

Global imbalances narrowed during the crisis, but a strong and balanced recovery requires that this narrowing be made more durable. Before the crisis, a number of economies experienced large and persistent current account imbalances (Figure 4.1). These imbalances shrank sharply in 2009, reflecting both cyclical and more lasting developments. In economies with large external deficits before the crisis, most notably the United States, private demand is likely to remain below the precrisis trend as households repair their balance sheets, and a strong recovery will require an increase in net exports. For surplus economies facing weaker demand from deficit economies, the challenge is to rebalance growth from external sources to domestic sources and to run smaller surpluses in the future. Together, these two adjustments could promote a strong and balanced global recovery.

Economies with large external surpluses may hesitate to adopt policies that help rebalance demand because of concerns that this could slow their economic growth. In particular, they may be concerned about declining competitiveness, shrinking output in the tradables sector, and a slowdown in productivity and output growth. But while there is a substantial literature that examines deficit reversals,<sup>1</sup> very little is known about the nature of past current account surplus reversals, including their implications for growth, especially when these reversals were policy driven.

This chapter examines the experiences of economies that ended large, sustained current account surpluses

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<sup>1</sup>The literature on deficit reversals includes Milesi-Ferretti and Razin (1998), Edwards (2004), Meissner and Taylor (2006), Adalet and Eichengreen (2007), Freund and Warnock (2007), and the September 2002 and April 2007 issues of the *World Economic Outlook* (WEO). Many of these studies were motivated by the recent U.S. experience with large and sustained current account deficits. A common lesson is that deficit reversals are typically associated with real exchange rate depreciation and a slowdown in output growth. As discussed in Chapter 1, global demand rebalancing also requires that economies with excessive deficits rebalance growth from domestic to external sources.

through policy actions such as exchange rate appreciation or macroeconomic stimulus. It subjects these historical episodes to statistical analysis and provides a narrative account of five specific transitions, examining economic performance and identifying key factors that explain various growth outcomes. To guide the analysis, the chapter focuses on the following questions:

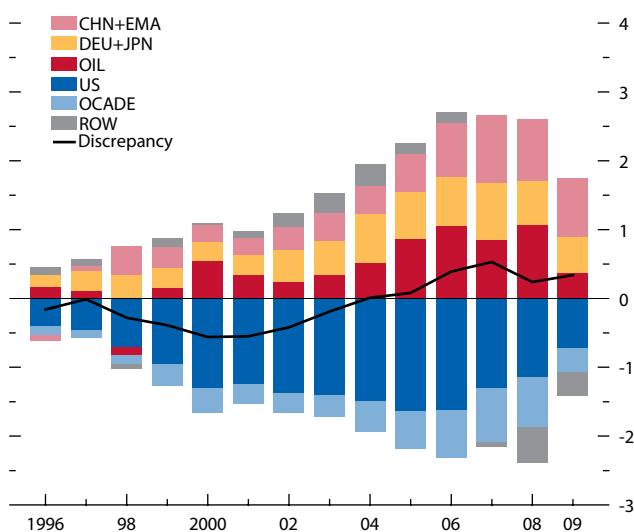
- What were the main pretransition features of economies that undertook reversals from large and sustained current account surpluses? What policy frameworks were in place?
- What policies were implemented during surplus reversals? What role did macroeconomic, exchange rate, and structural policies play?
- What were the implications of reversals for economic performance? In particular, was there a significant change in output growth?<sup>2</sup> Did a reversal typically feature an acceleration of domestic demand? What happened to employment and capital growth? What were the sectoral changes?
- What lessons can be drawn for economies considering a transition away from large current account surpluses in today's environment?

The following findings stand out. First, the current account surplus narrowed significantly in response to policy changes. Although exchange rate appreciation often played a role, other policies also facilitated the reversals, including macroeconomic policies that stimulated domestic demand and, in some cases, structural reforms. Second, policy-induced current account surplus reversals were not typically associated with lower growth. Real appreciation seems to have slowed growth, but other factors tended to offset this adverse effect. Specifically, demand frequently shifted from external to domestic sources, and rising

<sup>2</sup>This chapter focuses on the growth implications of reductions in the current account surplus; a separate literature focuses on the relationship between trade openness and growth (see, for instance, Acemoglu, 2009; Frankel and Romer, 1999; Feyrer, 2009; and the Commission on Growth and Development, 2008). Note that the narrowing of a current account surplus does not necessarily entail a reduction in trade openness.

**Figure 4.1. Global Imbalances<sup>1</sup>**  
(Current account balance in percent of world GDP)

Global imbalances narrowed sharply in 2009 owing to both cyclical and more lasting developments. Imbalances are projected to widen once again as the global recovery takes hold.



Source: IMF staff calculations.

<sup>1</sup>CHN+EMA: China, Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan Province of China, Thailand; DEU+JPN: Germany and Japan; OIL: Oil exporters; US: United States; OCADE: other current-account-deficit economies; ROW: rest of the world.

consumption and investment offset the fall in net exports. At the same time, supply rebalanced, with resources shifting from the tradables to the non-tradables sector. In some cases, real appreciation was followed by a shift in export composition toward higher-value-added goods—that is, by a move up the export quality ladder.<sup>3</sup> Third, total employment rose slightly during reversals, as gains in nontradables employment more than offset employment losses in the tradables sector. Finally, there were some policy mistakes made during the rebalancing phase. Specifically, in some cases macroeconomic policy stimulus undertaken to offset the contractionary impact of appreciation was excessive, resulting in overheating and asset price booms.

The chapter is structured as follows. The first section defines and identifies policy-induced surplus reversals based on data covering a broad range of economies over the past 50 years. The second section presents a statistical analysis of these episodes, with emphasis on the behavior of key variables, including savings, investment, and growth. In particular, this section uses regression analysis to identify the domestic and external factors that account for the wide variety of growth outcomes associated with surplus reversals. Given the difficulty of quantifying some important policy variables, such as structural reforms and discretionary fiscal and monetary policy responses, the third section applies a narrative approach to five selected case studies considered relevant to what is happening in surplus economies today, which complements the statistical analysis.

## Surplus Reversals: Definition and Anatomy

This section defines a policy-induced surplus reversal. It also reports how the current account typically adjusts during these episodes and how much the exchange rate tends to change.

### Identifying Policy-Induced Surplus Reversals

To identify episodes that might offer lessons for economies considering a surplus reversal in

<sup>3</sup>Although an upgrade in quality could strengthen an economy's export competitiveness following real appreciation, it would not prevent imports from increasing and the trade surplus from falling.

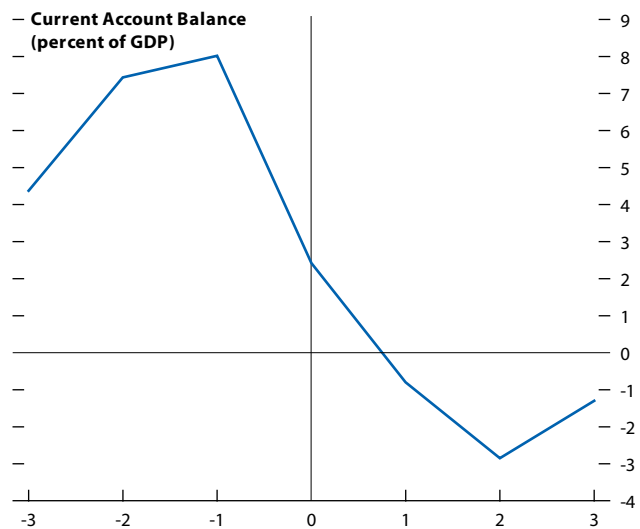
today’s environment, the chapter follows a two-step approach. First, it uses statistical criteria to identify large and persistent reductions in the current account surplus during the past 50 years.<sup>4</sup> Second, based on this initial list of large reversals, it selects those that were policy driven, that is, those associated with a large and deliberate exchange rate appreciation or with macroeconomic stimulus.

A surplus reversal is defined as a sustained and significant decline in the current account balance from a period of large and persistent surpluses. Figure 4.2 illustrates the basis for this definition using the example of Korea’s 1989 reversal. To make the definition operational, the chapter utilizes a methodology that mirrors those used to examine deficit reversals by Milesi-Ferretti and Razin (1998) and Freund and Warnock (2007). In particular, a surplus reversal has to satisfy three key requirements:

- A period of large and persistent current account surpluses preceding the reversal: In the three years before the reversal, the current account surplus must average at least 2 percent of GDP.<sup>5</sup> To ensure that this average is not influenced by outliers, the surplus must exceed 2 percent of GDP in at least two of the three years preceding the reversal.
- A substantial narrowing in the surpluses following reversals: The average current account surplus in the three years starting with the reversal year must be at least 2 percentage points of GDP less than the average in the three years before the reversal.
- A sustained narrowing in the surpluses: To ensure that the reversal is sustained and not a sharp but temporary change in the current account, the maximum surplus in the three years following the reversal must be smaller than the minimum

**Figure 4.2. Methodology Example (Korea 1989)**  
(Year of surplus reversal at  $t = 0$ ; years on x-axis)

A surplus reversal is a sustained and significant decline (2 percentage points of GDP or more) in the current account balance from a period of large and persistent surpluses.



Source: IMF staff calculations.

<sup>4</sup>The economies and data sources utilized in the analysis are listed in Appendix 4.1.

<sup>5</sup>Note that 2 percent is the median of all current account surpluses, for both advanced and emerging market economies.

surplus recorded in the three years preceding the reversal.<sup>6</sup>

Although these requirements allow reversals to occur in consecutive years, such multiple episodes are unlikely to be independent events. To eliminate such episodes, reversals occurring within 10 years of each other are excluded from the sample.

When is a surplus reversal policy driven? In principle, many policies could induce a surplus reversal, including exchange rate policy, fiscal and monetary policies, and structural policies. Deliberate changes in structural policies are difficult to measure, and so the statistical analysis in this chapter focuses on policy-induced exchange rate appreciation and macroeconomic policy stimulus, although structural policies are analyzed in relatively greater depth in the case studies. A policy-induced exchange rate appreciation is defined here as an appreciation of at least 10 percent (trough to peak) in nominal effective terms within three years of the surplus reversal.<sup>7</sup> For economies with a pegged or heavily managed exchange rate, it is assumed that such large appreciations reflect a policy choice. For economies with floating exchange rates, it was verified that the appreciation was policy induced by consulting the narrative record in IMF staff reports. For macroeconomic policies, the analysis focuses on cases in which fiscal or monetary stimulus is explicitly discussed in IMF staff reports within three years of the reversal.

The application of this two-step approach to a broad sample of advanced and emerging market economies during the past 50 years yields 28 policy-induced surplus reversals.<sup>8</sup> Such surplus reversals

were infrequent, with less than one per economy on average. In contrast, using a similar statistical approach identified twice as many deficit reversals during the same period. This may be because deficit reversals are often unavoidable, reflecting large macroeconomic and financial imbalances, whereas surplus reversals can take place from a position of strength following a policy decision.<sup>9</sup> (See Table 4.8 for a full list of surplus reversals.)

### Anatomy of Policy-Driven Surplus Reversals

This section decomposes the current account adjustment and examines the behavior of the real exchange rate during policy-driven surplus reversals. All variable changes are measured over three years, starting with the year of the reversal, and compared with the three years before the reversal. The analysis of these 28 episodes yields the following stylized facts:

- The current account narrowed sharply during a policy-driven reversal. On average, the surplus narrowed by 5.1 percentage points of GDP, well above the minimum required adjustment of 2 percentage points (Table 4.1). After the reversal, the current account balance was relatively small (0.4 percent of GDP on average) and not statistically different from zero.
- The process of current account adjustment was typically accompanied by both a significant reduction in savings and a sharp increase in investment. On average, domestic savings fell by 2.1 percentage points of GDP. The drop in private savings during the reversal was even larger (3.3 percentage points of GDP).<sup>10</sup> Investment

<sup>6</sup>Several robustness checks were performed. First, the calculations were repeated with the prereversal period starting six years before the event, rather than three years. Second, a more stringent requirement was applied to the postreversal current account balance, with the postreversal period extended six years, rather than three years. In both cases, the results were broadly consistent with those reported here.

<sup>7</sup>The trough-to-peak appreciation calculation is based on monthly data for the nominal effective exchange rate.

