2010) and economic growth (OECD, 2010b), the United States is on track to meeting the 2012 emissions intensity target but has not yet implemented policies to achieve the longer-term targets.

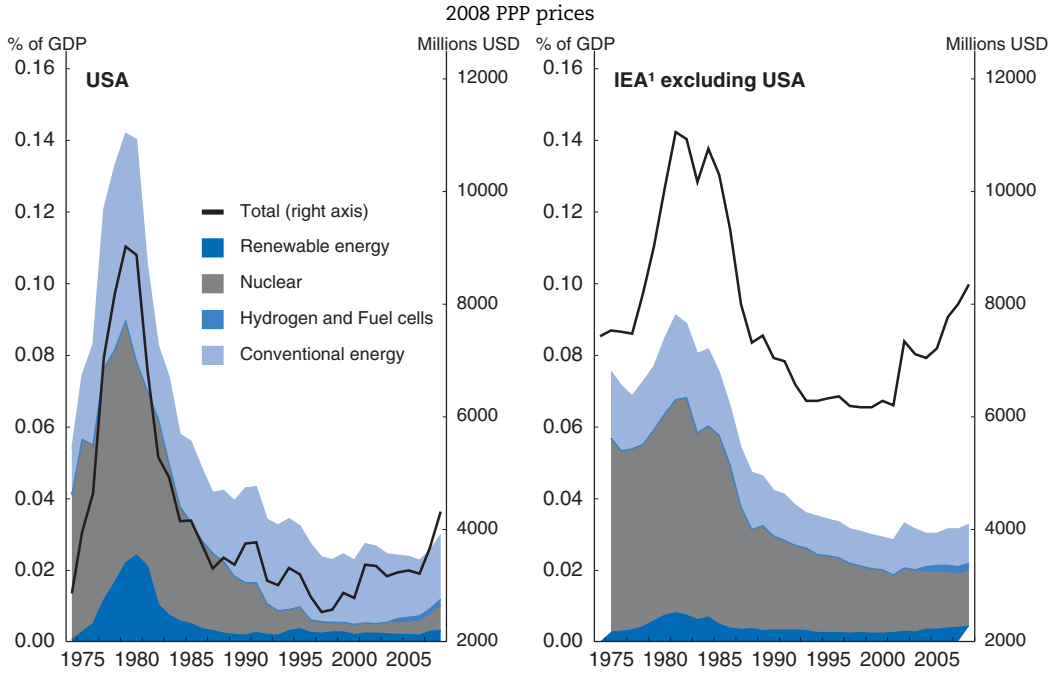
Thus far, the main policy instruments deployed have not been cost effective

Rather than price GHG emissions – the cornerstone of a cost-effective approach to reducing GHG emissions – the previous Administration focused on voluntary agreements (VA) with industry, which accounted for around one half of the estimated mitigation impact of measures reported in the fourth US Climate Action Report (United States Department of State, 2007), and on supporting the development and dissemination of technologies to reduce GHG emissions, notably through measures in the Energy Policy Act of 2005. This Act introduced or expanded tax breaks to accelerate market penetration of advanced, clean-energy technologies, provided loan guarantees for a variety of early commercial projects that use advanced technologies that avoid, reduce or sequester anthropogenic GHG emissions, and offered standby default coverage for certain regulatory and litigation delays for the first six new nuclear power plants to be constructed. To reduce emissions in the longer term, the Energy Policy Act of 2005 authorised the Climate Change Technology Program (CCTP). This is a multi-agency planning and coordinating entity whose purpose is to accelerate the development and deployment of technologies that can reduce, avoid, or capture and store greenhouse gas emissions. CCTP conducts analysis, provides strategic direction, and makes recommendations for strengthening the Federal portfolio of investments in related R&D.

While public spending on energy-related RD&D did increase, both the increase and the level attained were modest, especially compared with the period following the first two oil-price shocks (Figure 3.12); spending on nuclear and renewable sources, in particular, is now far lower than at that time. This increase and the level attained are comparable to those in other IEA member countries. The United States focuses much more of its public spending on energy-related RD&D on conventional energy sources (energy efficiency, fossil fuels, other power and storage technologies, and other technologies or research) than other IEA member countries, and much less on nuclear RD&D. While no comprehensive data exist on private sector RD&D, available evidence suggests that its share in overall private RD&D spending is low compared with other sectors and has been decreasing over the past two decades (OECD, 2009). Disaggregated sectoral analysis (Alic *et al.*, 2003) suggests that R&D spending in power generation as a share of total turnover is much lower than in manufacturing.

