V. Foreign exchange markets

Highlights

The continuing strength of the US dollar vis-à-vis most currencies, but particularly against the euro, was one of the salient features of foreign exchange markets in 2000. The relative stability of the yen, at the surprisingly high level against the dollar reached last year, and the general weakness of the euro were an extension of trends that had begun in 1999. The depreciation of the yen and some recovery of the euro in recent quarters marked a partial reversal of these earlier patterns.

The movements of the main currencies appeared to be driven mostly by prospective growth differentials and portfolio and foreign direct investment (FDI) flows. A series of official foreign exchange interventions in the autumn provided some support for the euro. The dollar's renewed strength vis-à-vis the euro in early 2001 was particularly puzzling in the light of the unexpectedly sharp slowdown in the United States and associated monetary easing. It seemed to indicate entrenched market expectations regarding the medium-term growth prospects in the two economic areas. In fact, in stark contrast to the pattern of the 1980s and most of the 1990s, interest rate differentials seemed to influence exchange rates primarily through their effect on growth expectations.

The magnitude of some other exchange rate movements was also somewhat unusual by historical standards. The Australian and New Zealand dollars fell to all-time lows, while the Canadian dollar depreciated substantially. The Swiss franc also broke with previous exchange rate patterns, strengthening against the euro when the euro fell against the US dollar.

After a period of relative stability in 1999, a number of emerging market currencies began to weaken against the dollar during 2000 in a context of slowing global demand and falling US equity prices. Despite isolated episodes of tension, however, foreign exchange markets were broadly calm.

Global foreign exchange market activity remained well below levels reached in 1998. At the same time, bid-ask spreads for the main currency pairs stayed tight. While short-term volatility increased in some market segments, overall liquidity appeared not to have deteriorated.

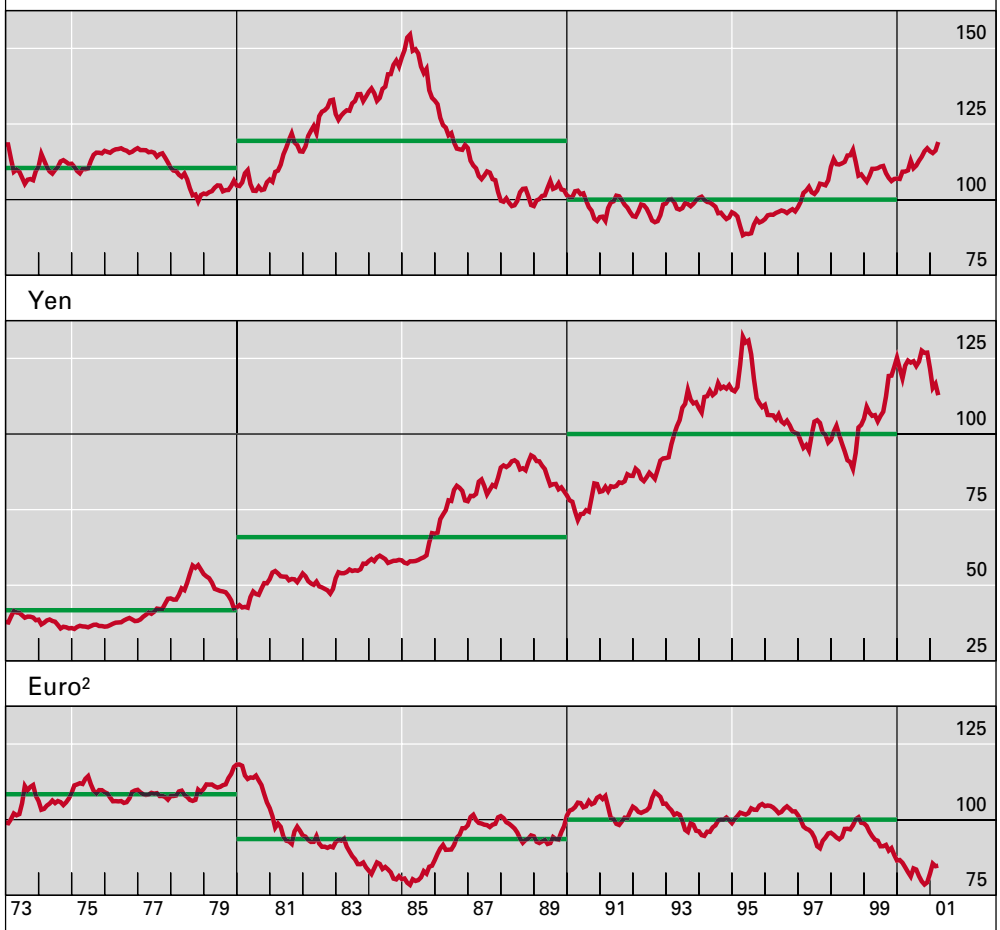
The dollar, yen and euro

Key developments and long-term perspectives

In 2000 and early 2001, the dollar appreciated in nominal effective terms by about 11% to a level last seen in 1986 (Graph V.1). In contrast, the nominal effective exchange rate of the euro fell by 4% to a historical low, 16% below the 1990s average for the "synthetic" euro. The yen remained stable in

Nominal effective exchange rates of the dollar, yen and euro[1]

Monthly averages, 1990–99 = 100



Note: The horizontal lines indicate the period averages.

[1] Trade-weighted averages; prior to 1999, vis-à-vis 25 countries; thereafter the EMU participants are treated as a single unit. [2] Prior to 1999, trade-weighted average of effective exchange rates of EMU participants.

Source: BIS. Graph V.1

effective terms between January and November 2000, but by early April 2001 it had depreciated by 13%.

Persistent dollar strength

The period under review was characterised by continued dollar strength against the euro and, to a lesser extent, the yen. Against the euro, the dollar's appreciating trend persisted, notwithstanding brief episodes of euro recovery in May–June 2000 and November 2000–January 2001 (Graph V.2). The euro reached its lowest level vis-à-vis the dollar in October at $0.82, a 19% fall since January 2000 and a 30% decline since its launch in January 1999. Taking a "synthetic" euro as a benchmark, this level was last seen in late 1985. The magnitude of the euro's depreciation in 2000 was remarkable, exceeded only by that of the Deutsche mark in 1981 and 1985–86, two periods of extraordinary dollar strength. Against the yen, after strengthening somewhat in early 2000, the dollar remained stable over most of the year and fluctuated in an unusually narrow range of ¥105–110. In November, however, the yen started to weaken, and by April 2001 it had lost almost 15% against the dollar.