<sup>8</sup>In particular, the sample is restricted to 46 advanced and emerging market economies during 1960–2008. Small economies, defined here as those with populations below 1 million, are excluded from the sample. The sample also excludes the transition economies of central and eastern Europe and the former Soviet Union because their external positions were influenced by

the output collapse associated with the transition from central planning to a market economy. The analysis initially included surplus reversals in the fuel and nonfuel commodity-exporting economies, as defined in the standard WEO classification, and found that reversals in these economies were more often brought about by terms-of-trade shocks than by domestic policies. For this reason, these episodes were excluded from the analysis.

<sup>9</sup>Edwards (2004) reports that there are many more deficit economies than surplus ones. Moreover, he also finds that the probability of a deficit reversal is higher for economies with large deficits, high external debt, and rapid credit growth.

<sup>10</sup>The timing of the macroeconomic stimulus that drove a reversal differs from the one used to measure the changes in savings. In particular, the macroeconomic stimulus often started before the reversal.

**Table 4.1. Decomposition of Current Account Surplus Reversals**

Current Account/GDP	
Initial Current Account (level)	5.5***
Change in Current Account	-5.1***
New Current Account (level)	0.4
Savings and Investment	
Fall in Savings/GDP (percent of episodes)	74.1***
Change in Savings/GDP	-2.1***
Fall in Private Savings/GDP (percent of episodes)	91.7***
Change in Private Savings/GDP	-3.3***
Rise in Investment/GDP (percent of episodes)	77.8***
Change in Investment/GDP	3.0***
Imports and Exports	
Rise in Imports/GDP (percent of episodes)	77.8***
Change in Imports/GDP	4.2***
Fall in Exports/GDP (percent of episodes)	51.9***
Change in Exports/GDP	0.1

Source: IMF staff calculations.

Note: Table reports changes in variables measured as three-year average starting with year of current account surplus reversal minus three-year average growth before reversal. \*, \*\*, and \*\*\* denote statistical significance at the 1, 5, and 10 percent level, respectively.

rose during the vast majority of reversals, with an average increase of 3 percentage points of GDP.

- On average, imports increased and exports remained virtually unchanged. Imports rose in the vast majority of events by 4.2 percentage points of GDP on average, while exports as a percentage of GDP remained virtually unchanged.
- Surplus reversals were often associated with exchange rate appreciations. In most cases, the exchange rate initially appeared undervalued, according to a number of different measures,<sup>11</sup> and the extent of this undervaluation was reduced (Table 4.2). Moreover, in more than half the reversals, there was appreciation of both the nominal and the real effective exchange rates. In these cases, the nominal and real effective exchange rates appreciated by an average of 9.2 percent and 10.5 percent, respectively.<sup>12</sup> Notably,

<sup>11</sup>Two measures of undervaluation are used here: a model-based measure following Lee and others (2008) and the deviation of the real effective exchange rate from a Hodrick-Prescott-filtered trend. The control group of nonreversals consists of all observations in the sample that are at least two years removed from the start of a surplus reversal.

<sup>12</sup>The average change in the exchange rate—including cases of currency depreciation—was 2 percent in nominal effective terms and 3.1 percent in real effective terms. Note that the

**Table 4.2. Exchange Rate Developments during Current Account Surplus Reversals**

Variable	Surplus Reversals	Control Group
Reduced Model-Based Undervaluation (percent of episodes)	90.5***	29.6
Reduced Statistical Undervaluation (percent of episodes)	53.6	43.6
NEER Appreciation (percent of episodes)	60.7***	29.1
NEER Appreciation (change if positive)	9.2***	2.0
NEER Appreciation (change)	2.0***	-4.7
REER Appreciation (percent of episodes)	53.6	49.4
REER Appreciation (change if positive)	10.5***	3.3
REER Appreciation (change)	3.1***	-0.4
REER Overshooting (percent of episodes)	35.7	33.2
Real Appreciation against U.S. Dollar (percent of episodes)	59.3	54.3
Real Appreciation against U.S. Dollar (change if positive)	16.0***	6.0
Real Appreciation against U.S. Dollar (change)	4.3**	1.2
Increased Exchange Rate Regime Flexibility (percent of episodes)	7.7	12.6

Source: IMF staff calculations.

Note: Model-based measure of undervaluation is described in Lee and others (2008). Statistical measure of undervaluation is based on the deviation of the real exchange rate from its Hodrick-Prescott-filtered trend. NEER = nominal effective exchange rate. REER = real effective exchange rate. Exchange rate regime flexibility is based on Reinhart and Rogoff (2004) classification. Table reports changes in variables measured as three-year average starting with year of current account surplus reversal minus three-year average growth before reversal. \*, \*\*, and \*\*\* indicate that the difference relative to the control group is statistically significant at the 1, 5, and 10 percent level, respectively. The control group comprises all observations at least two years away from a reversal.

the appreciation tended to be larger the greater the estimated undervaluation prior to the transition. The small magnitude of the real appreciation relative to the observed current account adjustment suggests that factors or policies other than the exchange rate played a role in narrowing the current account; subsequent analysis will distinguish between episodes that featured real effective appreciation and those that did not. Finally, there was not much evidence of a significant shift toward more flexible exchange rate regimes.

analysis focuses on the average change in the exchange rate over three years after the start of the reversal relative to the previous three years. This measures more persistent shifts in exchange rates than the trough-to-peak appreciation used for the purposes of identifying policy-induced appreciations. According to the trough-to-peak measure, the appreciation of both the real and the nominal exchange rates averaged about 20 percent. In addition, the timing of the trough-to-peak exchange rate appreciation need not coincide exactly with the identified reversal year.

- Policymakers may be concerned that a current account surplus reversal might lead the exchange rate to overshoot, but there is no evidence that overshooting was more likely following reversals.<sup>13</sup> Overshooting occurred in about one-third of the cases in both the sample of reversals and the control group, and the overshooting was mild when it did occur. The fact that overshooting is less common during surplus reversals than during deficit reversals is likely because surplus economies can control the pace of appreciation by varying the rate of reserve purchases. In contrast, deficit economies frequently lack reserves to defend the currency during deficit reversals, which makes it more difficult to control the extent of depreciation.

### Are Policy-Driven Surplus Reversals Detrimental to Growth?

Having documented key stylized facts about surplus reversals, this section examines the growth implications of policy-driven surplus reversals, first by discussing growth performance and then by identifying which components drive the changes in economic growth. In addition, this section examines the extent of sectoral reallocation in these economies following a policy-driven reversal. Finally, it uses multivariate regression analysis to explore the factors that explain the variation in postreversal growth outcomes.

Whether growth will rise or fall following a surplus reversal depends on the underlying causes of the original surplus and the subsequent reversal as well as on the policy response. The following three scenarios illustrate how the source of the surplus reversal can influence the outcome for growth.

- A surplus reversal driven by a real exchange rate appreciation that eliminates or reduces undervaluation: A real exchange rate appreciation could reduce an economy's exports, increase its imports,

and slow the production of tradable goods.<sup>14</sup> Other things being equal, this would imply a slowdown in output growth. Some argue that these effects on growth could last longer if an undervalued currency had helped alleviate the negative growth effects of domestic distortions, such as weak institutions (Rodrik, 2008).<sup>15</sup>

- A surplus reversal driven by macroeconomic stimulus: Expansive fiscal and monetary policy could increase domestic demand, increase imports, narrow the current account, and boost output growth. The extent of these effects is likely, however, to depend on the composition of the policies as well as the initial conditions. For instance, an increase in government expenditure is likely to appreciate the real exchange rate and help the nontradables sector more than the tradables sector.
- A surplus reversal driven by the removal of distortions that result in high precautionary savings, low investment, and a large current account surplus: High precautionary savings could be the result of underdeveloped financial markets (including mortgage markets), inadequate public retirement systems, a limited social safety net (Blanchard and Giavazzi, 2006), and a lack of international mechanisms to mitigate sudden-stop risks.<sup>16</sup> In addition, poor corporate gov-

<sup>14</sup> Montiel (2000) and Montiel and Servén (2008) argue that an undervalued currency that is expected to reverse at some point in the future leads to changes in intertemporal relative prices that discourage consumption in favor of saving and also make investment in the tradables sector relatively more attractive than investment in the nontradables sector. Therefore, a real exchange rate appreciation that eliminates this undervaluation would lead to higher consumption and to higher investment in nontradables.

<sup>15</sup> Rodrik (2008) argues that the distortions in these economies hamper the tradables sector, which might be subject to dynamic learning-by-doing externalities. At the same time, he finds that the growth benefits of undervaluation are smaller in more advanced economies where institutions are likely to be stronger. In related work, Korinek and Servén (2010) show that currency undervaluation in economies with learning-by-investing externalities could lead to an improvement in welfare.

<sup>16</sup> Following the Asian crisis, emerging market economies substantially increased their foreign exchange reserves while exchange rates stayed undervalued. Blanchard and Milesi-Ferretti (2009) argue that this could either reflect an export-led growth strategy based on an undervalued exchange rate or the lack of international insurance mechanisms. Durdu, Mendoza, and Terrones (2009)

<sup>13</sup> Following Cavallo and others (2004), exchange rate overshooting is measured using monthly data for the real effective exchange rate and the following definition: overshooting occurs if the exchange rate appreciates over a 24-month period in a hump-shaped manner, with the level of the exchange rate exceeding the final value for at least half that time.

ernance and noncompetitive market structures could lead to excessive corporate savings. Reduction or elimination of these distortions could increase private consumption, reduce private savings, narrow the current account, and strengthen growth. Similarly, low investment might reflect the lack of a bank lending culture as well as restrictions on foreign capital inflows. Reduction or elimination of these distortions would increase investment, narrow the current account, and strengthen growth.

Beyond these factors, the effect on growth from a surplus reversal depends on specific policy actions as well as on global economic conditions. For example, if the current account surplus reversal is driven by the appreciation of an undervalued exchange rate, the effects of slower export growth could be offset by an increase in domestic demand for tradable goods or by structural reforms that foster production of nontradables. If the surplus reversal is driven by an increase in domestic demand associated with the removal of savings and investment distortions, growth may not rise if the economy is already operating at potential, if policymakers tighten macroeconomic policies, or if global growth slumps.

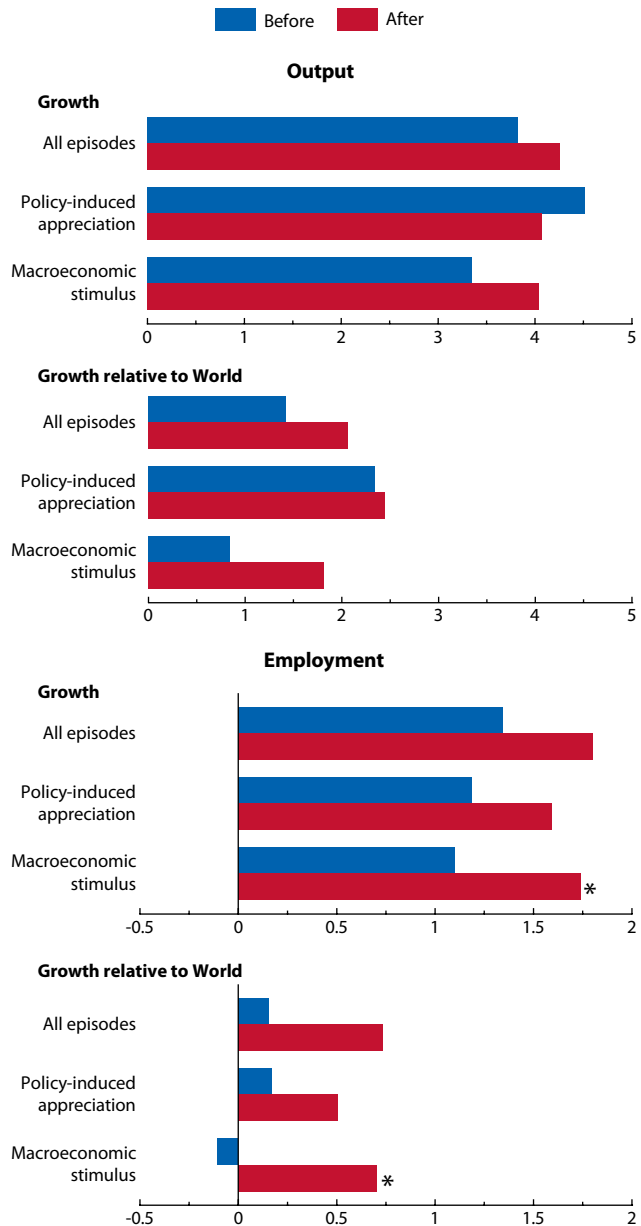
What do the data show? The following findings emerge from the analysis of the 28 policy-induced surplus reversals:

- There is no evidence that transitioning out of a large external surplus was associated with lower growth. The average change in growth in the three years following the start of the reversal compared with the three preceding years was an increase of 0.4 percentage point, which is not statistically different from zero (Figure 4.3). Over the medium term, the change in output growth is also statistically insignificant, at  $-0.3$  percentage point. An alternative measure of economic performance, the change in output growth relative to the world, accounts for the effects of global economic conditions and therefore increases the likelihood of picking up effects related only to domestic policy changes. Using this adjusted measure, the change

show that the recent surge in foreign reserves in emerging market economies could reflect self-insurance behavior against sudden-stop risks and the removal of barriers to asset trading given the underdevelopment of financial markets in these economies.