None of these policy instruments is cost effective as a substitute for emissions pricing. They do not internalise the costs that GHG emissions impose on others. Accordingly, there is no reason for abatement to be the least costly. Moreover, the absence of pricing weakens incentives for induced technical change to reduce emissions. Rather, such policies have the potential to work best as complements to emissions pricing. For example, voluntary

Figure 3.12. **Public spending on energy-related RD&D has increased in recent years but remains low**



1. Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom.

Source: International Energy Agency, *RD&D Budget* – Edition 2009; OECD, *OECD Economic Outlook database 87* (May 2010).

StatLink http://dx.doi.org/10.1787/888932325900

agreement (VA) programmes can contribute to information gathering and diffusion of best practice. Similarly, support for RD&D to reduce emissions complements emissions pricing by addressing other market failures, such as the inability of investors in innovation to appropriate all social returns from these investments owing to the public-good nature of knowledge. Another problem with proposing support for RD&D as a substitute for the pricing of GHG emissions is that this pushes back the timing for achieving emission reductions. Yet timing is important because irreversible environmental damage could occur before the hoped-for emission-reducing technologies materialise. Moreover, as noted above, even much higher levels of support for RD&D in the absence of pricing of GHG emissions could not stabilise GHG atmospheric concentrations.

The Energy Policy Act of 2005 also mandated an increase in the bio-fuel content of gasoline sold in the United States – to 4 billion gallons in 2006, 6.1 billion gallons by 2009, and 7.5 billion gallons by 2012. This programme has been a particularly costly way of reducing GHG emissions. Abstracting from indirect land use effects (ILUE), corn-based ethanol, which is a first generation bio-fuel and the dominant one in the United States, is estimated to reduce GHG emissions by 20-30% (Wang, 2009); another widely quoted study, however, puts the reduction at only 13% (Farrell, 2006). Assuming that the reduction in GHG emissions is 10-20%, the OECD (2008b) estimates abatement costs of at least USD 1 000 per tonne of CO_2, making this a very expensive way of reducing GHG emissions; by way of comparison, emission permit prices in the European Trading Scheme have generally been less than EUR 20 per tonne of CO_2-equivalent. This programme has also taken land out of production of food for (direct or indirect) human

consumption, pushing up food prices slightly, and increased the cyclical volatility of global food prices because subsidies for corn-based bio-fuels are positively related to oil prices, which are positively correlated with the global business cycle.

The Renewable Fuels Standard (RFS) was substantially revised in the Energy Independence and Security Act of 2007 (EISA) to give increased weight to bio-fuels that are more effective in reducing GHG emissions, allowing for direct emissions and significant indirect emissions such as from indirect land use changes. EISA established new renewable fuel categories, setting mandatory life-cycle-GHG-emissions thresholds for them in relation to average petroleum fuels used in 2005. It grandfathered existing corn-ethanol plants but requires a 20% reduction in life-cycle GHG emissions for any renewable fuel produced at facilities for which construction started after 19 December, 2007, a 50% reduction for a renewable fuel to be classified as biomass-based diesel or advanced bio-fuel, and a 60% reduction for a fuel to be classified as cellulosic bio-fuel. EISA requires a gradual increase in the use of bio-fuels by American fuel producers from 9 billion gallons in 2008 to 36 billion by 2022 and requires them to use an increasing proportion of advanced bio-fuels – they are required to rise from nothing in 2008 to 21 billion gallons (16 billion gallons of which must be cellulosic bio-fuel) by 2022.[4] The Act also created a USD 1.04 per gallon subsidy for cellulosic bio-fuel and reduced the ethanol subsidy from USD 0.51 to USD 0.45 per gallon. The requirement in EISA to take account of ILUE when setting the revised renewable fuel standard (RFS2) is a major improvement on the original RFS that should not be sacrificed, as would occur were the provision in the American Clean Energy and Security Act of 2009 (ACES, see below) prohibiting the EPA from taking this factor into account to be retained in final climate-change legislation. This provision was not included in the American Power Act (Kerry-Lieberman) subsequently submitted to the Senate, but not voted on owing to insufficient support in the Senate.

