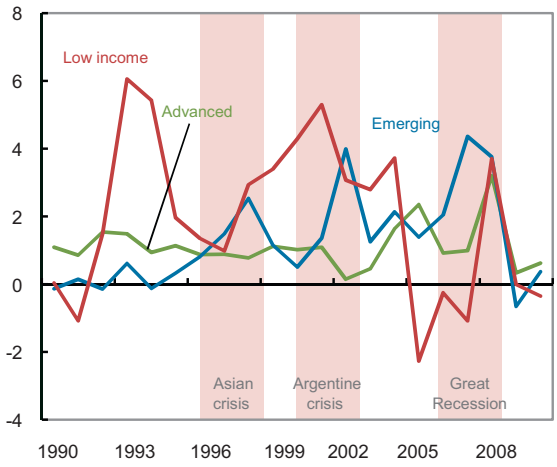
Appendix 4. Stock-Flow Adjustments and Their Determinants

Stock-flow adjustments are defined as the difference between the annual change in gross debt and the budget deficit.[1] Over the past three decades, on average, they have been positive in advanced, emerging, and low-income economies, with the latter exhibiting not only the largest stock-flow adjustments but also the greatest volatility in this residual entity (Figure A4.1, Table A4.1). Stock-flow adjustments arise for different reasons, including valuation effects through the impact of exchange rate changes on foreign-currency-denominated debt, time-of-recording effects (deficits are often measured in accrual terms while debt is a cash concept), and below-the-line operations such as privatization and transactions in financial assets. While some stock-flow adjustments are to be expected due to accounting issues, large and persistent stock-flow adjustments could be the result of inappropriate recording of budgetary operations and, if positive, could lead to ex post upward revisions of deficit levels (European Commission, 2003).

Figure A4.1

Stock-Flow Adjustments

(Percent of GDP)



Sources: Country authorities; and IMF staff estimates.
Note: Weighted averages (GDP at PPP) with moving weights.

In most countries, public debt stocks have increased more than their accumulated deficits over the past three decades. Out of the total sample of 34 advanced, 68 emerging, and 61 low-income economies, only 5 advanced, 11 emerging, and 22 low-income economies showed negative cumulative stock-flow adjustments between 1981 and 2010. This finding does not change

Table A4.1

Distribution of Stock-Flow Adjustments, 1980–2010

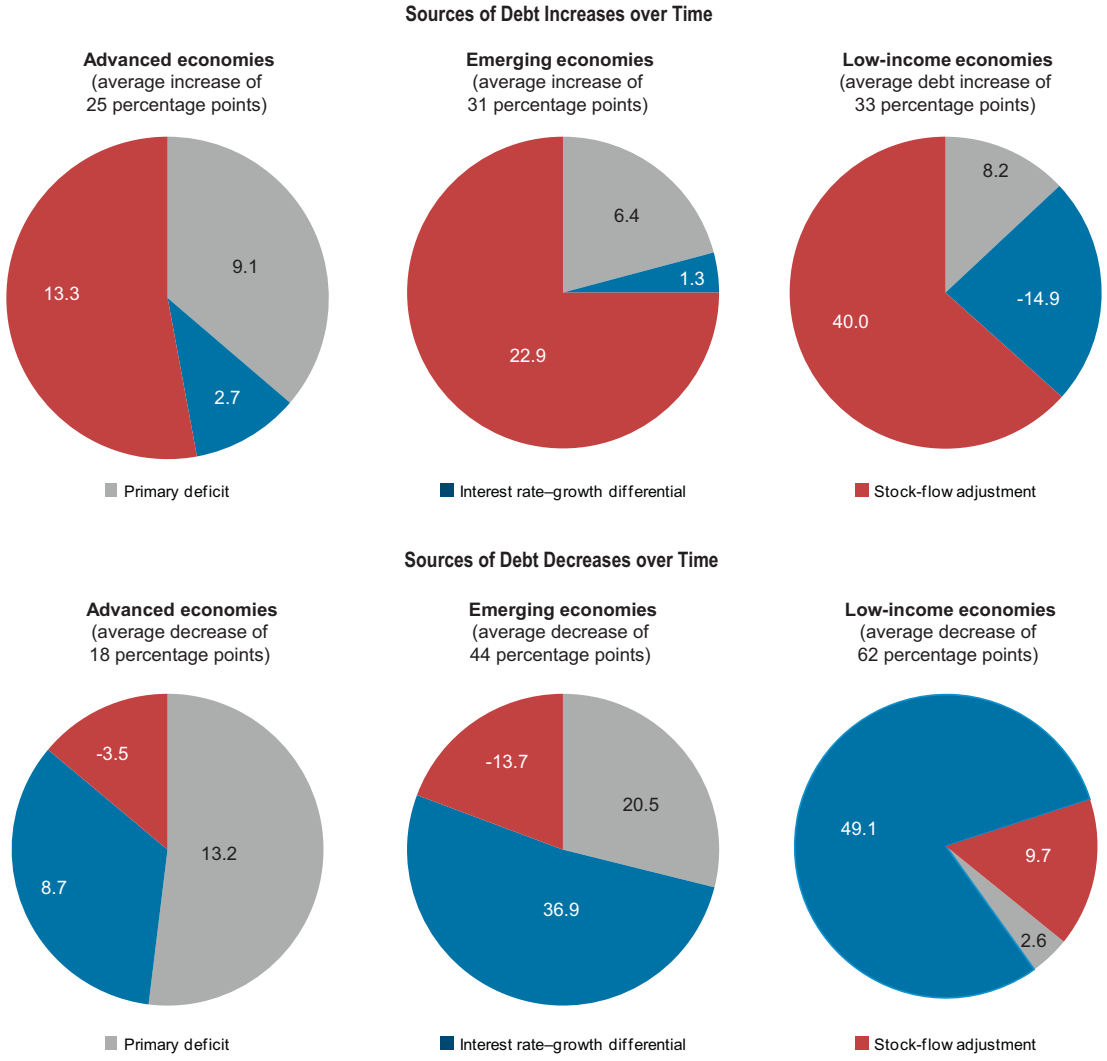
(Percent of GDP)