**Figure 4.3. Output and Employment Growth during Surplus Reversals**  
(Percent)

There is no evidence that a policy-induced surplus reversal is associated with significantly lower output or employment growth. When measured relative to world growth, both output and employment growth increase.



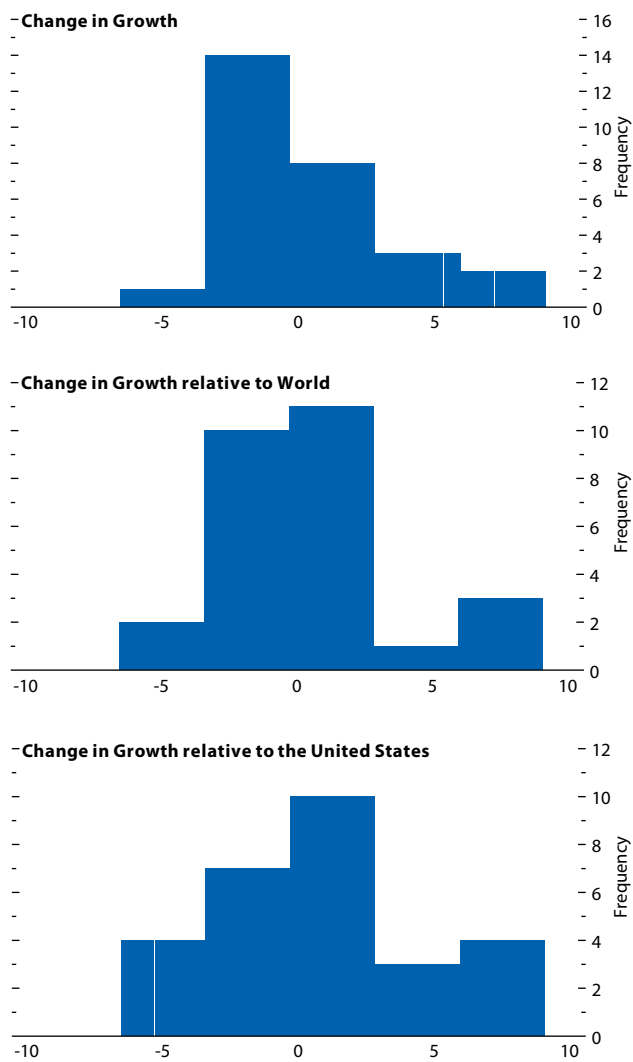
Source: IMF staff calculations.

Note: Figure reports average growth of real GDP per capita and employment in the three years before the reversal and the three years starting with a reversal. An asterisk (\*) indicates that change in growth is statistically significant at the 10 percent level. "Policy-induced appreciation" denotes cases in which there was a policy-induced appreciation of at least 10 percent as described in the text. "Macroeconomic stimulus" denotes cases in which there was fiscal or monetary stimulus as described in the text.

**Figure 4.4. Change in Growth after Surplus Reversals**

(Difference from prereversal growth rate; percentage points)

The growth outcomes after a reversal are varied and somewhat skewed to the right.



Source: IMF staff calculations.  
 Note: Change in growth is measured as the three-year average starting with the reversal year minus the three-year average before reversal.

in growth was also small and statistically insignificant (see Figure 4.3). In addition, growth relative to the United States increased, suggesting that the pace of income convergence was at least as fast as before the reversal.

- The insignificant change in growth was not driven by outliers. In particular, it holds whether the sample is based on the full sample of 28 policy-induced reversal episodes, restricted to the subsample of 11 episodes associated with policy-induced appreciation, or restricted to the 23 episodes associated with macroeconomic stimulus. At the same time, as expected, reversal episodes with policy-induced appreciation experienced a small slowdown in growth, and those with macroeconomic stimulus experienced an increase in growth. However, in none of these cases was the change in growth statistically significant.
- The variation in growth outcomes was substantial. Although the average change in growth is small and insignificant, there is a wide range of growth outcomes, from -5.1 percentage points to 9.4 percentage points (Figure 4.4). The largest changes in growth occurred when there was abnormally high or low growth in the run-up to the reversal that was not the result of policies implemented during the reversal. (Disentangling the effects of initial conditions and various shocks from the role of domestic policies is addressed later using regression analysis.)

**The Sources of Growth after Surplus Reversals**

To better understand these results, the change in per capita real GDP growth is decomposed into underlying components. On the demand side, the change in output growth is divided into contributions from net exports and from domestic demand. Similarly, on the supply side, the change in growth is decomposed into contributions from employment per capita, capital per capita, and total factor productivity.<sup>17</sup>

<sup>17</sup>Note that, due to limited data availability, the sample shrinks from 28 reversal episodes to 26 observations for the demand-side decomposition and 20 observations for the factor-input decomposition, respectively. The factor-input decomposition is based on a Cobb-Douglas production function of the



The main results for the two growth decompositions are presented in Figure 4.5. The following findings emerge:

- The typical surplus reversal featured a full rebalancing of demand from net exports to domestic demand. In particular, whereas the contribution to growth from net exports declined by 1.6 percentage points, private consumption growth and investment growth rose by 1 and 0.7 percentage point, respectively, leaving output growth higher by 0.1 percentage point (see Figure 4.5). Both the increase in consumption growth and the decline in net exports growth were statistically significant, but the change in output and investment growth was not.
- The typical surplus reversal was accompanied by gains in employment and capital, although total factor productivity growth fell slightly. Again, although none of the changes were statistically significant, there was a modest increase in the growth rates of employment and capital per capita during the first three years following the reversal (see Figure 4.5). In addition, the average growth rate of employment was positive both before and after surplus episodes, implying that the level of employment increased (see Figure 4.3).

Reversals tended to be followed by an increase in the size of the nontradables sector as a share of GDP (Table 4.3).<sup>18</sup> The growth rates of output and employment tended to rise in the nontradables sector and decline in the tradables sector. Moreover, although the level of employment in the tradables sector declined, this change was more than offset by

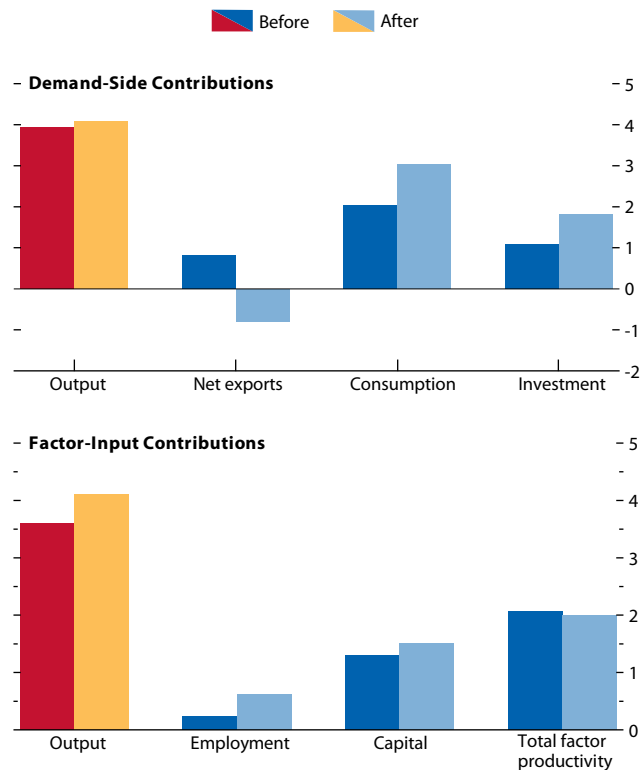
form  $Y = AE^\alpha K^{1-\alpha}$ , where  $A$  denotes total factor productivity,  $E$  denotes employment, and  $K$  denotes the capital stock. The employment share  $\alpha$  is assumed to be 0.65. Given the assumption of constant returns to scale, the production function can be expressed in per capita terms by dividing by population,  $P$ , yielding:  $\frac{Y}{P} = A\left(\frac{E}{P}\right)^\alpha\left(\frac{K}{P}\right)^{1-\alpha}$ . Finally, taking logs and first differences yields the decomposition used in the analysis:  $\Delta g^{Y/P} = \alpha\Delta g^{E/P} + (1 - \alpha)\Delta g^{K/P} + \Delta g^A$ , where  $\Delta g^{Y/P}$  is the change in the growth rate of output per capita;  $\Delta g^{E/P}$  is the change in the growth rate of employment per capita,  $\Delta g^{K/P}$  is the change in the growth rate of capital per capita, and  $\Delta g^A$  is the change in total factor productivity growth.

<sup>18</sup> The nontradables sector is defined here as services and nonmanufacturing industries, and the tradables sector comprises agriculture and manufacturing industries.

**Figure 4.5. Contributions to Growth**

(Percentage points; before and after reversal)

Policy-induced surplus reversals are accompanied by demand rebalancing—from net exports to consumption and investment. At the same time, employment and capital contributions increase, while total factor productivity falls slightly, although these changes were not statistically significant.



Source: IMF staff calculations.

Note: Because of limited data availability, the size of the sample is 26 observations for the demand-side decomposition and 20 observations for the factor-input decomposition.

**Table 4.3. Structural Reallocation during Current Account Surplus Reversals**

Variable	Surplus Reversals	Control
Increase in Nontradables/GDP (percent of episodes)	70.8	68.6
Change in Nontradables/GDP	1.3	1.2
Nontradables Output Growth (change)	0.9***	0.2
Tradables Output Growth (change)	-0.4*	0.1
Nontradables Employment Growth (change)	1.3***	-0.2
Tradables Employment Growth (change)	-1.2***	0.0
Growth of High-Tech Sector (percent of episodes)	70.8	62.8
Increase in Export Quality (percent of episodes)	66.7	54.9

Source: IMF staff calculations.

Note: Table reports changes in variables measured as three-year average starting with year of current account surplus reversal minus three-year average growth before reversal. \*, \*\*, \*\*\* indicate that the difference relative to the control group is statistically significant at the 1, 5, and 10 percent level, respectively. The control group comprises all observations at least two years away from a reversal.

an increase in nontradables sector employment, leaving the overall level of employment higher. Finally, regarding the tradables sector, data on the structure of exports reveal that the share of high-tech products and the quality of exported goods rose following the majority of reversals (see Table 4.3).<sup>19</sup>

### What Factors Explain the Great Diversity of Growth Outcomes?

To explain the substantial variation in outcomes following surplus reversals, this section explores how the change in growth is related to various initial conditions, policies, and structural variables. Due to limited data availability, the analysis is based on a reduced sample of economies, with the number of observations ranging from 20 to 27, depending on the regression specification.<sup>20</sup> This section examines the importance of the following variables:

<sup>19</sup> Following the trade literature, export quality is measured using the unit value ratio, the relative unit value of an economy's exports to a given market with respect to the unit value of all exports to that market. See, for example, Igan, Fabrizio, and Mody (2007).

<sup>20</sup> Given the small sample size, a number of statistical tests were performed to ensure that outliers do not drive the regressions results. Based on these tests, one observation with a particularly large residual—Japan (1988)—was excluded from the regression sample.