To implement RFS2, the EPA has had to estimate the life-cycle GHG emissions effects of bio-fuels, allowing for significant ILUE. Based on its modelling, peer-review comments and new studies and public comments, the EPA issued its final ruling on RFS2 in February 2010 (Table 3.1). Taking a 30-year time horizon and a zero per cent discount rate, the EPA concluded that corn-based ethanol produced under certain conditions (notably, not using a coal-fired dry mill plant) just met RFS2. Sugarcane ethanol and cellulosic ethanol are much more effective, qualifying as advanced bio-fuels under the ruling.

The EPA's analysis thus supports earlier evidence that sugarcane-based ethanol has much lower GHG emissions abatement costs than corn-based ethanol, even when the latter is produced under conditions that minimise GHG emissions (using natural gas instead of coal to power dry mill plants). However, agriculture and trade policies discourage the use of sugarcane-based ethanol, which would be imported from Brazil, by setting high import tariffs on sugarcane-based ethanol. Abatement costs could be reduced by eliminating subsidies for bio-fuels with lower life-cycle GHG emissions reductions than sugarcane-based ethanol – *i.e.*, corn-based ethanol and butanol, including from plants currently grandfathered – and by abolishing the import tariffs on sugarcane-based ethanol. These measures could also be used to help to negotiate lower barriers in Brazil against imports of technologies to reduce GHG-emissions. Removing the barriers to sugarcane-based ethanol could also make it easier to meet the advanced bio-fuels requirements in EISA as there are still considerable technical barriers to overcome before commercialisation of other such fuels. Even so, the blend wall – current federal regulations stipulate that gasoline should not contain more than the current 10% ethanol-fuel blend

Table 3.1. **Sugarcane ethanol and cellulosic ethanol are more effective for reducing GHG emissions than corn ethanol**

Life cycle Year 2022 GHG emissions reduction results for RFS2 final rule (includes direct and indirect land use change effects and a 30 year payback period at a 0% discount rate)

Renewable fuel pathway (for US consumption)	Mean GHG emission reduction[1]	GHG emission reduction 95% confidence interval[2]	Assumptions/comments
Corn ethanol	21%	7-32%	New or expanded natural gas fired dry mill plant, producing 37% wet and 63% dry Distiller's Grains and Soluables (DGS), and employing corn oil fractionation technology
Corn butanol	31%	20-40%	
Sugarcane ethanol[3]	61%	52-71%	Ethanol is produced and dehydrated in Brazil prior to being imported into the U.S. and the residue is not collected. GHG emissions from ocean tankers hauling ethanol from Brazil to the U.S. are included.
Cellulosic ethanol from switchgrass	110%	102-117%	Ethanol produced using the biochemical process.
Cellulosic ethanol from corn stover	129%	No ILUE	Ethanol produced using the biochemical process. Ethanol produced from agricultural residues does not have any international land use emissions.
Biodiesel from soybean	57%	22-85%	Plant using natural gas.
Waste grease biodiesel	86%	No ILUE	Waste grease feedstock does not have any agricultural or land use emissions.

1. Per cent reduction in lifecycle GHG emissions compared to the average lifecycle GHG for gasoline or diesel sold or distributed as transportation fuel in 2005.
2. Confidence range accounts for uncertainty in the types of land use change assumptions and the magnitude of resulting GHG emissions.
3. A new Brazil module was developed to model the impact of increased production of Brazilian sugarcane ethanol for use in the US market and the international impacts of Brazilian sugarcane ethanol production. The Brazil module also accounts for the domestic competition between crop and pasture land uses, and allows for livestock intensification (heads of cattle per unit area of land).

Source: US Environmental Protection Agency (EPA, 2010a), Tables 2.6.1 to 2.6.12.

because higher concentrations could damage engines – is a major technical barrier to meeting RFS2. It has been suggested that raising the permissible blend to 15% (E15) could ease this constraint. However, it is debatable whether recent vehicles as a group can use E15, older vehicles (pre-2001) cannot do so, and use of intermediate blends in gasoline-powered non-road engines can create serious safety issues. Moreover, using E15 in motors not adapted for this fuel may damage emissions-control equipment. The blend wall is particularly problematic for the development of cellulosic ethanol envisaged in EISA because any incremental additions to the already saturated ethanol market would have to be absorbed by Flexible-Fuel-Vehicles (FFVs) that receive E85 through a new, parallel fuel distribution infrastructure. In view of these problems, it would be preferable to replace the bio-fuels mandate with the pricing GHG emissions, which would be a more cost-effective means of reducing them. Were the various actors presented with prices that internalized the external impacts of GHG emissions, it is quite possible that altogether different approaches (such as electric or hybrid-electric vehicles) would displace crop-derived liquid fuels. Moreover, proper pricing could help reveal whether bio-fuels truly are less carbon intensive than conventional fuels (corn, in particular, requires a great deal of energy to grow, harvest and process even before it appears at a bio-refinery).