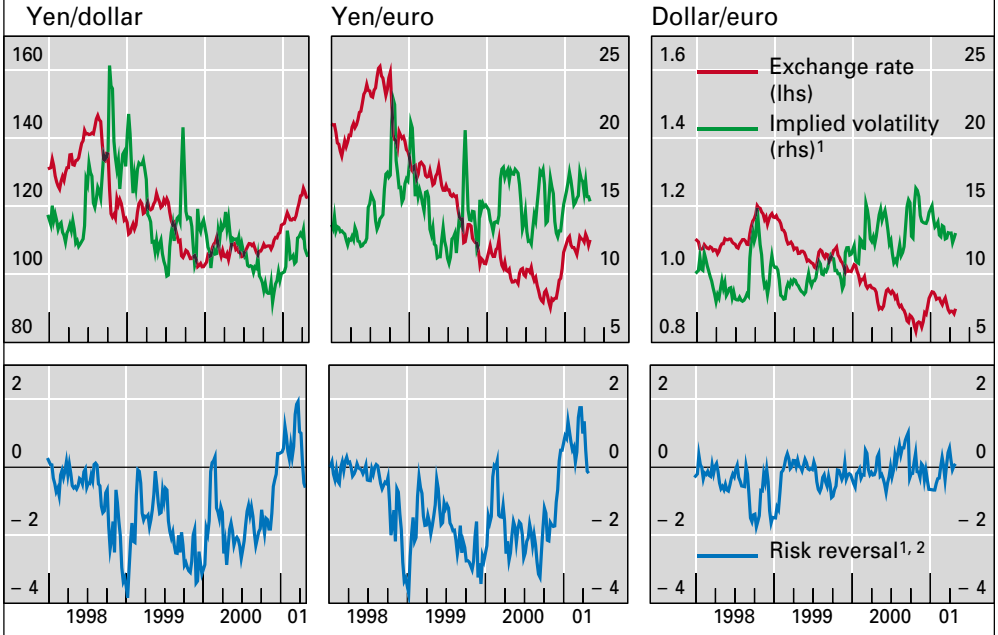
In terms of its relationship with the yen, the euro reached an all-time low of ¥89 in late October, amounting to a 14% fall since January 2000 and a 33% drop since January 1999. Between November 2000 and early April 2001, however, the yen depreciated against the euro by 21%.

Short-term effects ...

This configuration of exchange rate movements has had implications for growth outcomes and prospects across major regions in the world. The dollar's strength in effective terms helped redistribute world aggregate demand from the United States to economies with less buoyant demand, such as the euro area. At the same time, it placed a certain additional pressure on some countries with currencies firmly tied to the dollar, such as Argentina. The yen's decline in effective terms since November 2000 could prove beneficial for Japan's uncertain recovery, ending a long period in which the currency either failed to support or acted as a drag on the country's exports. Depending on its extent, however, further depreciation of the yen might create difficulties for exporters in the Asian region, already affected by weakening demand in the United States. Were the US slowdown to have an impact on the dollar, the main degree of freedom in the system would appear to be the euro exchange rate, an appreciation of which would be more easily absorbed given relatively more robust growth in Europe.

The prevailing pattern of exchange and interest rates among the main currency areas may also have implications for potential financial disturbances driven by certain trading strategies. In particular, if the view becomes entrenched

Exchange rates, implied volatilities and risk reversals of the dollar, yen and euro



Note: Prior to 1999, the euro exchange rate is calculated as the trade-weighted average of bilateral rates of the legacy currencies and adjusted at the value of the ECU rate of 31 December 1998 (passim).

[1] One-month, in percentages. [2] A positive value indicates a bias towards dollar strength in the left- and right-hand panels, and towards euro strength in the centre panel.

Sources: ECB; Dresdner Kleinwort Wasserstein Research; Reuters; BIS calculations. Graph V.2

that there is a limited or no immediate prospect of a yen strengthening, it might seem profitable for investors to build up short yen positions through yen carry trades. Indeed there is anecdotal evidence that such trades have been increasing since autumn 2000. Not least, carry trades could contribute to the accumulation of pressure on currencies of emerging market countries with comparatively tight exchange rate commitments. The large dollar/yen movement in autumn 1998 highlighted the fact that in some cases they can even induce sharp spikes of short-term volatility in the major foreign exchange markets.

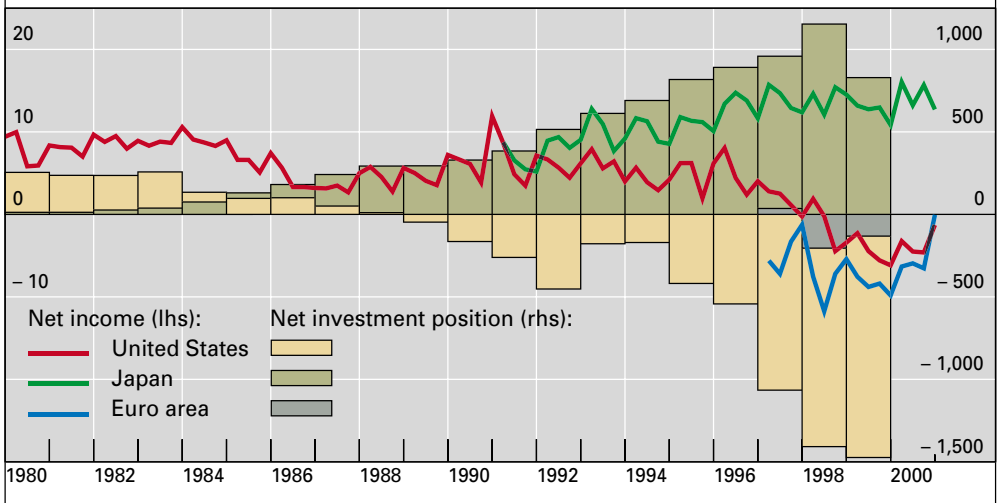
... and long-term perspectives

In a longer-term perspective, the issue of the sustainability of current exchange rate levels was raised again as the US current account deficit reached a record $435.4 billion (or 4.4% of GDP) in 2000, increasing the external liabilities of the United States further (Graph V.3).