- **Initial growth:** It is quite plausible that unusually high growth before a surplus reversal would be followed by a subsequent moderation in growth and that a recession prior to the reversal would likely be followed by an upswing. To separate the effects of such initial cyclical factors, all estimation results control for the average growth rate in the three years before the reversal. The estimation results indicate that a 1 percentage point increase in prereversal growth above the sample average is associated with a subsequent decline in growth of about 0.55–0.75 percentage point (Table 4.4, row 1). At the same time, growth that is “unusually high” in some regions may be normal in fast-growing regions such as emerging Asia. To account for that possibility, we include an emerging Asia dummy variable in the estimated equation and find it to have a positive and significant coefficient, as expected (Table 4.4, row 2).<sup>21</sup>
- **External conditions:** A favorable external environment would be expected to enhance postreversal growth, especially because many of the economies in the core subsample display a high degree of trade openness. To separate the influence of external shocks from the effects of policies implemented as part of the surplus reversal, all estimation results control for the change in the terms of trade and the change in world growth during the reversal (Table 4.4, rows 3–4). As expected, the regression results indicate that an improvement in the terms of trade is followed by an increase in postreversal growth. A 10 percent deterioration in the terms of trade is associated with a decline in growth of about 0.7–1.5 percentage points. Similarly, an increase in real world output growth is correlated with faster domestic growth: a 1 percentage point increase in world growth is associated with an increase in domestic growth of about 0.1–0.8 percentage point.
- **Initial current account surplus, savings, and investment:** A particularly large initial current account surplus could indicate the presence of

<sup>21</sup> The inclusion of the emerging Asia dummy can also be motivated by the fact that the means of other right-hand variables, such as the initial current account balance, the saving rate, or the investment rate, are likely to be substantially different in that region compared with other regions.

**Table 4.4. Estimation Results: Change in Growth after Current Account Surplus Reversals**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Initial Growth	-0.752*** [-5.184]	-0.553*** [-5.651]	-0.694*** [-5.335]	-0.613*** [-4.899]	-0.660*** [-4.923]	-0.624*** [-5.227]	-0.587*** [-4.100]	-0.593*** [-4.185]	-0.663*** [-4.549]
(2) Emerging Asia	0.024*** [2.854]	0.027*** [4.265]	0.023*** [3.446]	0.021*** [3.577]	0.019*** [3.091]	0.015* [2.085]	0.021** [2.855]	0.020** [2.475]	0.023*** [4.181]
(3) Change in Log Terms of Trade	0.157** [2.812]	0.136** [2.775]	0.147*** [2.885]	0.098*** [3.443]	0.094*** [3.049]	0.073** [2.771]	0.086*** [4.330]	0.099*** [3.344]	0.078** [2.727]
(4) Change in World Growth	0.440 [1.136]	0.109 [0.295]	0.428 [1.302]	0.267 [1.148]	0.431* [2.092]	0.420* [1.782]	0.676* [1.889]	0.770** [2.823]	0.503* [1.899]
(5) Initial Current Account/GDP	-0.168* [-1.911]		-0.157 [-1.547]	-0.120 [-1.417]	-0.143** [-2.310]	-0.053 [-0.945]	-0.158** [-2.771]	-0.219*** [-3.442]	-0.204*** [-4.516]
(6) Initial Savings/GDP		-0.177** [-2.710]							
(7) Initial Investment/GDP		0.015 [0.203]							
(8) Real Appreciation			-0.067** [-2.146]						
(9) Real Appreciation (first lag)				-0.074*** [-2.877]					
(10) Real Appreciation (second lag)					-0.090*** [-3.163]	-0.146*** [-4.648]	-0.131*** [-3.896]	-0.125*** [-5.115]	-0.078* [-2.115]
(11) Real Appreciation × per Capita Income (second lag)						0.223** [2.444]			
(12) Per Capita Income (second lag)						-0.011 [-1.251]			
(13) Real Appreciation × Export Quality (second lag)							0.152* [1.850]	0.225** [2.504]	
(14) Export Quality (second lag)							0.003 [0.250]	0.009 [0.919]	
(15) Real Appreciation × Change in Export Quality (second lag)								0.428** [2.425]	
(16) Change in Export Quality (second lag)								-0.009 [-0.891]	
(17) Change in Trade Liberalization Index									0.087** [2.852]
(18) Constant Term	0.037*** [3.467]	0.057** [2.886]	0.036*** [3.314]	0.026*** [3.511]	0.028*** [3.679]	0.027*** [3.554]	0.025*** [3.701]	0.032*** [3.324]	0.026*** [3.929]
Observations	27	23	27	26	26	26	20	20	24
R <sup>2</sup>	0.678	0.749	0.719	0.771	0.785	0.841	0.820	0.866	0.793

Source: IMF staff calculations.

Note: Dependent variable is three-year average growth starting with year of current account surplus reversal minus three-year average growth before reversal. Estimation results are based on ordinary least squares with robust *t*-statistics in square brackets. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively.

some of the distortions discussed previously.<sup>22</sup> These results suggest that economies with a larger initial current account surplus tended to experience sharper declines in growth following the reversal (Table 4.4, row 5). In addition, there is evidence that high initial savings, rather than low initial investment, are behind this result (Table 4.4, rows 6–7). These results could reflect the withdrawal of policies, such as undervaluation, that resulted in both high savings and rapid growth before the reversal.

- Exchange rate appreciation:<sup>23</sup> A growing literature investigates the links between real appreciation and growth. For the economies in the sample, there is evidence of a significant negative association between real appreciation and growth, and this strengthens over time (Table 4.4, rows 8–10). At the two-year-lag horizon, a 10 percent appreciation of the real effective exchange rate is associated with a fall in growth of about 1 percentage point. However, there is also evidence that the relationship between the change in output growth and the real exchange rate is nonlinear. In particular, as per capita income or export quality rises, the link weakens between real appreciation and growth in both magnitude and statistical significance (Table 4.4, rows 11, 13, and 15). These results are consistent with those reported by Rodrik (2008), suggesting that real appreciation is likely to affect developing economies more than advanced economies. The results are also consistent with the notion that climbing the export quality ladder can mitigate the negative impact on growth of a real appreciation.
- Structural policies: There is evidence that trade liberalization is associated with a significant increase in growth following surplus reversals (Table 4.4, row 17). An increase in trade liberalization by 1 standard deviation corresponds to

<sup>22</sup> Ideally, the analysis would be based on direct measures of domestic distortions that affect savings and investment. Due to limited data availability for such direct measures, we use data on the current account surplus as an indirect proxy for underlying distortions, on the assumption that more severe distortions result in greater surpluses.

<sup>23</sup> Since the sample covers policy-induced reversals, featuring the exchange rate as a right-hand-side variable should not raise major concerns.

an estimated increase in growth of 0.7 percentage point.

How should these empirical findings be interpreted? Overall, the results underscore that growth following a surplus reversal is a function of a variety of factors, only one of which is the exchange rate: other things being equal, a real exchange rate appreciation is associated with lower growth. But stronger global growth can offset the effect of the appreciation and so can a cyclical rebound. Moreover, the negative growth effects of an appreciation are less pronounced for more advanced economies and for those that undertake structural reforms and climb the export quality ladder.

### Surplus Reversals: Case Studies

To complement the statistical analysis, this section focuses on five episodes whose prereversal conditions closely resemble those of today's large current account surplus economies. The five case studies ranked highest among all the episodes in the sample in terms of the similarity of their prereversal conditions with those of today's large surplus economies. As reported in Table 4.5, the ranking was based on 10 characteristics, including strong output and export growth, large and persistent surpluses, a high saving rate, and an undervalued exchange rate (Appendix 4.2 provides details on the scoring methodology). Using this approach, the top five cases included economies with globally important surpluses that were pressured into revaluing their currencies (Japan and Germany in the early 1970s and Japan in the mid-1980s) and economies that allowed their currencies to appreciate against the U.S. dollar to facilitate rebalancing (Korea and Taiwan Province of China in the late 1980s).<sup>24</sup> Overall, although the circumstances of these case studies were not identical to those prevailing in surplus economies today, the hope is that there are sufficient similarities to facilitate drawing some lessons.

<sup>24</sup> One potential case study, Hong Kong in 1990, is excluded because Hong Kong SAR's status as a financial center makes it difficult to draw lessons that can be generalized to other economies.

**Table 4.5. Historical Current Account Surplus Reversal Episodes: Relevance for Today's Current Account Surplus Economies**

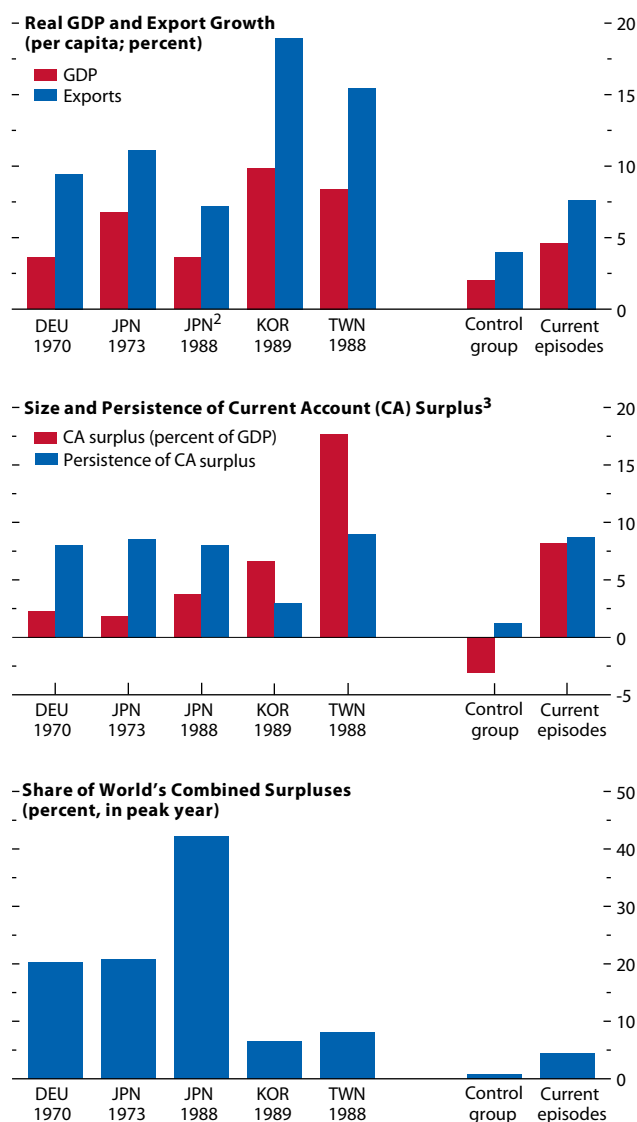
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		Strong Growth	Strong Exports	Large Current Account	Globally Important Surplus	Persistent Surplus	High Savings	High Investment	Low Consumption	Pegged or Heavily Managed Exchange Rate	Under-valuation	Total Score
Japan	1973	✓	✓		✓	✓	✓	✓	✓	✓	✓	9
Germany	1970	✓	✓		✓	✓		✓		✓	✓	7
Japan	1988	✓			✓	✓	✓	✓	✓	✓		7
Korea	1989	✓	✓	✓			✓	✓	✓	✓	✓	8
Taiwan Province of China	1988	✓	✓	✓		✓	✓		✓	✓	✓	8
Hong Kong SAR	1990	✓	✓	✓		✓	✓	✓	✓		✓	8
China	1993	✓	✓			✓	✓	✓	✓	✓		7
Korea	2001		✓	✓	✓		✓	✓	✓			6
Malaysia	1990	✓	✓	✓				✓	✓		✓	6
Norway	1986	✓		✓		✓	✓	✓	✓			6
Ireland	1998	✓	✓			✓			✓		✓	5
Malaysia	1980	✓						✓	✓		✓	4
Singapore	2000			✓		✓	✓	✓	✓			5
South Africa	1981						✓	✓	✓	✓		4
Thailand	2001		✓	✓			✓		✓	✓		5
Vietnam	2002	✓	✓				✓	✓			✓	5
Belgium	1966	✓				✓			✓		✓	4
Egypt	1994	✓		✓						✓	✓	4
Finland	2003			✓		✓				✓	✓	4
Netherlands	1998		✓	✓		✓					✓	4
Belgium	2000			✓		✓					✓	3
Jordan	1977						✓	✓			✓	3
Panama	1991			✓		✓					✓	3
Indonesia	2003			✓						✓		2
Italy	1998				✓						✓	2
Netherlands	1977					✓					✓	2
South Africa	1964	✓									✓	2
Switzerland	1978					✓						1

Source: IMF staff calculations.

Note: Table reports measures of variables in the three years prior to the current account surplus reversal (columns 1–10), with scores based on whether the variable is above or below the sample median. For Globally Important Surplus, the score is based on whether the current account surplus comprises more than 10 percent of the world's combined surpluses. For Pegged or Heavily Managed Exchange Rate, the score is based on whether the economy has a score of 1 or 2 according to Reinhart and Rogoff (2004) classification. Total Score indicates the sum of the scores for the various criteria, with each criterion receiving a weight of 1.

**Figure 4.6. Case Studies: Pretransition Initial Conditions<sup>1</sup>**

Strong, export-led growth led to large, persistent, and globally important current account surpluses...