Some states are introducing measures to reduce GHG emissions

In the face of weak measures at the national level to reduce GHG emissions, a number of states have set emission-reduction targets and have introduced or plan to introduce emissions trading schemes to achieve these targets cost-effectively (Table 3.2). The only

Table 3.2. **A number of state/regional or voluntary GHG emissions trading schemes are getting underway**

United States			
Regional GHG initiative (RGGI), covering ten North-eastern and Mid-Atlantic states	In place	2009	CO_2 emissions from the power sector have to be reduced by 10% by 2018. The majority of allowances are auctioned. Offsets can be used but are limited to a number of projects within states participating in the scheme and outside the capped electric power generation sector.
Voluntary Chicago Climate Exchange (CCX)	In place	2003	CCX is a voluntary cap and trade system, CCX emitting members make a voluntary but legally-binding commitment to meet annual GHG emission reduction targets. Those who reduce below the targets have surplus allowances to sell or bank; those who emit above the targets comply by purchasing a CCX carbon financial instrument. In Phase I (2003-06), members committed to reduce emissions by at least 1% a year, for a total reduction of 4% below the baseline. In Phase II (2007-10), CCX members commit to a reduction schedule that requires 2010 emission reductions to be at least 6% below the baseline.
California	Planned	2010	The Global Warming Solutions Act signed in 2006 caps GHG emissions at 1990 levels by 2020. Against this background, California has released plans for the introduction of an emissions trading scheme in 2010 and is working closely with other states and provinces in the Western Climate Initiative (WCI) to design a regional cap-and-trade programme (see below). Regulations to implement the cap-and-trade system would need to be developed by the beginning of 2011.
Western Climate Initiative (WCI)[1]	Planned	2010-20 depending on state	The target is to lower GHG emissions by 15% from 2005 levels by 2020. When fully implemented in 2015, the programme is expected to cover nearly 90% of the GHG emissions in WCI states and provinces. Each member state/province has the flexibility to decide how best to allocate allowances. At least 10% of allowances at the start of the programme, increasing to at least 25% by 2020, will have to be auctioned. Offsets can be used under certain conditions.
Midwestern Regional GHG Reduction Accord[2]	Planned		The target and design of this ETS has yet to be decided. However, the Advisory Group recommends a 20% emission cut by 2020 relative to 2005 levels, and a 80% cut by 2050.

1. The Western Climate Initiative includes seven US states and four Canadian provinces: Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington; and British Columbia, Manitoba, Ontario, and Quebec.
2. The accord involves 9 Midwestern governors and 2 Canadian premiers, who have signed on to participate or observe in the *Midwestern Greenhouse Gas Reduction Accord*.

Source: OECD (2009, Table 7.2).

such scheme already in place is the Regional GHG Initiative (RGGI), which covers 10 North-eastern and mid-Atlantic states (Box 3.2). Other major regional schemes are scheduled to begin in 2010. There is also a voluntary emissions trading scheme (the Chicago Climate Exchange, CCX) which operates at a national level. CCX emitting members make voluntary but legally-binding commitments to meet annual emission-reduction targets, which are modest. A major aim of the scheme, in common with the RGGI, is to build experience with GHG emissions trading schemes. In the event that a national emissions trading scheme is created (see below), it could pre-empt regional systems, although no decisions in this regard have yet been taken. It could also provide some allowances or other "carrots" for early action, giving states incentives to move forward with their ETS in the meantime.

Box 3.2. **Regional Greenhouse Gas Initiative (RGGI)**

The RGGI, which got underway in 2009, is a cap-and-trade scheme covering the electricity sector in 10 North-eastern and mid-Atlantic states.* This scheme sets caps that stabilize electricity sector GHG emissions at their 2009 level over the first compliance period (2009-14) and reduces them by 10% over the second period (2015-18). Ninety per cent of RGGI emission permits are auctioned and 70% of the auction proceeds are invested in promoting energy efficiency, including by supporting R&D. The RGGI has not had a great effect on emissions to date because emissions have turned out to be much lower than anticipated when the cap was set; concomitantly, emission-permit prices have collapsed to just above the price floor (banking between compliance periods is permitted). The sharp drop in emissions occurred because of mild weather, a large switch out of oil-based electricity since 2005, and the severe recession. The cap will need to be adjusted down for the next compliance period to allow for the lower than anticipated BAU level of emissions.