Country group	Sample	Mean	Standard deviation	Minimum	Maximum	Number of countries	Number of observations
All countries	All	2.8	11.4	–108.6	168.5	163	2,364
	Without outliers	2.6	6.5	–15.8	30.8	163	2,270
Advanced	All	2.3	4.9	–9.8	44.0	34	705
	Without outliers	2.0	3.6	–4.1	18.3	34	677
Emerging	All	2.9	9.1	–36.5	103.1	68	905
	Without outliers	2.5	5.7	–9.5	27.3	67	869
Low-Income	All	3.2	16.9	–108.6	168.5	61	754
	Without outliers	3.0	10.6	–32.5	42.9	61	724

Sources: Country authorities; and IMF staff estimates.
Note: Outliers are defined as the top and bottom 2 percentiles of the stock-flow adjustments.

[1] This appendix summarizes Weber (2011).

Figure A4.2
Decomposition of Large Episodes of Debt Changes
(Percent of GDP)



Sources: Country authorities; and IMF staff estimates.

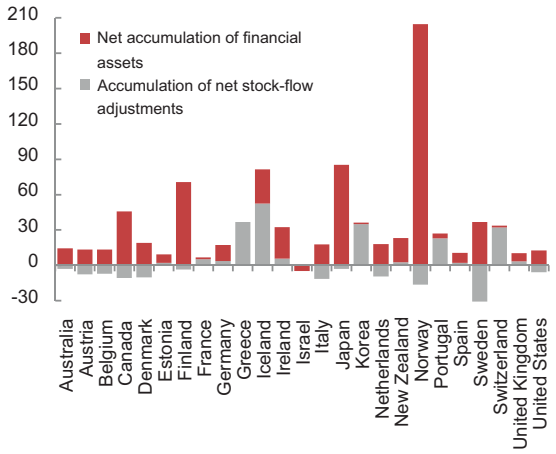
significantly when the sample concludes in 2007, with 5 advanced, 14 emerging, and 22 low-income economies not experiencing higher gross debt-to-GDP ratios than can be accounted for by their accumulated deficits and initial debt-to-GDP ratios. Thus, most countries had already experienced persistent positive stock-flow adjustments prior to the crisis period of 2008 to 2010, during which time sizable financial sector support occurred and a resurgence of accounting stratagems was observed (April 2011 *Fiscal Monitor*). For the low-income economies, the larger number of negative cumulative stock-flow adjustments compared to the advanced and emerging economies is mainly the result of debt relief and forgiveness.

How large a role have stock-flow adjustments played in explaining large changes in the public debt ratio? Major episodes of debt changes are defined as changes of more than 10 percentage points in the gross public debt-to-GDP ratios while allowing temporary reversals, following the methodology

Figure A4.3

Advanced Economies: Financial Assets Accumulation and Stock-Flow Adjustments

(Percentage of 2010 GDP)



Sources: Country authorities; and IMF staff calculations.