Source: IMF staff calculations.

<sup>1</sup>DEU: Germany; JPN: Japan; KOR: Korea; TWN: Taiwan Province of China. The control group of nonreversals consists of all observations in the sample that are at least three years removed from a surplus reversal. The sample of current surplus episodes includes all economies with large and persistent current account surpluses, averaging at least 2 percent of GDP in the three years leading up to 2008.

<sup>2</sup>Pretransition export growth for Japan 1988 is the average from 1980–85; exports contracted during 1986–87 following the sharp appreciation after the signing of the Plaza Accord.

<sup>3</sup>Persistence of CA surplus is the number of years in the decade prior to the transition during which the economy had a CA surplus.

**What Were the Key Pretransition Characteristics of a Reversal?**

By design, the five case studies share many pretransition characteristics with economies that have large current account surpluses today. Figure 4.6 presents some of these key characteristics for the case studies, for large current surplus economies, and for the nonreversal control observations in the sample.<sup>25</sup> The following characteristics stand out:

- The surplus economies had strong output growth, driven largely by exports. These were the result of long periods of macroeconomic stability and active export promotion policies—starting in the 1950s in Japan and Germany and in the late 1950s and early 1960s in Korea and Taiwan Province of China. In the latter, for example, export promotion began in 1958 with a package of policies that included a 25 percent devaluation, unified exchange rate, incentives for exports (preferential credit access, often at concessional rates), establishment of export-processing zones to attract foreign direct investment, and the easing of quantitative import restrictions.<sup>26</sup> All five case studies—even Germany and Japan, which were already advanced economies—had output and export growth rates that exceeded the average in the control group.
- The surplus economies had large, persistent, and in some cases “globally important” current account surpluses that created tensions with their trading partners. Average pretransition surpluses ranged from 2 percent of GDP in Japan (1970–72) to an extraordinarily high 18 percent of GDP in Taiwan Province of China (1985–87). The surpluses of Germany and Japan, though small in relation to their own GDP, were globally important in that they accounted for a substantial portion of the world’s combined surpluses at their respective peaks: in 1967, Germany accounted for 20 percent of the world’s combined surpluses; Japan accounted for 20 percent in 1971 and 42

<sup>25</sup> As in the statistical analysis, the control group of nonreversals consists of all observations in the sample that are at least two years removed from a surplus reversal.

<sup>26</sup> For details on the various industrial and export promotion policies pursued in these economies, see World Bank (1993), Noland and Pack (2005), and Kuchiki (2007).

percent in 1986.<sup>27</sup> These large surpluses created tension with these economies' trading partners—particularly the United States—that was intense enough to spur measures to address the imbalances, either unilaterally (such as the “Nixon shock”<sup>28</sup> of 1971) or bilaterally (such as the Plaza Accord<sup>29</sup> of 1985). Although the surpluses of Korea and Taiwan Province of China in the late 1980s were not globally important, their bilateral surpluses with the United States were large enough that both were cited in the U.S. Omnibus Trade and Competitiveness Act of 1988 as “manipulating their currencies” for unfair trade gain (Lindner, 1992).

- The surplus economies had high levels of investment but even higher levels of savings.<sup>30</sup> Prereversal levels of investment averaged 28 percent of GDP in the case studies, above the 21 percent of GDP average for the control group. But prereversal levels of savings were even higher, averaging 34 percent of GDP in the case studies compared with 19 percent in the control group. The high savings levels were associated with particularly low levels of private consumption, which averaged 52 percent of GDP in the case studies, compared with 66 percent of GDP in the control group. The low consumption levels in these economies were in part the result of structural distortions, described in greater detail below.
- Most of the case studies had a pegged or a heavily managed exchange rate. Germany and Japan in the late 1960s and early 1970s were part of the Bretton Woods system of fixed exchange rates and were pegged to the U.S. dollar (which

<sup>27</sup> For comparison, China's current account surplus accounted for 21 percent of the world's combined surpluses in 2008.

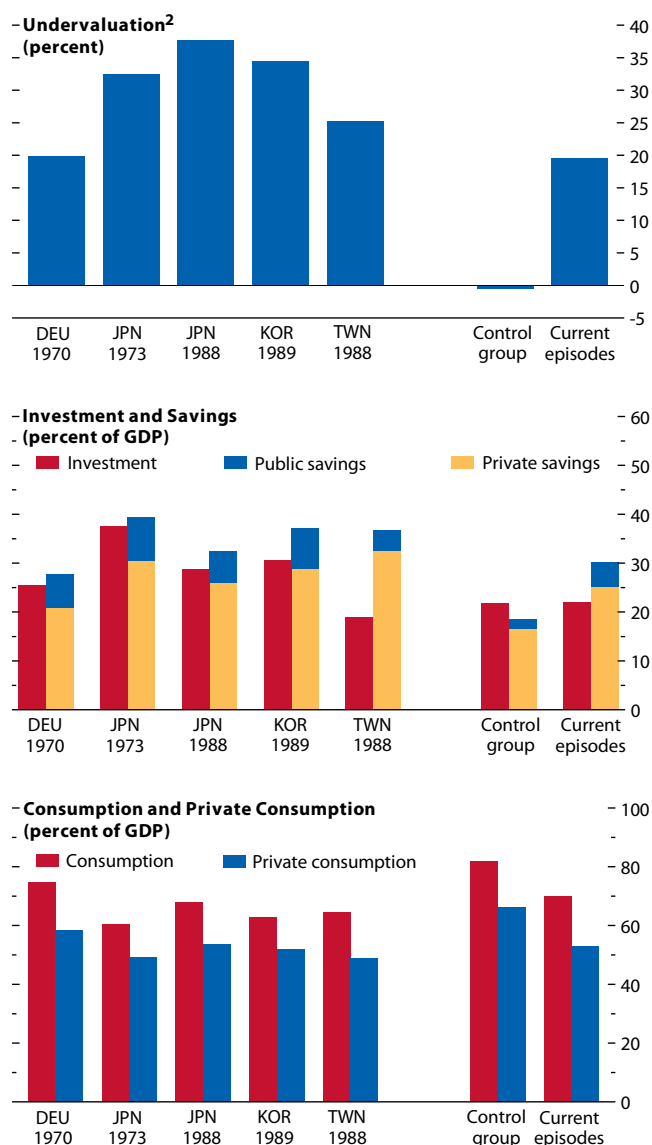
<sup>28</sup> On August 15, 1971, President Richard M. Nixon imposed a 10 percent tax on all imports to the United States until its trading partners agreed to revalue against the dollar. The Nixon shock led to a revaluation of the yen within two weeks and eventually to the floating of the yen in early 1973.

<sup>29</sup> On September 22, 1985, the major advanced economies announced their intention to coordinate foreign exchange intervention policies in order to bring about a depreciation of the U.S. dollar against the Japanese yen and Deutsche Mark.

<sup>30</sup> To encourage saving, Japan, Korea, and Taiwan Province of China implemented effective bank prudential supervision and regulation of entry. In addition, all three had postal savings or similar savings institutions.

Figure 4.6 (concluded)<sup>1</sup>

...driven in part by undervaluation. The resulting surpluses were characterized by high investment, even higher savings, and low consumption.



Source: IMF staff calculations.

<sup>1</sup>DEU: Germany; JPN: Japan; KOR: Korea; TWN: Taiwan Province of China. The control group of nonreversals consists of all observations in the sample that are at least three years removed from a surplus reversal. The sample of current surplus episodes includes all economies with large and persistent current account surpluses, averaging at least 2 percent of GDP in the three years leading up to 2008.

<sup>2</sup>Undervaluation estimates are based on an application of the IMF Consultative Group on Exchange Rate Issues (CGER) macroeconomic balance methodology to historical data. For Germany 1970 and Taiwan Province of China 1988, lack of data precludes the use of this methodology, and the CGER's external sustainability approach is used instead; for details see Lee and others (2008). For current surplus episodes, the value is the average of available data for Argentina, China, Israel, Japan, Malaysia, Sweden, and Switzerland.

- in turn was pegged to gold). Korea and Taiwan Province of China in the mid- to late 1980s both had heavily managed exchange rates that were kept relatively stable against the U.S. dollar; these quasi pegs against the U.S. dollar stayed in place as the dollar depreciated against the yen and the Deutsche Mark in 1986 following the Plaza Accord, contributing to both economies' surpluses. Among the case studies, only Japan in the mid-1980s had a freely floating exchange rate.
- Exchange rates appeared undervalued in all of the case study economies prior to the reversals, distorting an important price signal. First, there is evidence of significant undervaluation in all five case studies. The application of a number of standard measures produces estimates of undervaluation ranging from just under 20 percent in Germany in the late 1960s to close to 40 percent in Japan in the mid-1980s.<sup>31</sup> These estimates are consistent with the literature, which also finds evidence of significant undervaluation using alternative methods.<sup>32</sup> Beyond model-based assessments of exchange rate misalignment, the strong and persistent appreciations that occurred when these currencies were allowed to float is perhaps the most convincing de facto evidence that they were undervalued prior to the transition. As discussed, by distorting relative prices, undervaluation discourages consumption and makes investment in the tradables sector relatively more attractive than investment in the nontradables sector.
  - Some of these economies had other policies that resulted in additional distortions and helped support the surpluses. In Japan, Korea, and Taiwan Province of China, preferential credit was directed toward the export sector, sometimes at subsidized rates. There were also trade restrictions, particularly on imports of manufactured goods, in both Korea and Taiwan Province of China. Third, there were tax incentives to pro-

mote research and development and to support strategic industries in Korea and Taiwan Province of China. Finally, substantial capital controls were in place in Japan in the early 1970s and in Korea in the late 1980s, which allowed for some degree of sterilization.<sup>33</sup>

- Many of these economies had strong macroeconomic frameworks and policy room, which affected how they responded to and managed the reversal. In these economies, inflation was relatively low, averaging less than 3 percent in the prereversal period compared with close to 7 percent in the control group. Fiscal balances were also close to zero, and most of them (with the exception of Japan in the mid-1980s) had low levels of government debt.

#### What Policies Were Used during the Transition Period?

The current account surpluses became a policy concern for both external and domestic reasons (Table 4.6). As noted, the large surpluses created tensions with these economies' trading partners that in some cases led to unilateral or multilateral measures. Domestically, the current account surpluses led to significant balance of payments surpluses, which in the context of pegged or heavily managed exchange rates led to money supply growth that was more rapid than desired. For Germany and Taiwan Province of China, which had relatively open capital accounts, speculative capital inflows (driven by expectations of revaluation) exacerbated the problem, and in both cases the authorities decided to float the currency rather than to let money growth get out of hand (Berger, 1997; and Xu, 2008).

In all the case studies, appreciation was the main policy lever for reversing the current account surplus. The appreciation was both in nominal terms—all economies let their currencies appreciate against the U.S. dollar—and in real effective terms. And it was substantial in all cases. The extent of nominal appreciation against the dollar ranged

<sup>31</sup> The analysis measures undervaluation using the IMF's Consultative Group on Exchange Rate Issues (CGER) methodologies for exchange rate assessment (Lee and others, 2008).

<sup>32</sup> See, for example, Eichengreen (2007), Fujino (1988), and Kosai (1989) for Japan; and World Bank (1993) for Korea and Taiwan Province of China.

<sup>33</sup> Ostry and others (2010) argue that capital controls might be appropriate under certain circumstances, including when standard macroeconomic prescriptions are not appropriate (for example, to reduce domestic interest rates when inflation is creeping in) and when there are financial fragility concerns.