* The 10 participating states are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

Permits from the regional systems could be converted into national permits at the average market price for regional permits in the year of their vintage.

States have taken a variety of other actions to reduce GHG emissions (United States Department of State, 2010, Table 4-2). In some cases, the efficiency of these measures is undermined by the lack of co-ordination between states. An important example in this regard is renewable (energy) portfolio standards (RPS) (IEA, 2008). Twenty-five states and the District of Columbia have established such standards using different design principles and goals. The lack of consistency between these standards increases the cost of meeting renewable energy standards by limiting cross-border trade in such energy. These problems could be overcome by the federal government establishing a federal electricity RPS covering those parts of the country in which cross-border trade in electricity is feasible, as is proposed in ACES (see below), although the efficiency of such an instrument would depend on its interaction with a national carbon pricing instrument.

State and local government land-use regulations need to integrate housing development and public-transport infrastructure decisions

Another government policy weakness from the point of view of combating climate change is that local and state land-use regulations often do not integrate housing development and transport infrastructure decisions. The result is that the United States has many urban areas that are not adapted for public transport. For this to change in the long term, land-use regulations should integrate housing development and public transport availability. This could result, for example, in more housing redevelopment in already built-up areas, which are often better suited to public transport than the alternative green-field sites. In making this change, policymakers could learn from the experiences of Germany and the Netherlands, which have successfully implemented such policies.

The current Administration's preferred climate-change policy would yield large cost-effective reductions in emissions if implemented

The Administration is endeavouring to establish a comprehensive climate-change policy

The current Administration is endeavouring to establish a comprehensive climate-change policy, the main planks of which are pricing GHG emissions and supporting the development and deployment of innovative technologies to reduce GHG emissions. As discussed above and emphasized in OECD (2009), this is the right approach to deliver cost-effective abatement. Pricing emissions provides incentives to reduce emissions at least cost. It also provides incentives to invest in RD&D to develop and deploy clean technologies, although public support for RD&D and deployment is still needed to bring them up to socially optimal levels owing to a number of market failures (knowledge spillovers, political uncertainty, market-size effects, and learning-by-doing effects). Public support for the development and deployment of such technologies has been increased, and further increases are planned. And the Administration has proposed pricing GHG emissions through a cap-and-trade scheme that would reduce emissions in line with the conditional commitments made at Copenhagen and would reduce emissions from covered emissions sources (82.5% of the total by 2016) by 83% from the 2005 level by 2050. To prepare the ground for such a scheme (or regulation of GHG emissions if a cap-and-trade scheme is not implemented – see below), the United States will begin collecting data in 2010 on greenhouse gases from large emitters. The federal government's technology strategy to reduce GHG emissions, which is supported by these policy instruments, is summarised in Box 3.3.

Box 3.3. **The federal government's technology strategy to reduce GHG emissions**

Key technology elements	Supporting policies
• Coal	• Financial incentives
– De-carbonize the grid	– Value avoided GHG emissions
– Nuclear power	– Technology investment incentives
– Low-emission coal power	– Loan guarantees to address risk
– Renewable power	– Fuel mandates
• Cars	– Codes, standards, labelling
– Transform vehicles to new fuels	– Transparent means for measuring progress
– Hybrid and electric vehicles	**R&D strategy**
– Alt. fuel vehicles and bio-based fuels	• Mobilize US Research Enterprise, incl. private
– Alternatives, including other modes	• Boldly innovate with new research approaches
• Efficiency (all sectors)	• US Climate Change Technology Program
• Other GHGs	– Strengthen federal R&D portfolio
• Enablers	– Prioritize investments
– CO_2 capture and storage	• Expand R&D co-operation and collaboration
– Modernized grid	– Include non-federal entities
– Energy storage	– Encourage international co-operation
Large scale, utility-scale	• Seek sustained increases in R&D investment
Small scale, vehicle-scale	
– Strategic and exploratory research	