One approach to assessing the longer-term appropriateness of exchange rate levels consists in estimating models of fundamental equilibrium exchange rates (FEERs), which are based on real exchange rate levels that are compatible with a stable ratio of external debt to potential output in the long run. While estimates of FEERs vary substantially across empirical studies and are typically very uncertain from a statistical standpoint, they tend to support the view that the dollar at current levels is above its long-term equilibrium value vis-à-vis the euro and, to a lesser extent, the yen. However, it should also be borne in mind that net income on the US international investment position turned negative only as recently as 1998. Since then it has remained stable as a fraction of US exports and is extremely small compared to US output. Moreover, while official dollar reserves continued to rise in 2000 and early 2001, their increase financed a smaller portion of the US deficit in 2000 than in 1999, with the share falling from 42% to 30% (Table V.1). Portfolio and FDI flows remained strong and covered 78% (1999: 64%) and 36% (1999: 38%) of the US deficit, respectively.

Net international investment position and income of the United States, Japan and the euro area

In billions of US dollars



Sources: ECB; IMF; national data. Graph V.3

Official foreign exchange reserves

	1997	1998	1999	2000	Amounts outstanding at end-2000
	in billions of US dollars				
	Changes, at current exchange rates				
Total	56.1	55.9	129.6	139.5	1,908.7
Industrial countries	–12.0	–11.3	40.7	54.5	774.8
Asia[1]	8.5	62.2	79.1	46.4	688.4
Latin America[2]	10.9	– 8.3	–8.0	2.4	127.6
Eastern Europe[3]	4.9	5.1	0.6	21.2	95.2
Other countries	43.8	8.2	17.2	15.0	222.7
	Changes, at constant exchange rates[4]				
Total	113.5	18.6	181.0	172.1	1,908.7
Dollar reserves	72.5	51.3	140.3	130.3	1,450.5
Non-dollar reserves	41.0	–32.7	40.7	41.8	458.2

[1] China, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand. [2] Argentina, Brazil, Chile, Colombia, Mexico and Venezuela. [3] Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia and Slovenia. [4] Partly estimated; valued at end-of-year exchange rates.

Sources: IMF; national data; BIS estimates. Table V.1

Factors driving exchange rate movements

Exchange rate movements are notoriously difficult to explain. The three most actively traded currencies in the period under review were no exception. In particular, it is difficult to find explanations that could be valid for all currency pairs simultaneously.

Medium-term growth prospects underpinned dollar strength ...

Arguably, the persistent strength of the dollar against the euro and, to a lesser extent, the yen was rooted in the belief that the US economy, propelled by higher productivity growth, would in the medium term continue to expand at a considerably faster pace than the other main currency areas. Sustained capital inflows in the form of equity, particularly FDI, lend support to this argument. The decline in the US equity market throughout the year, echoed elsewhere, did not appear to shake this belief, except perhaps transitorily. Nor did signs of an abrupt slowdown in the United States, consistent with the view that it would either be short-lived or have a stronger impact outside the country than anticipated in most forecasts. The role of the dollar as a safe haven par excellence could underpin this second explanation.

... but not the robustness of the yen

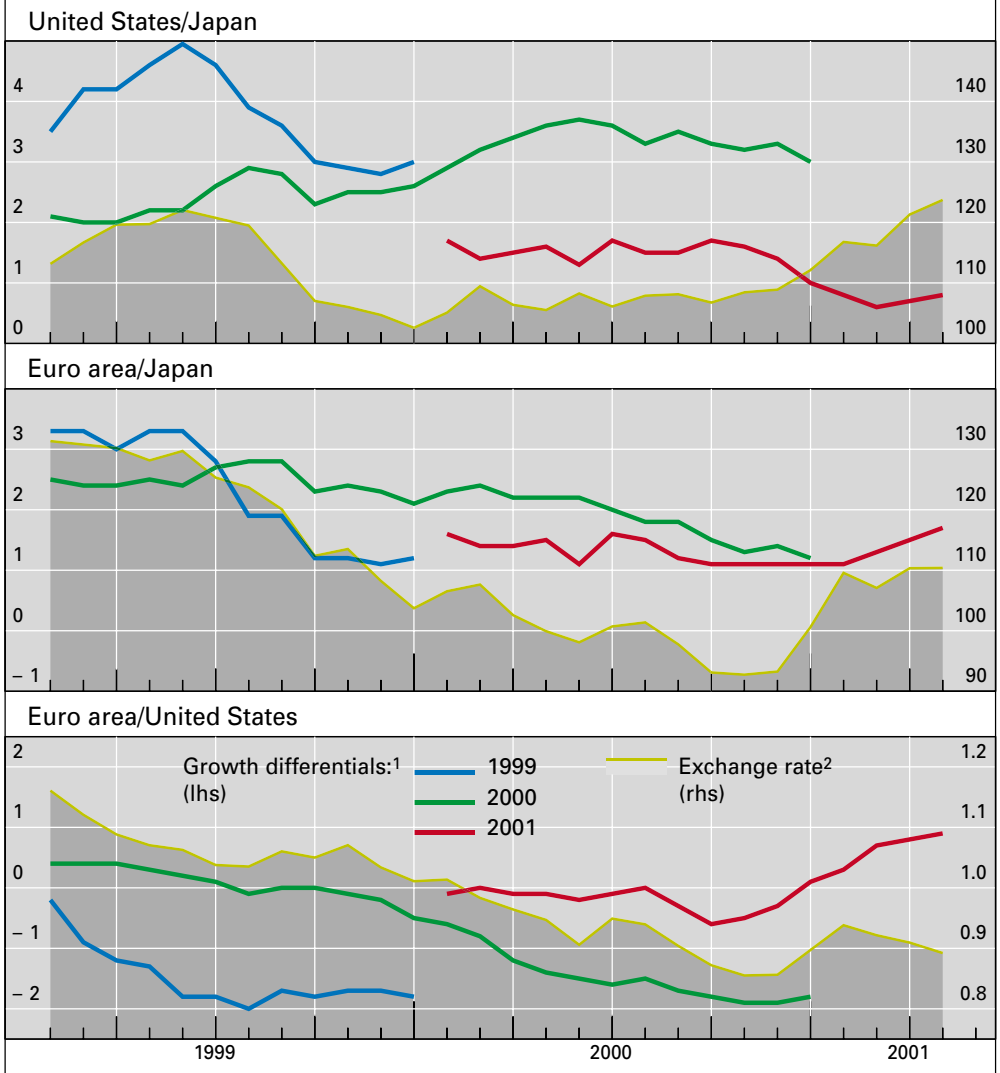
Using the same logic, however, it is harder to account for the comparative strength of the yen vis-à-vis the euro, especially seen from a somewhat longer-term perspective. In this case, a greater weight would need to be attached to the fluctuations in the prospects for the recovery of the Japanese economy during the past year. Accordingly, the weakening of the yen against the other main currencies since November 2000 would signal a long-awaited correction in line with Japan's relatively poor economic performance. A more careful look at the available data on short-run growth forecasts, capital flows and the response of foreign exchange markets to news can cast further light on these interrelationships.