**Table 4.6. Case Studies: Policies Used during Current Account Surplus Reversals**

	Germany 1970	Japan 1973	Japan 1988	Korea 1989	Taiwan Province of China 1988
Were Surpluses a Policy Issue?	Yes, because of trade tensions, speculative inflows, and rapid money growth	Yes, because of trade tensions	Yes, because of trade tensions	Yes, because of trade tensions and rapid money growth	Yes, because of trade tensions, speculative inflows, and rapid money growth
What Caused Surpluses to Decline?	Appreciation	Appreciation	Appreciation	Appreciation	Appreciation
Appreciation against U.S. dollar (percent) <sup>1</sup>	25	34	54	25	57
Real Effective Appreciation (percent) <sup>1</sup>	12	27	40	32	21
Exchange Rate Policy	Revaluation in 1969; exit from peg in 1971	Revaluation in 1971; exit from peg in 1973	Coordinated attempt to appreciate yen after 1985 Plaza Accord	Appreciation against U.S. dollar after mid-1987	Exit from quasi peg in mid-1986
Fiscal Policy	Neutral in 1968–69; shift to tightening in 1971–72 as excess demand pressures continued	Expansionary in 1971–72 in expectation of weakening external demand	Stimulative after 1986 as economy began to slow following appreciation	Tight fiscal policy in 1987 to counter overheating	Fiscal consolidation
Monetary Policy	Neutral in 1968–69; shift to tightening in 1971–72 as excess demand pressures continued	Expansionary in 1971–72 in expectation of weakening external demand; shift to tightening in 1973 as inflation accelerated; sterilization of capital inflows	Easing beginning in 1986 as economy began to slow following appreciation; sterilization of capital inflows	Tight monetary policy in 1987 to counter overheating; easing in 1989 after slowdown and stock market collapse; tightening after growth rebounded in 1990–91; sterilization of capital inflows	Neutral monetary policy, without regard for surpluses and/or appreciation
Structural Policies	...	...	Interest rate controls phased out between 1985 and 1994	Removal of import restrictions and reductions in tariffs to help lower surplus; liberalization of domestic financial sector; capital account liberalization, particularly foreign direct investment	Removal of import restrictions and reductions in tariffs; liberalization of domestic financial sector; capital account liberalization, particularly foreign direct investment; establishment of standard labor laws

<sup>1</sup>Specific dates used to measure appreciation are as follows: September 1969–March 1969 for Germany, August 1971–March 1973 for Japan, August 1985–August 1986 for Japan post–Plaza Accord, April 1987–December 1989 for Korea, and September 1985–September 1989 for Taiwan Province of China.

from 25 percent for the Deutsche Mark and Korean won to 54 percent for the yen following the Plaza Accord. These translated to real effective appreciations between 12 and 40 percent.

The fiscal and monetary policy responses accompanying the appreciations differed across the case studies. In the German and Japanese episodes, macroeconomic policies were kept looser than would have been the case in the absence of an appreciation. In all three of these episodes, the authorities anticipated a substantial weakening in external demand and output growth following the appreciation; relatively loose policies were meant to support domestic demand. In contrast, the Korean government pursued both fiscal and monetary tightening as the won appreciated, because its main concern was to reduce overheating and excess demand pressures (IMF, 1988).<sup>34</sup> Finally, in Taiwan Province of China both fiscal and monetary policy were neutral—the authorities did not see a need either to support or to slow down domestic demand.

In Germany and Japan, authorities had to reverse course and tighten monetary policy when demand turned out to be stronger than expected. The “preemptive” easing pursued in these economies following the appreciation of their currencies had to be subsequently reversed. The economies experienced sharp but short-lived slowdowns, partly because of oil price increases, and subsequent domestic demand growth proved stronger than expected. In Germany and Japan in the early 1970s, this domestic demand growth, combined with oil price increases, resulted in rising inflation; Germany began tightening monetary policy in 1971–72, and Japan in 1973, and this slowed down the economy in both cases. In Japan following the Plaza Accord, there were few signs of consumer price pressures, but lower interest rates and the appreciation-induced improvement in the terms of trade led to domestic demand growth of 8 percent in 1988 and to sharp rises in equity and property markets. The Bank of Japan tightened monetary policy rapidly in 1989 (Box 4.1).

<sup>34</sup>The Korean authorities eased monetary policy subsequently in 1989 in response to a collapse in the equity market (IMF, 1990, p. 7).

A number of structural policies were pursued to aid the transition or to mitigate its potential effects on growth and employment. In both Korea and Taiwan Province of China, further trade liberalization—specifically, removing restrictions on manufactured imports and lowering import tariffs on many goods—was an integral part of the adjustment process (IMF, 1990; World Bank, 1993). Both also liberalized the capital account, removing exchange restrictions and barriers to foreign direct investment inflows and outflows. And both (and to a lesser extent Japan in the mid-1980s) undertook substantial steps to liberalize their domestic financial sectors around the time of the transition, by deregulating interest rates and reducing the extent of directed and/or subsidized credit (World Bank, 1993), although these were not pursued for the purposes of lowering the large external surpluses.

#### What Were the Consequences of a Reversal?

An analysis of posttransition macroeconomic outcomes in the case studies (Figure 4.7; Table 4.7) confirms many of the findings of the statistical analysis.

- There was no uniform trend toward either lower or higher output growth after the reversals. In principle, a surplus reversal induced by an exchange rate appreciation would lower aggregate demand and thus reduce output and inflation.<sup>35</sup> In fact, inflation did not fall in any case study, suggesting that insufficient aggregate demand was not a problem: disinflationary effects were typically more than offset by macroeconomic stimulus or oil price shocks. GDP growth increased in one case, declined in two, and remained broadly unchanged in another two.<sup>36</sup> When compared with world growth or U.S. growth, the change in output growth is positive in two cases, negative in two, and unchanged in one. The biggest growth decline occurred in Japan, where the 1974 oil price shock played a large role (Figure

<sup>35</sup>An appreciation also affects inflation through the price of imports.

<sup>36</sup>As in the statistical analysis, the average change in output growth across the case studies was not significantly different from zero.

### Box 4.1. Japan after the Plaza Accord

This box provides a narrative account of Japan's surplus reversal after the Plaza Accord. There are two important lessons from this episode: the importance of exiting in a timely manner from supportive macroeconomic policies and the need to implement complementary structural reforms.

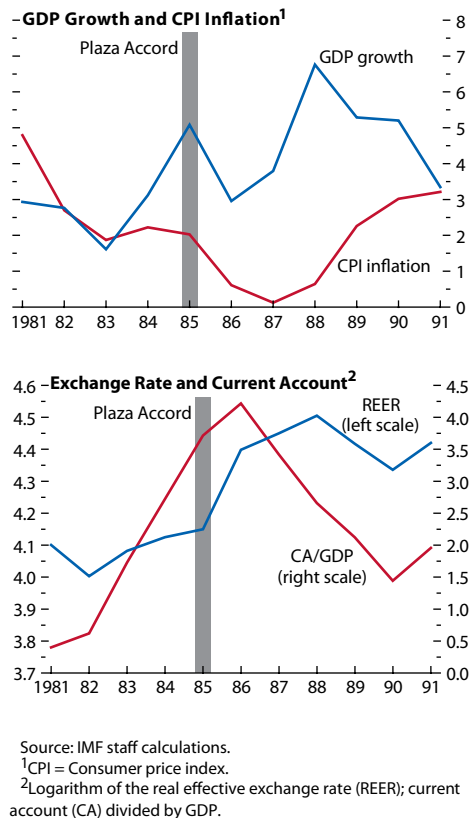
The Plaza Accord of 1985 was a response to the widening of Japan's current account surplus on the back of strengthening global demand and an undervalued currency (Cargill, Hutchison, and Ito, 1997). The surplus reached 3.7 percent of GDP in 1985, from 0.6 percent of GDP in 1982 (first figure). Calls intensified from the United States for protectionist measures, and in its annual consultation with the IMF in 1984, the Japanese authorities said they "would like to see a substantial strengthening of the yen, to help moderate the current account surplus" (IMF, 1985, p. 18). On September 22, 1985, the G5 announced their intention to coordinate foreign exchange intervention policies in order to bring about a depreciation of the U.S. dollar vis-à-vis the Japanese yen and the Deutsche Mark.<sup>1</sup>

The appreciation of the yen that followed the Plaza Accord was very rapid, resulting in slower growth and complicating policymaking. By the end of 1986, the yen had appreciated 46 percent against the dollar and 30 percent in real effective terms. The effects of this sharp appreciation on the manufacturing sector were swift—export volumes contracted 6 percent in 1986, business investment growth decelerated to 6 percent (from 12 percent in 1985), and GDP growth slowed to 2.5 percent in 1986 from 5 percent the previous year. In response, the government quickly shifted to a stimulative monetary and fiscal policy stance and signed the Louvre Accord in February 1987 to help stabilize the yen.

Japan's experience highlights how hard it is to time the withdrawal of macroeconomic stimulus intended to offset the effects of currency appreciation. By the late 1980s, Japan's economy was once again booming and asset price bubbles were beginning to form, but tighter monetary policy was not implemented. Estimates from Jinushi, Kuroki, and Miyao (2000);

<sup>1</sup>The G5 comprises France, Germany, Japan, United Kingdom, and United States.

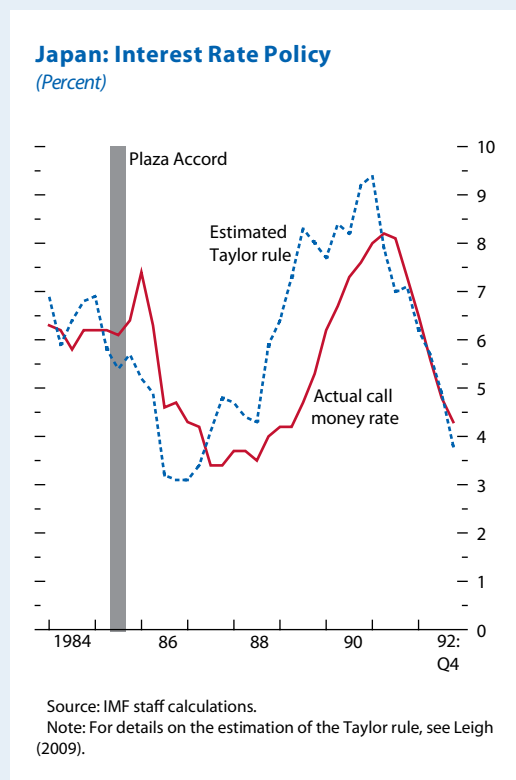
#### Japan following the Plaza Accord (Percent)



Leigh (2009); and others suggest that the Bank of Japan's policy rate was about 4 percentage points too low relative to an implicit Taylor rule during 1987–89 (second figure). Tighter policy could have restrained rapid domestic demand growth, helped reduce the still-sizable external surplus via further appreciation of the yen, and headed off incipient asset price bubbles. However, the authorities felt that "further appreciation would adversely affect business confidence" (IMF, 1988, p. 13), and both the authorities and the IMF staff expressed little concern about the potential adverse effects of new bubbles.<sup>2</sup>

<sup>2</sup>Additional reasons for the delay in tightening monetary policy may have been market instability following the U.S. stock market crash of October 1987.

## Box 4.1 (continued)



Furthermore, structural reforms—which would have acted as a “third leg” to aid rebalancing along with appreciation and expansionary macroeconomic policies—were not implemented in many areas. Japan’s post-Plaza appreciation was large by historical standards and support for expansionary fiscal and monetary policies was sizable, yet the current account surplus did not fall as much as intended,

remaining above 2 percent of GDP. The structural reforms recommended in the “Maekawa Report” endorsed by Prime Minister Yasuhiro Nakasone could have reinforced the rebalancing effects of appreciation.<sup>3</sup> The reforms included expanding food imports by reducing trade protection for Japan’s agricultural sector; eliminating distortions that encouraged saving, such as the tax exemption for postal savings; and reducing restrictions on land use that limited supply and exacerbated property price pressures. But following the large appreciation of the yen, and given the political difficulty of pursuing them, many of these reforms were set aside.

The period culminated in Japan’s asset market bust of the early 1990s and was followed by years of disappointing economic performance—Japan’s “Lost Decade.” However, it would be incorrect to conclude that Japan’s surplus reversal in the late 1980s caused the Lost Decade. The accepted wisdom is that Japan’s slump dragged on so long because of delays in cleaning up the banking system; the zero lower bound on nominal interest rates, which limited the Bank of Japan’s ability to stimulate demand; and external shocks such as the 1991 U.S. recession and the 1997 Asian financial crisis (Mikitani and Posen, 2000).

<sup>3</sup> Prime Minister Nakasone established the “Maekawa Commission” and tasked it with identifying ways to reduce Japan’s current account surplus. He presented the commission’s recommendations—the “Maekawa Report”—to President Ronald Reagan during his visit to the United States in April 1986. As Taylor (2008) emphasizes, “the suggested policies made sense whether or not the current account was a problem.”

4.8).<sup>37</sup> Taiwan Province of China also experienced a moderation in growth, but postreversal growth remained relatively high at 6 percent, and the rebalancing was very large. In the remaining

<sup>37</sup> Based on the estimates reported in Table 4.4, only about one-third of the 5 percentage point fall in Japan’s growth was due to the exchange rate appreciation. This result is obtained based on the estimated coefficient on real appreciation reported in Table 4.4 (column 3, row 8), along with the real appreciation observed in Japan during the 1973 episode.

cases, growth remained unchanged or increased slightly.