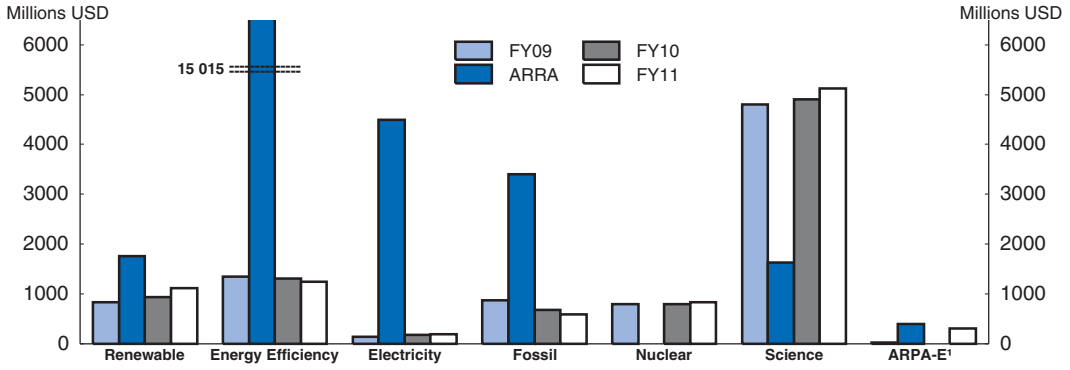
Source: Marlay (2010).

Public support for RD&D and deployment of technologies to reduce emissions is rising

The Administration gave a substantial boost to public funding for Research, Development and Deployment (RD&D, which includes expenditure to speed the spread of a given technology (deployment), in addition to traditional R&D, which is focused on creating new technologies) to reduce GHG emissions through the American Reinvestment and Recovery Act of 2009 (ARRA), which boosted such funding by about USD 26.7 billion according to US Department of Energy (DOE) estimates (Marlay, 2010) (Figure 3.13). Almost one half of this total was allocated to measures to increase energy efficiency, such as subsidies for improving building insulation. ARRA included USD 400 million of funding for the DOE's Advanced Research Projects Agency – Energy (ARPA-E), which promotes and funds research and development of advanced energy technologies that might not otherwise occur because of a high risk of failure. Such funding could also help to overcome underfunding of such R&D caused by the risk of high innovation rents from breakthrough technologies being expropriated, as discussed above. There was also a considerable boost to funding to improve the electric grid so that it is better adapted to receiving and managing renewable energy and an additional USD 6.0 billion of loan guarantees offered through the Innovative Technology Loan Guarantee Program. The Department of Energy is aiming to have committed all of these ARRA funds by the end of FY 2010 and to have spent 35-40% of the total by then.

Figure 3.13. **The Department of Energy's (DOE's) innovation budget ("science") is steadily rising**

DOE Energy RD&D by Program Office (Total $9.4 B)



1. Advanced Research Projects Agency-Energy.

Source: Marlay (2010).

StatLink http://dx.doi.org/10.1787/888932325919

The DOE's innovation budget ("Science" in Figure 3.14) has increased steadily in recent years, to USD 5.1 billion in the FY 2011 budget request. The largest budget allocations in this category, which represents about one half of DOE's RD&D budget, are for basic energy sciences, high energy physics, and biological and environmental research. The government plans to double investment in basic research over the next five years. The main categories in the remainder of the DOE's energy RD&D budget are for energy efficiency, renewable energy, nuclear energy, and fossil energy (advanced coal-fuelled-systems, and CCS). To further deployment, the DOE has requested funding authority to support loan guarantees of USD 36 billion for new nuclear power plants and USD 4.4 billion for renewable energy and electricity transmission. These guarantees are intended to enhance access to finance

for these projects as they may otherwise have difficulty being financed owing to their high risk, high capital intensity, and high degree of sunk costs (which reduces the collateral value of such assets). The Administration has also proposed in the FY 2011 Budget to eliminate most fossil-fuel subsidies by ending tax credits worth USD 39 billion over the next decade, in line with the agreement among G20 countries in September 2009 to phase out such subsidies.

While the actual and planned increases in public support for RD&D and deployment of technologies to reduce GHG emissions are laudable, still larger increases are likely to be required to have a good chance of developing breakthrough technologies that greatly reduce abatement costs (see above). To avoid an inadequate supply of scientists being a constraint on such a large expansion in both public- and private-energy RD&D – there is evidence that R&D subsidies can drive up wages of scientists enough to prevent significant increases in R&D (Goolsbee, 1998) – it will probably be necessary also to substantially increase investments in training scientists.