The evolution of revisions in expectations of growth differentials across the three main currency areas one to two years ahead is broadly consistent with movements in exchange rates, at least until late 2000 (Graph V.4). The dollar's appreciation against the euro during most of 2000 appears to have been underpinned by revisions in market participants' one- to two-year forecasts of growth differentials favouring the United States. Similarly, the yen's rise against the euro over most of last year coincided with a narrowing of expected growth differentials between the euro area and Japan, as prospects for the Japanese economy brightened temporarily. Moreover, the dollar's stability against the yen over the first three quarters of 2000 was in line with expectations of fairly constant growth differentials between Japan and the United States.

Some puzzles

However, given this evidence, the subsequent strength of the dollar would appear to be something of a puzzle. Starting in November, the

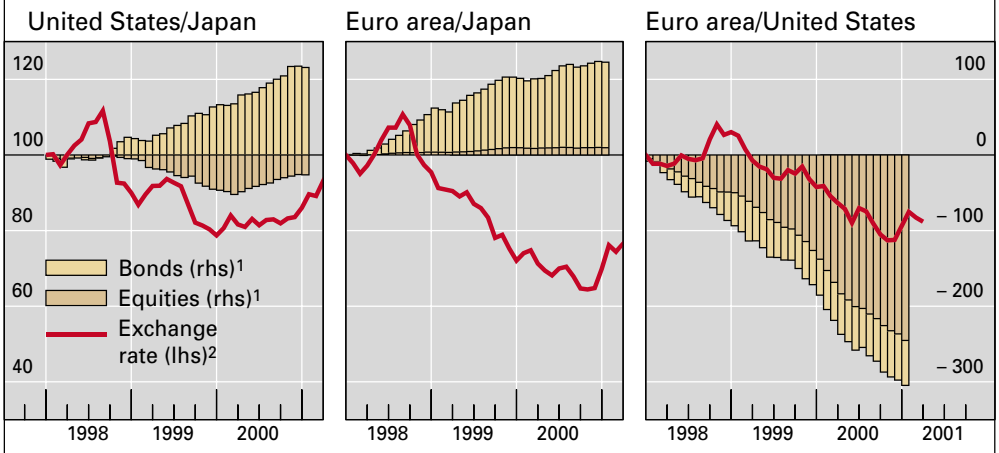
Growth forecast differentials between the three major economies



1 In the top two panels, growth forecasts in the United States and the euro area respectively minus that in Japan; in the bottom panel, that in the euro area minus that in the United States. In percentage points. 2 Yen/dollar, yen/euro and dollar/euro rates respectively, at the time of the survey.

Sources: © Consensus Economics; national data; BIS calculations. Graph V.4

Cumulative portfolio flows between the three major economies



[1] Cumulative flows since January 1998, in billions of US dollars. A positive value indicates, in the left-hand panel, a net flow into the United States and, in the other panels, into the euro area. Data may include official transactions; for the centre panel, Japanese investors only. [2] Yen/dollar, yen/euro and dollar/euro; December 1997 = 100.

Sources: Japanese Ministry of Finance; US Treasury; national data; BIS calculations. Graph V.5

dollar appreciated against the yen in spite of expectations of converging growth paths in the US and Japanese economies. Furthermore, the dollar's appreciation against the euro in the first quarter of 2001 is inconsistent with indications that market participants anticipated faster growth in the euro area than in the United States in the course of the year.

Portfolio and FDI flows supported the dollar against the euro

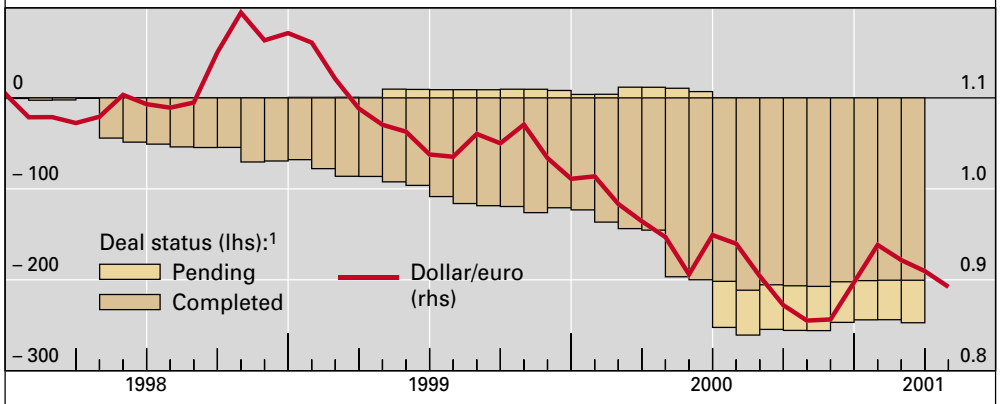
The persistent strength of the dollar could be rationalised if the comparative medium-term growth prospects for the United States remained resilient to the abrupt slowdown in the economy. In 2000, such views and expectations of "new era" rates of return on US assets arguably underpinned a sharp rise in net portfolio, largely equity, flows from the euro area (Graph V.5). Notably, net equity flows from the euro area to the United States reached $110 billion in 2000, compared to only $16 billion of bond flows. These flows did decline somewhat towards the year-end, but remained positive.