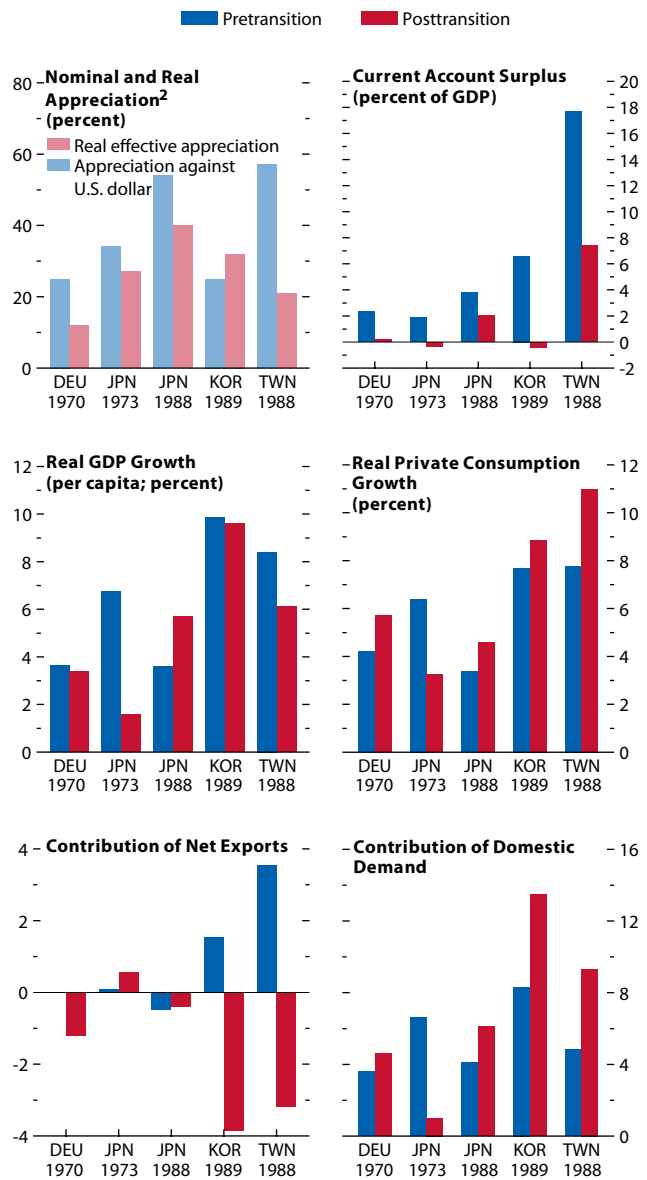
- As for output, employment growth in the case studies exhibited no clear trend. Employment growth increased in two cases, but declined in three; the average change in employment growth was not statistically different from zero. As explored below, however, this ambiguity in economy-wide employment dynamics in the case

studies masks more distinct patterns of employment reallocation across sectors.

- Output responded much better than the effects of exchange rate changes alone would suggest. In the absence of offsetting factors, output growth in the five case studies should have fallen by 2 to 4 percentage points, according to the coefficient estimates from the regressions in the statistical analysis and the size of the appreciations. The fact that growth in most of them did better than predicted is due to the presence of offsetting factors, including complementary policies (supporting fiscal, monetary, and structural policies) and in some cases strong external demand.
- Private consumption growth is an alternative measure of postreversal performance, and this increased in four of the five case studies. The exception is Japan in 1973, where consumption was adversely affected by monetary tightening and the oil-price-induced recession. In the other cases, private consumption growth ranged from 5 to 11 percent following the reversal, reflecting an increase of between 1 and 3 percentage points relative to prereversal growth rates. In addition, in all cases, the process of income convergence continued—that is, relative per capita incomes in purchasing power parity terms continued to rise toward U.S. levels after the transition.
- In most case studies, the appreciation led to rebalancing—a declining contribution of net exports to growth, which was partially or fully offset by an increase in the contribution of domestic demand. Again, the exception is Japan in 1973, where domestic demand growth fell sharply and external demand remained unchanged. In the other cases, the contribution of net exports remained unchanged or fell substantially following the reversal, by as much as 7 percentage points in the case of Taiwan Province of China, but the contribution of domestic demand rose by between 1 and 5 percentage points.
- The sharp falls in the current account surpluses in the case studies reflected both lower (private) savings rates and higher investment rates, as indicated by the statistical analysis. Investment rose in all cases, except Japan in 1973, by between 3 and 7 percent of GDP relative to prereversal

**Figure 4.7. Case Studies: Posttransition Implications<sup>1</sup>**

Strong nominal and real appreciation led to a decline in surpluses, with varying effects on output growth and private consumption growth. There was a rebalancing from external demand to domestic demand.



Source: IMF staff calculations.

<sup>1</sup>See Figure 4.6 for abbreviations.

<sup>2</sup>Specific dates used to measure appreciation are as follows: September 1969–March 1972 for Germany; August 1971–March 1973 for Japan; August 1985–August 1986 for Japan following the Plaza Accord; April 1987–December 1989 for Korea; September 1985–September 1989 for Taiwan Province of China.

**Table 4.7. Case Studies: Key Indicators after Current Account Surplus Reversals**

	Germany 1970	Japan 1973	Japan 1988	Korea 1989	Taiwan Province of China 1988	Average	Median
<b>Output and Consumption</b>							
Real GDP per Capita Growth	3.4	1.6	5.7	9.6	6.1	5.3	5.7
Real GDP per Capita Growth (change)	-0.2	-5.1	2.1	-0.3	-2.3	-1.2	-0.3
Real GDP per Capita Growth relative to World (change)	...	-3.8	2.1	0.9	-2.3	-0.8	-0.7
Real GDP per Capita Growth relative to United States (change)	0.1	-3.5	2.7	1.9	-1.7	-0.1	0.1
Real Private Consumption Growth	5.7	3.2	4.6	8.9	11.0	6.7	5.7
Real Private Consumption Growth (change)	1.5	-3.2	1.2	1.2	3.2	0.8	1.2
Convergence to United States (change in income gap)	5.0	2.3	6.0	8.0	5.7	5.4	5.7
<b>Changes in Output Components</b>							
Contribution of Net Exports	-1.2	0.6	-0.4	-3.9	-3.2	-1.6	-1.2
Contribution of Net Exports (change)	-1.2	0.5	0.1	-5.4	-6.8	-2.6	-1.2
Contribution of Domestic Demand	4.6	1.0	6.1	3.5	9.3	6.9	6.1
Contribution of Domestic Demand (change)	1.0	-5.6	2.0	5.2	4.5	1.4	2.0
Labor Productivity Growth	3.9	2.5	4.1	6.8	6.0	4.7	4.1
Labor Productivity Growth (change)	0.6	-4.6	0.8	0.5	-0.1	-0.6	0.5
Employment Growth	0.0	-1.0	1.5	2.3	-0.1	0.6	0.0
Employment Growth (change)	1.0	-0.4	1.2	-0.7	-2.0	-0.2	-0.4
<b>Change in Current Account, Savings, and Investment</b>							
Current Account Surplus (percent of GDP, change)	-2.1	-2.2	-1.7	-7.0	-10.3	-4.7	-2.2
Savings (percent of GDP, change)	0.7	-3.1	1.8	-0.3	-6.0	-1.4	-0.3
Private Savings (percent of GDP, change)	-0.1	-1.4	-1.5	-1.0	-6.7	-2.1	-1.4
Investment (percent of GDP, change)	2.9	-0.9	3.5	6.8	4.3	3.3	3.5
<b>Sectoral Reallocation</b>							
Share of Nontradables (change) <sup>1</sup>	...	1.6	0.5	4.3	6.6	3.2	3.0
Share of High- and Medium-Tech (change)	...	...	1.1	1.8	9.8	4.2	1.8
Tradables Employment Growth	...	-3.6	0.2	-1.6	-4.1	-2.3	-2.6
Nontradables Employment Growth	...	0.7	2.7	5.5	3.6	3.1	3.1
<b>Overheating Indicators</b>							
Consumer Price Index Inflation	4.6	14.3	2.0	7.6	3.2	6.3	4.6
Consumer Price Index Inflation (change)	2.9	8.2	1.1	3.3	2.9	3.7	2.9
Output Gap	0.6	0.9	1.7	0.2	0.7	0.8	0.7
Output Gap (change)	0.7	1.3	4.2	1.5	1.2	1.8	1.3

Source: IMF staff calculations.

<sup>1</sup>Numbers for Japan are derived from data from the Organization for Economic Cooperation and Development STAN database. Numbers for Taiwan Province of China are calculated from two data points (1985, 1990) as published in Xu (2008, Table 2).

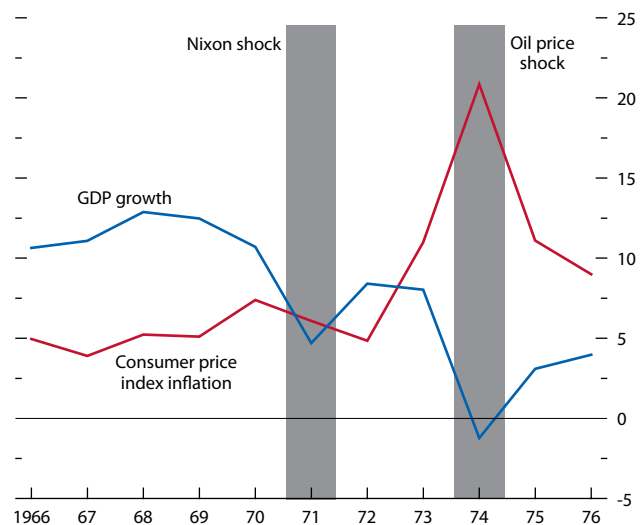
levels. Savings, and particularly private savings, either remained unchanged or fell, substantially in the case of Taiwan Province of China.

- There was a clear sectoral reallocation of resources, from the tradables to the nontradables sector. The share of the nontradables sector in the economy rose in all cases, most substantially in Korea and Taiwan Province of China, where there was more scope for reallocation given the relatively smaller size of the nontradables sector prior to the reversal. Employment in the tradables sector was either stagnant or declined; in Taiwan Province of China the loss of manufacturing jobs was particularly large as Taiwanese firms moved their production offshore to lower-cost economies in southeast Asia and later to mainland China. But these losses were either partially or fully offset by gains in the nontradables sector; employment growth in this sector was positive in all cases and was substantial in the case of Japan, Korea, and Taiwan Province of China in the mid- to late 1980s.
- There is evidence that these economies climbed the export quality ladder, with the share of high- and medium-tech exports rising. This was more pronounced where there was more room to improve—most notably in Taiwan Province of China (Box 4.2)—than in economies such as Japan, where high-tech manufactures already accounted for a large share of exports. In Taiwan Province of China, the reallocation of production toward higher-value-added industries was also supported by structural policies such as tax incentives that encouraged investment in research and development.

In sum, exchange rate appreciation was only one among several important factors in the process of reversing the current account surpluses in the case study economies. The analysis indicates that differences in macroeconomic management and in the external environment are central to economic performance following surplus reversals. In terms of fiscal and monetary policy, the lesson that emerges is not that domestic demand might be too weak following an appreciation, but rather that it has tended to be stronger than expected, creating problems when preemptive stimulus policies were pursued. Structural policies can play an important role in helping sustain the rebalancing from exports

**Figure 4.8. Japan at the End of Bretton Woods**  
(Percent)

Japan's economy featured stagflation, largely reflecting an unfavorable oil price shock in 1974.



Source: IMF staff calculations.