As noted above, the United States cooperates with other members of the Major Economies Forum on Energy and Climate to promote innovation, deployment and information sharing in low GHG-emissions technologies. Action plans have been developed in the technologies considered to be the most important for reducing emissions. The United States is leading the action plans on energy efficiency in the buildings sector and industrial sector energy efficiency.[5]

Energy-efficiency regulations are contributing to cost-effective abatement

Regulation can also be a cost-effective approach to reducing emissions where information and other barriers prevent market-based instruments from working efficiently. For example, the Administration has been proactive in establishing minimum energy efficiency standards for motor vehicles and a wide variety of consumer products and commercial equipment. In the case of motor vehicles, the Corporate Average Fuel Economy (CAFE) regulation issued in 2001, which stipulated an increase in new vehicle fuel economy standards to be achieved by 2007, was one of the programmes estimated to have made the greatest contribution to abatement over recent years (United States Department of State, 2007). The EPA and the Department of Transport (DOT) recently issued new joint regulations to reduce GHG emissions and increase fuel economy of new passenger cars and light trucks sold in model years 2012 through 2016. The EPA projects that CO_2 emissions per mile of the average new light-duty vehicle will be 23% lower by 2016 than in 2011 and that fuel savings associated with the more efficient GHG technologies will far outweigh the higher initial vehicle costs (by 2020, fuel savings (at pre-tax fuel prices) amount to 35.7 billion USD, compared with vehicle compliance costs (excluding fuel savings) of 15.6 billion USD [US Environmental Protection Agency, 2010b]). These estimates do not, however, allow for the loss of consumer welfare from requiring consumers to purchase more fuel economy than they would absent the regulation. This loss is likely to be significant given that consumers are not already flocking to fuel efficient models for which extra technology costs are more than compensated by fuel savings (this phenomenon is sometimes referred to as the "Energy Paradox"). President Obama also issued an Executive Order in 2009 requiring federal agencies to set and meet strict GHG reduction targets by 2020. He also called for more aggressive efficiency standards for common household appliances and put in motion a programme to open the outer continental shelf to renewable energy production.

Legislation along the lines of the American Clean Energy and Security Act of 2009 (ACES) would provide a sound basis for achieving cost-effective abatement

The House of Representatives has passed legislation (the American Clean Energy and Security Act of 2009, ACES) that contains a cap-and-trade programme covering 85% of US emissions by 2016 that would deliver the GHG-emission reductions signalled in Copenhagen (17% below the 2005 level by 2020 and 83% below by 2050), and the Senate introduced a new climate bill (the American Power Act, sponsored by Senators Kerry and Lieberman) in May 2010 that is broadly similar, although it has not be passed owing to insufficient support in the Senate. Extensive analyses of ACES highlight a number of lessons that can inform legislators as they decide whether or not to support future climate-change legislation. The economic costs of reducing GHG emissions are modest when a comprehensive approach is adopted, the centrepiece of which is the pricing of GHG emissions. The CBO (2009) estimates that GDP would be 1.1% to 3.4% lower in 2050 than on a BAU basis were ACES to be passed (Table 3.3), which corresponds to a tiny reduction in annual GDP growth.[6] CBO (2009) also concludes that annual workforce turnover caused by comprehensive climate-change legislation would be small compared with what normally occurs because there are few workers in energy-intensive sectors and change occurs over a long period. Competiveness- and employment impacts in energy-intensive and/or trade-exposed sectors (which account for 10% of emissions and 0.5% of non-farm employment) are minimal if they are given output-based allocations of emission permits free of charge (*Inter-Agency Report*, 2009). Finally the border-tax-adjustment (BTA, import fees levied by countries that price GHG emissions on goods manufactured in countries that do not) provisions in the ACES legislation passed by the House of Representatives would be costly to the economy, administratively burdensome to implement, are unlikely to be successful at protecting domestic industries from competiveness impacts, and may not be the most effective means of addressing leakage (OECD, 2009). The Senate bill has much more flexible language on this front, although as noted above, there has not been enough support in the Senate to pass this bill.

Table 3.3. **The economic costs of reducing GHG emissions are modest when a comprehensive approach is adopted**

Projected changes in gross domestic product in selected years from the implementation of H.R. 2454

	Percentage change
2020	–0.2 to –0.7
2030	–0.4 to –1.1
2040	–0.7 to –2.0
2050	–1.1 to –3.4

Source: Congressional Budget Office (2009).