More tellingly perhaps, those same expectations seemingly continued to support large FDI flows, generated mostly by transatlantic mergers and acquisitions (M&As), throughout 2000 even though their pace did slow compared with 1999 (Graph V.6). Admittedly, it is difficult to draw conclusions about the causal relationship between M&As and exchange rate movements in the absence of detailed information on the financing of such deals and the timing of related cash flows. Even so, there is statistical evidence that on average the dollar did appreciate against the euro on days on which major acquisitions of US companies by euro area companies were announced. Moreover, the trend in M&As was clearly consistent with the behaviour of the exchange rate and could be seen as a sign of the medium-term attractiveness of dollar assets more generally. Against this background, however, the persistent portfolio and FDI outflows from Japan to the euro area underline the anomaly of the comparative strength of the yen for much of the period.

The euro's asymmetric reaction to news

The relevance of medium-term growth prospects associated with entrenched perceptions of economic paradigms may also be inferred from the

Merger and acquisition activity and the euro/dollar exchange rate

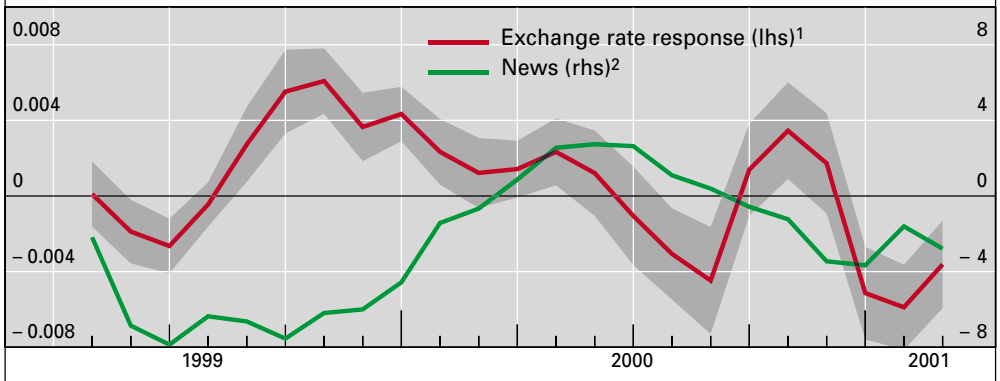


[1] Cumulative net flows from the United States into the euro area since January 1998, in billions of US dollars. Observations are assigned to the announcement date of the deal.

Sources: ECB; Bloomberg. Graph V.6

asymmetric reaction of the euro to "news" about macroeconomic indicators in the euro area since the inception of the new currency. Evidence of this asymmetry is provided by rolling regressions of daily percentage changes in the euro/dollar exchange rate on "surprises" about key data released in the euro area, such as the Ifo index or industrial production in Germany. For most of 1999, the euro declined following largely disappointing data releases in the euro area (Graph V.7). In contrast, the currency failed to respond accordingly when news from the euro area became more favourable in late 1999 and early 2000. This asymmetry appears indicative of a persistent negative market sentiment towards the European currency. Market participants have tended to rationalise this on the basis of lagging structural adjustments in continental Europe in spite of the progress made in addressing this problem (see Chapter II).

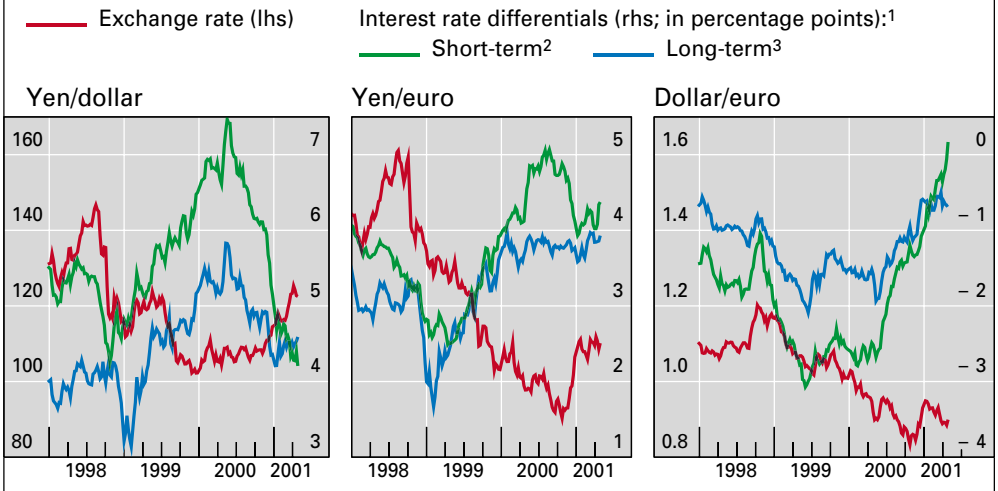
The response of the euro/dollar rate to news about the euro area



[1] Slope coefficient in the regression of the log differences of the dollar/euro exchange rate on the "surprises" in macroeconomic data releases (defined as the difference between actual announcements and median values of their forecasts) in the euro area and the United States. A positive coefficient indicates a strengthening (weakening) of the euro against the dollar in association with a positive (negative) surprise in the euro area data. The regressions are estimated using daily data over rolling samples of 60 business days. The shaded area is the ±1 standard deviation confidence band. [2] Cumulative number of positive and negative surprises in euro area data releases.

Sources: Bloomberg; national data; BIS calculations. Graph V.7

Exchange rates and interest rate differentials



[1] In the left-hand and centre panels, calculated as US and euro area rates respectively minus Japanese rates; in the right-hand panel, euro area minus US rates. [2] Using forward interest rates derived from six- and 12-month Libid. [3] Using 10-year swap rates.