Note: *Accumulation of net stock-flow adjustments* measures the sum of net stock-flow adjustments between 1981 and 2010, as a percentage of 2010 GDP. Net stock-flow adjustments are defined as the difference between the change in the level of annual net debt minus the overall budget balance (in levels). *Net accumulation of financial assets* corresponds to the difference between cumulative gross stock-flow adjustments and net stock-flow adjustments.

outlined in Abbas and others (2011). Debt changes during these episodes can be decomposed into their determinants, namely, the primary deficit, the interest-growth differential, and the stock-flow adjustment.[2] Between 1980 and 2010, stock-flow adjustments were a significant source of debt increases, while they played only a minor role in explaining debt decreases (Figure A4.2). The average debt increase for country groups ranged from 25 percent of GDP in advanced economies to 33 percent of GDP in low-income economies, of which more than half was explained by stock-flow adjustments. While primary deficits accounted for a substantial amount of debt increases in advanced economies, their contribution was smaller in emerging and low-income economies. The average debt decrease ranges from 18 percentage points of GDP in advanced to 62 percentage points of GDP in low-income economies. While in advanced economies, primary surpluses were the main contributor to debt reductions, in emerging and low-income economies, the combination of rapid output growth and low interest rates accounted for most of the debt decreases.

What were the main determinants of stock-flow adjustments over the past three decades? One important difference between the overall deficit and gross debt is that the latter includes financial transactions. The difference between gross and net debt data provides a measure of the magnitude of these below-the-line transactions, since government assets are netted from liabilities when compiling net debt data.

Using net debt and deficits data, the accumulated stock-flow adjustments become smaller, but remain sizable for several large advanced and emerging economies, including some among the G-20. More generally, however, data on net debt for emerging and low-income economies are scarce.

For a majority of advanced economies for which data are available, financial assets account for a large proportion of stock-flow adjustments (Figure A4.3). Countries may accumulate financial assets to invest budget surpluses instead of paying back debt. However, in countries with numerical budget balance rules, which have often received more attention than debt rules, governments may have an incentive to shift expenditure below the line in order to avoid breaching the deficit limit. These transactions could take the form of capital injections into public companies, thereby reducing spending by having it undertaken by entities excluded from the fiscal accounts (April 2011 *Fiscal Monitor*; Von Hagen and Wolff, 2006). A large majority of transactions in financial assets in the advanced economies have been positive over the last three decades (Table A4.2). Excluding banking crises, about one-third of financial asset

[2] The interest rate–growth differential refers to the difference between interest rates, higher values of which raise the debt ratio by pushing up the overall deficit, and output growth rates, higher values of which reduce the debt-to-GDP ratio by raising the denominator. Thus the larger the interest rate–growth differential, the faster is the growth of the debt ratio.

Table A4.2

Advanced Economies: Transactions of Financial Assets, 1980–2010

(Percent of GDP)

	Mean	Number of countries	Number of observations
All transactions (accumulations and decumulations)	2.0	25	559
Accumulations	3.6	25	411
Accumulations excluding banking crises			
All	3.5	25	370
Surplus countries	6.8	7	97
Numeric budget balance rules and deficit	2.0	14	94

Sources: Country authorities; IMF Fiscal Affairs Department, Fiscal Rules Database; Fiscal Policy and Surveillance Division (2009); and IMF staff calculations.
Note: Surplus countries are Denmark, Estonia, Finland, Korea, Norway, New Zealand, and Sweden.

Table A4.3

Unbalanced Fixed-Effects Panel Regressions,1980–2010, with Stock-Flow Adjustments as the Dependent Variable

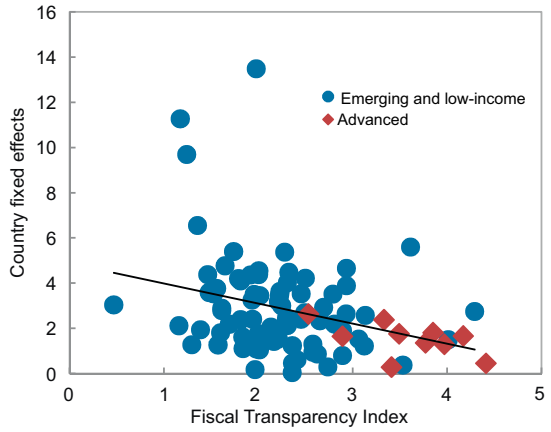
(Percent of GDP)

	Advanced	Emerging and low-income
Constant	–0.89	1.66
	(0.47)*	(0.38)***
Inflation	0.06	0.18
	(0.06)	(0.03)***
Valuation effect	0.00	0.75
	(0.00)	(0.06)***
Debt forgiveness or reduction		–0.46
		(0.06)***
Banking crises	5.33	3.92
	(0.70)***	(1.84)**
R^2 (within)	0.17	0.19
R^2 with country fixed effects	0.12	0.24
Number of observations	313	1,316
Number of countries	20	102