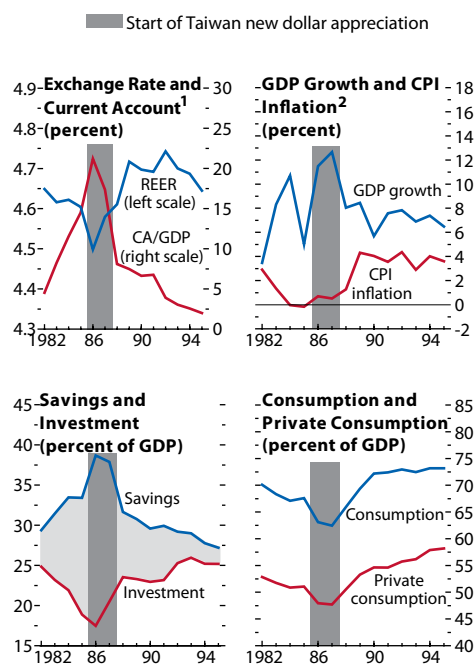
### Box 4.2. Taiwan Province of China in the Late 1980s

This box illustrates the role of sectoral rebalancing during a current account reversal in an emerging market economy, including climbing the export quality ladder and outsourcing.<sup>1</sup>

Taiwan Province of China's current account surplus exceeded 20 percent of GDP in the mid-1980s after years of strong export-oriented growth and a stable currency. But following the Plaza Accord, speculative inflows based on market expectations that the Taiwan dollar would appreciate against the U.S. dollar forced the central bank to abandon the currency's quasi peg and let the currency appreciate.<sup>2</sup> In the four years following the Plaza Accord, September 1985–September 1989, the Taiwan dollar appreciated 57 percent against the U.S. dollar and 21 percent in real effective terms. At the same time, the current account surplus dropped sharply, from its peak of 21 percent of GDP in 1986 to 7½ percent of GDP by 1989 and to less than 4 percent of GDP for much of the 1990s (first figure).

Exports slowed in response to the appreciation, but consumption and investment strengthened. Consumption growth, which averaged close to 6 percent a year in the first half of the 1980s, accelerated to 9½ percent a year in the second half of the decade, cushioning the effect of the slowdown in exports. The consumption-to-GDP ratio increased from 63 percent in 1986 to 73 percent in 1995 and has remained high and stable ever since. Investment growth was also buoyant in the late 1980s, averaging 12 percent a year, as the Taiwanese government implemented various tax incentives to encourage private investment in research and development (Wang and Mai, 2001). Overall, despite the Taiwan dollar's sharp appreciation, average GDP growth during 1987–91 remained at

### Taiwan Province of China in the Late 1980s



Source: IMF staff calculations.

<sup>1</sup>Logarithm of the real effective exchange rate (REER); current account (CA) divided by GDP.

<sup>2</sup>CPI = Consumer price index.

8.5 percent, close to the 8 percent average GDP growth during 1982–86.<sup>3</sup>

Firms in the tradables sector took a hit as a result of the appreciation but adjusted by climbing the export quality ladder and by outsourcing. The initial loss in competitiveness was severe: export growth slowed from an average 14 percent during

<sup>1</sup>This case study draws on Xu (2008).

<sup>2</sup>As the U.S. dollar began its post-Plaza Accord fall against the yen and Deutsche Mark in late 1985, speculation in the markets increased that the Taiwan dollar would appreciate as well. The central bank initially resisted the pressure to appreciate, but as reserves doubled and growth accelerated in the M1 money supply (money readily available for spending), the central bank decided to let the currency float freely with minimal intervention.

<sup>3</sup>Note that, in contrast to some of the other case studies, Taiwanese authorities made no attempt to preemptively ease monetary (or fiscal) policy in anticipation of the weakening external demand that an appreciation would engender. In the end, such an easing was not needed, because Taiwanese exporters moved to high-value-added exports—aided by structural policies to support private sector research and development—which mitigated the loss in competitiveness.

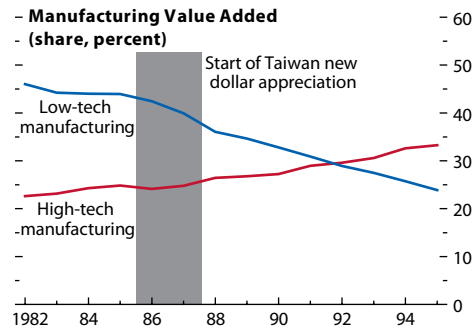


1982–86 to less than 9 percent on average during 1987–91.<sup>4</sup> One response of the manufacturing sector was to climb faster up the export quality ladder. Production of capital-intensive, higher-value-added products such as computers and electronics started rising, accounting for 32 percent of manufactures in 1985 and 43 percent by 1996 (second figure). The share of labor-intensive, low-value-added products such as textiles fell from 36 percent to 22 percent over the same period. The other response of the manufacturing sector was to shift production overseas, to economies with lower costs. Initially most of Taiwan’s outward foreign direct investment benefited southeast Asian economies, such as Malaysia, but in the 1990s more of this investment was directed toward mainland China.

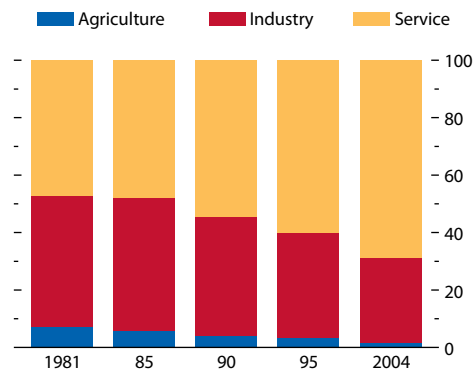
Finally, losses in the tradables sector were offset by gains in the nontradables sector. The share of services in GDP, which had been stable at about 47 percent in the first half of the 1980s, began to increase, from 48 percent in the mid-1980s to 60 percent by the mid-1990s (see second figure). Labor resources also shifted, with the share of employment in services increasing from 41 percent to 51 percent over the same period (Wang and Mai, 2001). Overall, economy-wide employment continued to grow on average by 2 percent a year.

<sup>4</sup>Growth of real value added in manufacturing fell from 11 percent to 4½ percent over the same period. In addition to the appreciation, another factor that adversely affected exports and manufacturing was the downturn in the U.S. economy during 1990–91 related to the Gulf War and the spike in oil prices.

### Taiwan Province of China: Sectoral Reallocation



### Factor-Input Contributions (percent of GDP)



Sources: Xu (2008); and IMF staff calculations.

toward domestic demand, as evidenced in Korea and Taiwan Province of China.

### Lessons for Economies Considering a Transition out of External Surpluses

This section outlines key lessons for economies considering a transition away from current account surpluses in today’s environment, drawing from the analysis here of historical surplus reversals and from related research.

First, reducing a current account surplus does not necessarily entail lowering output growth. In principle, there are many reasons for growth to either increase or decrease following surplus reversals. The empirical evidence suggests that output growth on average did not decline during policy-induced surplus reversals during the past 50 years. Moreover, growth after these reversals was more balanced across domestic and external sources, and, despite some employment losses in the tradables sector, economy-wide employment growth tended to increase. Although current account reversals were

associated with a wide range of growth outcomes, when large swings in growth occurred, they resulted primarily from shocks unrelated to policies aimed at reversing the current account surpluses.

Second, although real exchange rate appreciation itself seems to have slowed growth, other factors tended to offset this adverse effect. In particular, in many cases macroeconomic policy stimulus boosted domestic demand and offset the contractionary effects of appreciation. In addition, in some cases firms in the tradables sector responded to appreciation by improving the quality of their products. Finally, an improving external environment supported growth in a number of episodes.

Third, although expansionary macroeconomic policies can support the rebalancing of demand from exports toward domestic demand, there is a risk that such policies can stoke inflation and asset price booms. Encouragingly, surplus economies typically had accumulated ample policy room, enabling them to implement fiscal and monetary stimulus when exchange rates were allowed to appreciate. At the same time, however, it is possible to overestimate how much exchange rate appreciation will likely constrain growth and to react with excessive stimulus to aggregate demand, potentially leading to overheating and asset price booms.

Fourth, trade liberalization can help reduce large current account surpluses while supporting growth. The same holds for a broad range of structural reforms that foster growth of the nontradables sector. Moreover, economies that implement policies to facilitate upgrades in the quality of their exports and that have more room for such reallocation and upgrading experienced a smaller decline in growth following real exchange rate appreciation.

#### Appendix 4.1. Sample for Analysis and Data Sources

This appendix specifies the economies covered by the analysis and provides data sources.

**Table 4.8. Sample for Analysis and Current Surplus Episodes**

(Surplus reversal years listed in parentheses)

Sample for Analysis	Current Surplus Episodes
Argentina	Argentina
Australia	Austria
Austria	China
Belgium (1966 <sup>2</sup> , 2000 <sup>2</sup> )	Denmark
Brazil	Finland
Canada	Germany
China (1993 <sup>2</sup> )	Hong Kong SAR
Colombia	Israel
Denmark	Japan
Dominican Republic	Malaysia
Egypt (1994 <sup>1</sup> )	Netherlands
Finland (2003 <sup>2</sup> )	Norway
France	Philippines
Germany (1970 <sup>1,2</sup> )	Singapore
Greece	Sweden
Hong Kong SAR (1990 <sup>2</sup> )	Switzerland
India	Taiwan Province of China
Indonesia (2003 <sup>2</sup> )	
Ireland (1998 <sup>2</sup> )	
Israel	
Italy (1998 <sup>2</sup> )	
Japan (1973 <sup>1,2</sup> , 1988 <sup>1,2</sup> )	
Jordan (1977 <sup>2</sup> )	
Korea (1989 <sup>1</sup> , 2001 <sup>2</sup> )	
Malaysia (1980 <sup>1,2</sup> , 1990 <sup>1</sup> )	
Mexico	
Morocco	
Netherlands (1977 <sup>1</sup> , 1998 <sup>2</sup> )	
New Zealand	
Norway (1986 <sup>2</sup> )	
Pakistan	
Panama (1991 <sup>2</sup> )	
Peru	
Philippines	
Portugal	
Singapore (2000 <sup>2</sup> )	
South Africa (1964 <sup>2</sup> , 1981 <sup>1,2</sup> )	
Spain	
Sweden	
Switzerland (1978 <sup>1,2</sup> )	
Taiwan Province of China (1988 <sup>1</sup> )	
Thailand (2001 <sup>2</sup> )	
Turkey	
United Kingdom	
United States	
Vietnam (2002 <sup>2</sup> )	

<sup>1</sup>Denotes reversals associated with policy-induced appreciation, as described in the text.

<sup>2</sup>Denotes reversals associated with macroeconomic stimulus, as described in the text.

**Table 4.9. Data Sources**

Variable	Source
Real GDP	World Bank World Development Indicators (WDI) Database, World Economic Outlook (WEO) Database
Population	WDI Database, WEO Database
Real Consumption	WDI Database, WEO Database
Real Private Consumption	WDI Database, WEO Database
Real Government Consumption	WDI Database, WEO Database
Real Exports	WDI Database, WEO Database
Real Imports	WDI Database, WEO Database
Real Investment	WDI Database, WEO Database
Current Account Balance	WDI Database, WEO Database
Consumer Price Index	International Financial Statistics (IFS) Database, WEO Database
Employment	WDI Database, WEO Database
Trade Liberalization Index	IMF
Domestic Finance Liberalization Index	IMF
Capital Account Liberalization Index	IMF
Exchange Rate	Penn World Tables, IFS Database
Nominal Effective Exchange Rate	IMF
Real Effective Exchange Rate	IMF
Real Capital Stock	Penn World Tables
Terms of Trade	WDI Database, WEO Database
Total Savings	WEO Database
Private Savings	WEO Database
Public Savings	WEO Database
Interest Rates	IFS Database
Policy Rates	Bloomberg Financial Markets, National Authorities, Thomson Datastream
Undervaluation	IMF
UVR <sup>1</sup>	IMF
Sector-Specific Output Data	WDI Database, Organization for Economic Cooperation and Development Structural Analysis (STAN) Database

<sup>1</sup>UVR is the unit value of an economy's exports divided by the unit value of world exports.

## Appendix 4.2. Scoring Method Used to Group Economies

Each episode was scored on the following criteria, which measure similarity with current account surplus episodes:

- High output growth: Per capita GDP growth that is above the sample median
- High export growth: Per capita export growth that is above the sample median

- Relatively large current account: A current account surplus in percent of GDP that is above the sample median
- Globally important surplus: A current account surplus that accounts for at least 10 percent of the world's combined surpluses
- Persistent surplus: A fraction of the past decade spent in surplus that is above the sample median
- High savings: Savings as a percent of GDP that is above the sample median
- High investment: Investment as a percent of GDP that is above the sample median
- Low consumption: Consumption as a percent of GDP that is below the sample median
- Relatively inflexible exchange rate: An exchange rate regime that is either a peg or a heavily managed float, as classified by Reinhart and Rogoff (2004)
- Undervaluation: An estimated undervaluation, using an application of the IMF Consultative Group on Exchange Rate Issues—CGER—macroeconomic balance approach, that is above the sample median

Each criterion was given equal weight. The relevance score for each surplus reversal is the sum of the scores for the various criteria. As a result, the relevance score ranges from 0 to 10.

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