Sources: ECB; Reuters; BIS calculations. Graph V.8

Decoupling of interest rates and exchange rate changes

A corollary of the significance of growth prospects in driving exchange rates is what might otherwise appear to be a puzzling relationship between short-term interest rate differentials and exchange rates. In 2000 and early 2001, a substantial narrowing of short-term interest rate differentials favouring the United States, compared to the euro area, coincided with a depreciating trend of the euro (Graph V.8). To the extent that market participants consider inflation to be under control, such a narrowing would tend to be positively correlated with growth prospects and hence with returns on investments other than government bonds or money market paper. On balance, market participants may have considered the Eurosystem's monetary policy stance to be excessively tight inasmuch as it may have negatively influenced the outlook for euro area growth. The divergent behaviour of long-term interest rate differentials and exchange rate movements is consistent with the view that markets believed inflation to be under control (see Chapter IV). Likewise, the increasing importance of cross-border equity flows, in the form of portfolio or FDI flows, relative to bond investments lends further support to this broad explanation of events.

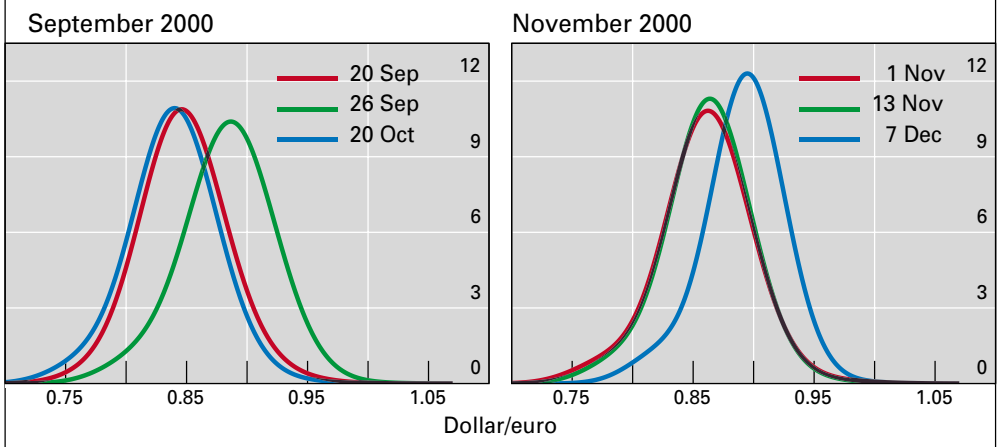
Foreign exchange market intervention in the euro/dollar market

In the second half of 2000, against the background of the protracted weakening of the euro against the dollar and its implications for medium-term inflation, the ECB and national central banks of the Eurosystem intervened several times in foreign exchange markets. On 22 September, they acted jointly with other G7 monetary authorities. On 3, 6 and 9 November, the ECB announced again that it had intervened in conjunction with the Eurosystem's national central banks to buy euros.

The September intervention had less impact ...

The first intervention episode highlights the difficulties that central banks may encounter when they try to influence the level of a sharply declining exchange rate when markets are assigning more weight to a much weaker

Probability distributions of the dollar against the euro[1]



[1] The calculation assumes risk neutrality and is based on data posted around 2 pm on the days shown.

Sources: Deutsche Bank; BIS calculations. Graph V.9

rather than a much stronger rate. Information extracted from option prices suggests that following the September intervention, traders changed their expectations of future exchange rate levels only temporarily, and did not alter their assessment of the balance of risks between a much stronger and a much weaker euro (Graph V.9). Consistent with this evidence, the euro resumed its downward trend vis-à-vis the dollar.

... than those in November

In contrast, the second round of intervention appears to have been, on balance, more successful. In the wake of the euro's recovery from its trough, after the three interventions in early November, traders seemed to become more concerned about the possibility of a much stronger rather than a much weaker euro. Although this change in market sentiment took several days to materialise, as evidenced by the cautious path of the euro following the interventions, it seemed to indicate that the Eurosystem's action provided some support for the euro.

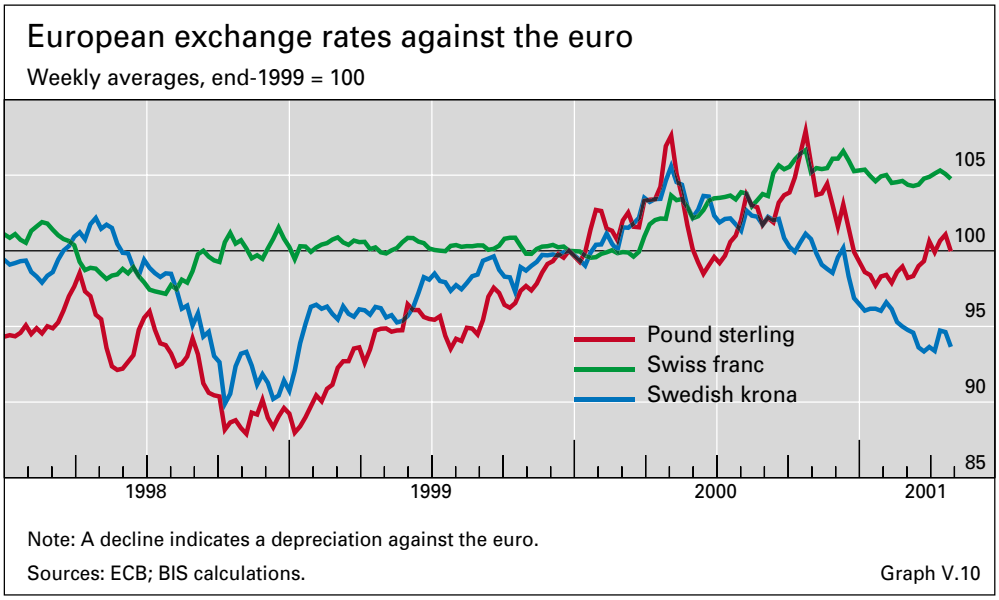
Developments in other foreign exchange markets

European currencies

Expected growth differentials influenced the pound

The pound sterling continued to follow an intermediate path between the dollar and the euro. In contrast to its relative stability against the dollar in 1999, the pound depreciated by about 15% between January and mid-September 2000 but recovered somewhat thereafter. Against the euro, sterling's strengthening trend in 1999 ended in April 2000, giving way to wide swings (Graph V.10). The pound's movements against both the dollar and the euro were broadly consistent with revisions in market forecasts of growth differentials over most of 2000, but appeared less clearly so in early 2001. Like that of the three main currencies, the behaviour of sterling did not appear to be significantly influenced by changes in short- or long-term interest rate differentials.