Sources: *World Economic Outlook*; World Bank Global Development Finance Database; OECD; *International Financial Statistics*; and IMF Financial Crisis Episodes Database (Laeven and Valencia, 2010).
Note: The definition of stock-flow adjustments follows from the basic debt accumulation equation: $\frac{Debt_t - Debt_{t-1}}{NGDP_t} = \frac{Deficit_t}{NGDP_t} + \frac{SF_t}{NGDP_t}$, where *Debt* denotes net debt for the advanced economies and gross debt for the emerging and low-income economies, *Deficit* denotes the overall budget deficit, *SF* denotes the stock-flow adjustment, and *NGDP* denotes nominal GDP. *Valuation effect* refers to the percentage change in the real effective exchange rate interacted with the public sector debt denominated in foreign currency (in percent of GDP); a positive change denotes exchange rate depreciation. *Debt forgiveness or reduction* refers to the total amount of debt that is forgiven or reduced. In the advanced economies, *Banking crises* denotes the total fiscal costs of a particular banking crisis spread equally over its duration. For emerging and low-income economies, for which detailed data on fiscal costs are not as widely available, *Banking crises* is a dummy variable that takes a value of 1 during a banking crisis. Robust standard errors in parentheses.
*significant at 10 percent level; **significant at 5 percent level; ***significant at 1 percent level.

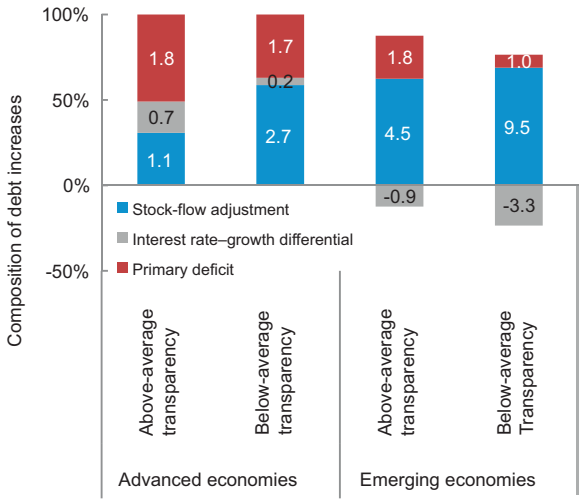
accumulations occurred in countries that were experiencing budget surpluses on average and had relatively small debt levels. About one-third of financial asset accumulations took place in countries with numeric budget balance rules that were experiencing deficits at the same time. Thus there

Figure A4.4
Fiscal Transparency and Fixed Effects



Source: IMF staff calculations.
Note: Higher values of the Fiscal Transparency Index denote greater fiscal transparency. Absolute values of fixed effects for each country from panel regressions where stock-flow adjustments are derived from gross debt.

Figure A4.5
Fiscal Transparency and Composition of Debt Increases, 1980–2010



Source: IMF staff calculations.
Note: *Debt* increases refer to any positive change in gross debt between 1980 and 2010. Data labels provide the mean of the components of debt increases for advanced, emerging, and low-income economies. *Above- (below-) average transparency* refers to groups of countries with Fiscal Transparency Index values above (below) the average of their peer groups (i.e., advanced or emerging economies). Higher values of the Fiscal Transparency Index denote greater fiscal transparency.

were a number of episodes during which countries may have had an incentive to revert to creative accounting practices.[3]

Econometric analysis also suggests that for the advanced economies over 1980–2010, in addition to the net accumulation of financial assets, fiscal costs arising from banking crises significantly contributed to stock-flow adjustments. In emerging and low-income economies, on the other hand, banking crises, valuation effects—primarily, changes in the domestic currency value of the public debt stock arising from exchange rate fluctuations—and debt forgiveness or reduction were the main determinants of stock-flow adjustments (Table A4.3). There are significant differences in the average stock-flow adjustments across countries that cannot be explained by the included variables in the above regressions but instead reflect country-specific characteristics ("country fixed effects" in regression analysis). Greater fiscal transparency—defined as openness toward the public at large about government structure and functions, fiscal policy intentions, public sector accounts and projections (IMF, 2007)—is associated with lower values of these country-specific characteristics (Figure A4.4). In general, fiscal transparency is higher in advanced economies than in emerging economies and low-income countries, and, correspondingly, country fixed effects in advanced economies are lower.[4] Moreover, within each group, countries with above-average fiscal transparency also have lower stock-flow residuals (Figure A4.5). The interpretation is that fiscal transparency allows better scrutiny of fiscal accounts and thus decreases the ability of governments to use accounting stratagems and low-quality statistical systems, thereby lowering stock-flow adjustments. However, causation could also run in the other direction, in that governments that are not subject to these political incentives and data limitations may be more willing to be fiscally transparent.

[3] See the April 2011 *Fiscal Monitor* for examples of accounting stratagems applied by some governments.

[4] For this analysis, an index of fiscal transparency is constructed, combining two sources: the fiscal transparency Report on Observance of Standards and Codes (see Hameed, 2005) and Dabla-Norris and others (2010).