One aspect of achieving modest abatement costs is the availability of a large supply of international offsets (*i.e.,* emission reductions from foreign sources not subject to emission caps that can be used by a covered entity towards its emission permit requirements) provided that they are subject to strict oversight and are verifiable to ensure that they represent genuine reductions from business-as-usual (a concern with offsets is that they may be subject to fraud and double counting). For example, ACES permits a large supply of international offsets to enter the system each year (up to 1.5 $GtCO_2$-equivalent, discounted by 25% from 2017).[7] The US EPA (2010c) projects that covered entities would make

substantial use of them (accounting for 33% of cumulative abatement over 2012-50) but would not hit the usage constraint during the first half of the century. Consequently, permit prices would equal international offset prices (USD 14 per tonne of CO_2 eq. in 2012, rising to USD 70 in 2050 in 2005 prices) adjusted for the discount factor. In the absence of international offsets, however, permit prices would be up to 150% higher by 2050; on the other hand, simply delaying international offsets has a much more modest impact. This makes it important for the US government to support multilateral efforts towards strengthened emissions monitoring in developing countries and to develop sectoral or even country-based approaches to ensure that a large supply of genuine offsets is available if comprehensive climate-change legislation is passed. There would also be much to gain from working with foreign governments to harmonise national cap-and-trade programmes so that they can eventually be linked. All of these measures would help to ensure that abatement occurs where it is cheapest rather than where it is being paid for. In the presence of an adequate supply of international offsets, the bringing on-stream of Carbon Capture and Storage (CCS) electricity generation capacity and/or of more nuclear power is not a critical factor in containing abatement costs (the EPA estimates that permit prices would only be 15% higher than otherwise). However, in the absence of international offsets, these technologies make a large difference to abatement costs (permit prices would be 80 percentage points higher by 2050, bringing the total increase to 230% above the reference scenario). Regardless of whether or not there are international offsets, ACES would represent a relatively low-cost approach to reducing emissions.

Another issue for legislators to consider if they adopt a cap-and-trade scheme is the extent to which permits will be issued free of charge. The more permits that are given away, the less scope there is to use revenues from allowance auctions to reduce other taxes that distort economic activity more, increasing the overall economic costs of reducing GHG emissions. In view of the need for budget consolidation, it would be wise to keep the free allocation of permits to a minimum so that funds raised from permit auctions can be devoted to deficit reduction, once low-income households have been compensated and more funds made available for energy RD&D. Insofar as this reduces the need for increases in other taxes, which distort economic activity, this use of the funds raised reduces the excess burden of taxation (*i.e.,* the costs to economic efficiency of taxation) compared with what it otherwise would have been.

If climate change legislation is not passed, the EPA will progressively extend regulation to reduce emissions from motor vehicles to all other sectors. This would not be as cost-effective an approach to abatement and would be unlikely to be sufficient to enable the United States to achieve the emissions reduction targets communicated at Copenhagen. In this scenario, such regulation should be complemented by increases in gasoline and other fossil-fuel taxes.

Notes

1. The regional time profiles of local air pollution (LAP) substances in the BAU scenario follow OECD (2008a) for SO_2, NO_X, and NH_3, and Bollen *et al.* (2007) for $PM_{2.5}$.
2. The pathway set forth in pending legislation would entail a 30% reduction by 2025 and a 42% reduction by 2030, in line with the goal to reduce emissions by 83% by 2050.
3. This estimate comes from the WITCH-model, which incorporates a detailed representation of the energy sector into an inter-temporal growth model of the economy and, in contrast to most of the literature, does not assume that backstop technologies emerge without dedicated investments.

The way in which the impacts of R&D (and learning-by-doing) on the costs of these "backstop" technologies are incorporated into the model relies partly on past experience with solar, wind and nuclear power.

4. EISA's volume requirements are denominated in ethanol equivalent gallons (*i.e.*, indexed to the relatively low energy density of ethyl alcohol). As a gallon of diesel contains approximately twice the energy of a gallon of ethanol, the drop in diesel fuels currently projected to satisfy the bulk of the cellulosic fuel requirements is a far smaller number of gallons than the rise in the number of ethanol equivalent gallons.
5. The other action plans are: advanced vehicles (led by Canada); bio-energy (led by Brazil and Italy); carbon capture, use and storage (led by Australia and the United Kingdom); high-efficiency-low-emissions coal (led by India and Japan); marine energy (led by France); smart grids (led by Italy and Korea); solar energy (led by Germany and Spain); and wind energy (led by Germany, Spain, and Denmark).
6. By way of comparison, current environmental regulation in the United States is estimated to cost about 2-2½ per cent of GDP (Portney, 1998).
7. In other words, an international offset of 125 tonnes of CO_2-equivalent gives a covered entity an emission permit credit of 100 tonnes of CO_2-equivalent.

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