Up until May 2000, the Swedish krona followed the pound in its appreciating trend against the euro. However, from then to mid-April 2001, the krona declined steadily, losing about 12% against the euro, despite the fact



The performance of the high-tech sector weighed on the krona

that Sweden's economy was outperforming that of the euro area. The krona's weakness has been attributed mainly to the concurrent downturn in the Nasdaq. In particular, traders focused on the dominance of the high-tech sector in Sweden, where the leading electronics firm accounts for 15% of total exports and ½ percentage point of the country's current growth rate. Since 1999, daily percentage movements in the krona's nominal effective exchange rate have on average amounted to almost half the daily percentage changes in the Nasdaq.

The changing link between the Swiss franc and the euro

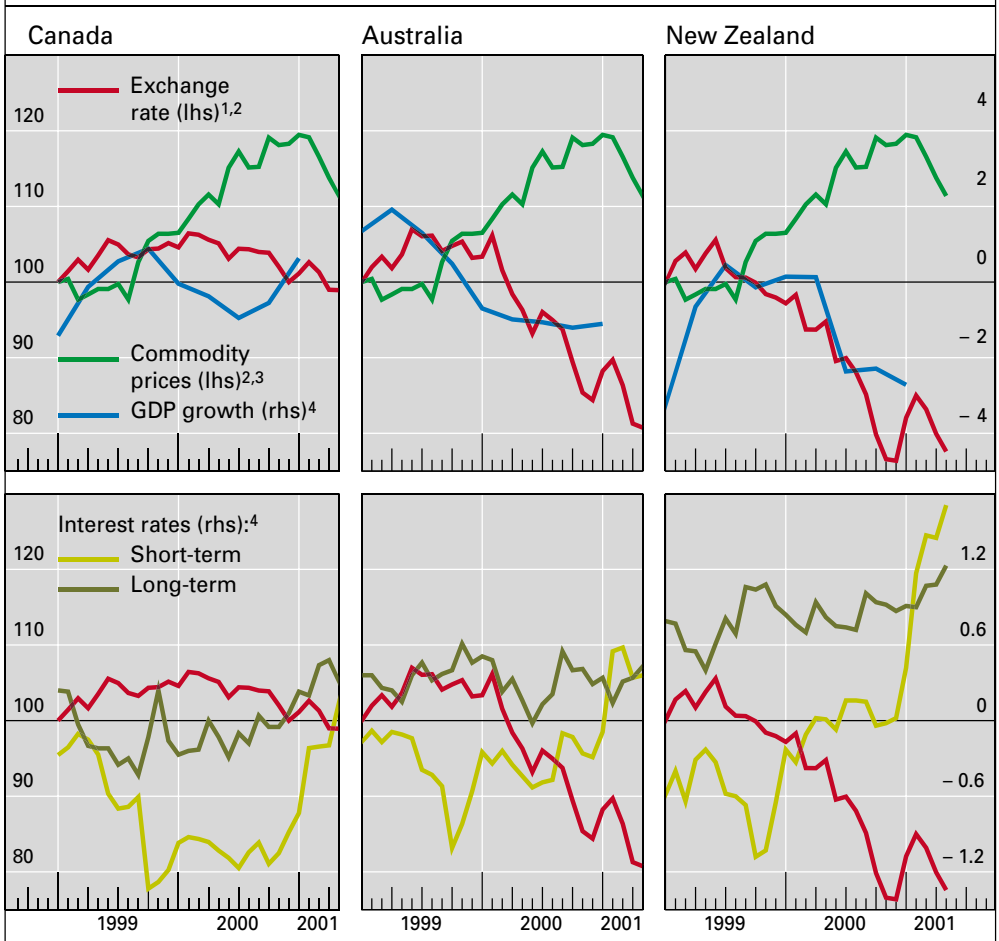
In late March 2000, the Swiss franc began to appreciate against the euro, breaking away from the tight trading range that had prevailed from the beginning of 1999. Furthermore, the franc has since appeared at times to follow a new pattern: strengthening (weakening) against the euro when the euro falls (rises) against the dollar, in clear contrast to its earlier behaviour vis-à-vis the Deutsche mark, against which it tended to weaken (strengthen) when the mark depreciated (appreciated) against the dollar. This change in pattern was not associated with less synchronous cyclical developments in the euro area and Switzerland. Rather, it appeared to be rooted in market participants' perception that the Swiss authorities favoured the disinflationary effects of a stronger franc in the light of the tightening by the Swiss National Bank on 23 March 2000, which reflected its concern about the franc's weakness against the dollar at the time.

Currencies of other industrial countries

Marked depreciation of dollar bloc currencies

In certain other industrial countries during the period under review, the size of exchange rate movements was exceptional and again not obviously explainable in terms of underlying fundamentals. The depreciation to historical (or close to historical) lows of the currencies that have traditionally belonged to the dollar bloc was noteworthy. Between January 2000 and the end of March 2001, the Canadian dollar weakened by an overall 8% against the US dollar to $0.64, close to its all-time low in 1998. The Australian dollar depreciated by about 23% to a record low of close to $0.48 at the end of

Commodity prices, growth and interest rate differentials and exchange rates



[1] Against the US dollar; a decline indicates a US dollar appreciation. [2] December 1998 = 100. [3] Bridge/Commodity Research Bureau (CRB) Futures Price Index. [4] Vis-à-vis the United States, in percentage points.

Sources: Bloomberg; Datastream; national data. Graph V.11

March this year, while the New Zealand dollar fell by almost 25% and hit a low of $0.39 in mid-October 2000. The speed with which the Australian and New Zealand currencies declined was almost without precedent. The Canadian dollar's fall was also steeper than average, though not so extreme.

Admittedly, larger growth gaps vis-à-vis the United States and sizeable current account deficits weighed on the currencies of the smaller and more open economies of Australia and New Zealand (Graph V.11). Moreover, although Australia's productivity growth exceeded that of the United States in 2000 (see Chapter II), market commentary suggested a perception of Australia as an "old economy", with a relatively small share of the information technology sector. This might help account for the weakness of its currency and stock market. The weakness of the Canadian dollar, however, is harder to explain in the light of Canada's current account surplus and the narrowing of growth differentials with the United States. Commodity prices, which have long been viewed as an important factor driving the Canadian dollar and, even more so, the Australian and New Zealand dollars, rose over most of 1999 and 2000, but failed to support these currencies.

Emerging market currencies

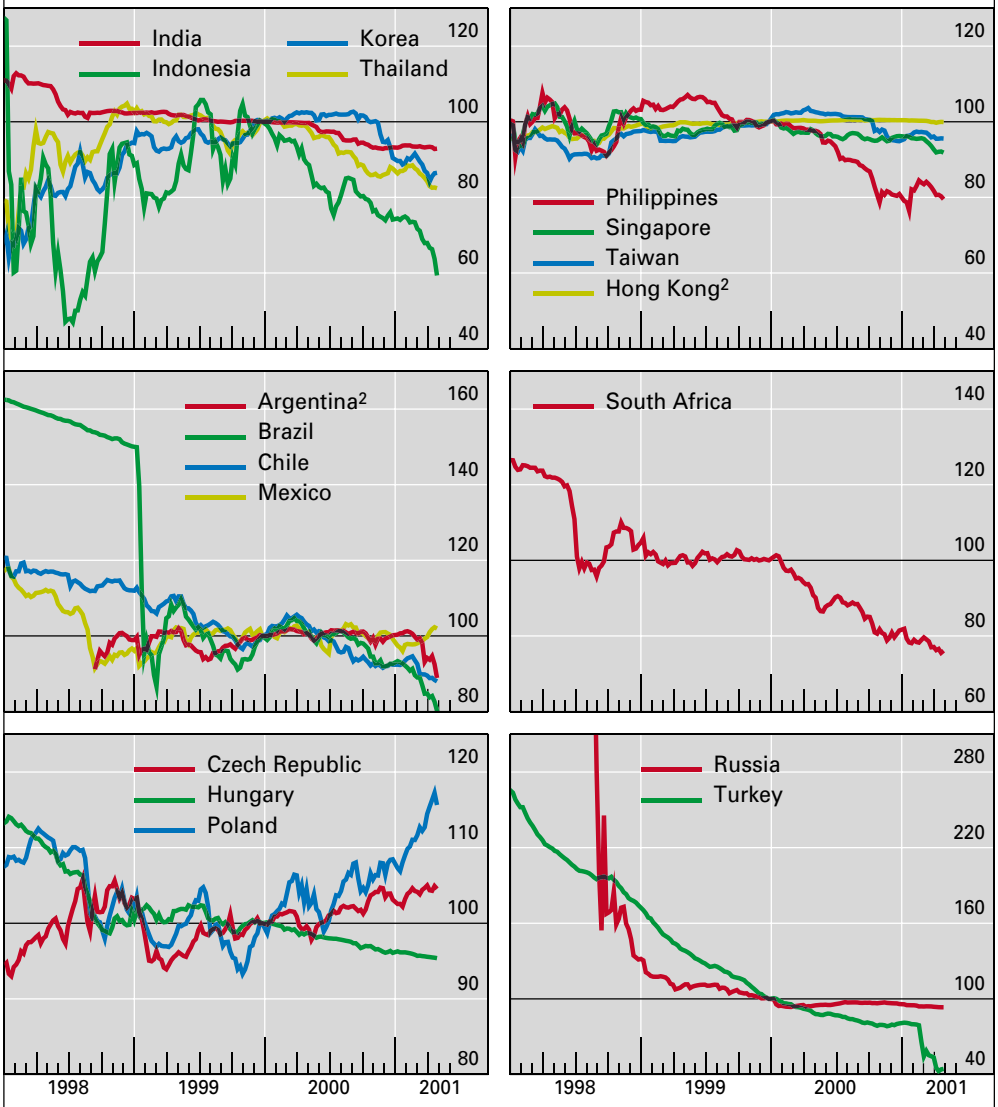
There were two main aspects to foreign exchange market developments in emerging market countries during the period under review. First, after a spell of relative stability in 1999, several emerging market currencies began to weaken in the course of 2000. Second, despite these instances of weakness and isolated episodes of tension, foreign exchange markets in emerging market countries remained broadly calm.

Weakening of emerging market currencies against the US dollar

During 2000, a number of Asian currencies depreciated against the US dollar (Graph V.12) and, to a lesser extent, in real effective terms. The rupiah, the baht and the Philippine peso declined significantly against the dollar throughout the year, while the won and the New Taiwan dollar remained on the strong side for most of the year before weakening to different degrees

Exchange rates in emerging markets[1]

Weekly averages, end-1999 = 100



Note: A decline indicates a dollar (euro) appreciation.

[1] Against the US dollar (for the currencies in the bottom left-hand panel, against the euro). [2] Twelve-month (for Argentina, non-deliverable) forward rate.

Sources: ECB; Datastream. Graph V.12

towards the year-end. In Latin America, the real and the Chilean peso drifted down against the US dollar at a similar pace during 2000, but the real began to decline more rapidly in early 2001. In Africa, the rand's relative stability against the dollar in 1999 gave way to a downward trend against both the dollar and the euro in 2000 and early 2001.

Most central and eastern European currencies remained fairly robust against the euro. The Czech koruna appreciated, while the forint depreciated modestly in accordance with its crawling band regime. Despite a considerable depreciation after being floated in April 2000, the zloty posted an overall appreciation against both the euro and the dollar from January 2000 to April 2001. In contrast to 1999, when it had weakened against the dollar and the euro, the Russian rouble was remarkably stable against the dollar in 2000 and strengthened against the euro.

The role of external factors

In addition to domestic factors, which are discussed in detail in Chapter III, a number of broad external forces also exerted an influence on emerging market currencies. While these forces had supported the currencies in 1999, they were less favourable during the period under review. The slowdown in world demand in 2000, compounded in many countries by inflationary pressures stemming from rising oil prices, had an overall negative impact on domestic growth rates and current accounts, and hence on local currencies. Exchange rates were also affected to different degrees by the association of domestic currencies and stock markets with US equity markets (Table V.2). The decline of US equity prices over the course of 2000, and specifically the rapid fall of the Nasdaq, appeared to weigh on some

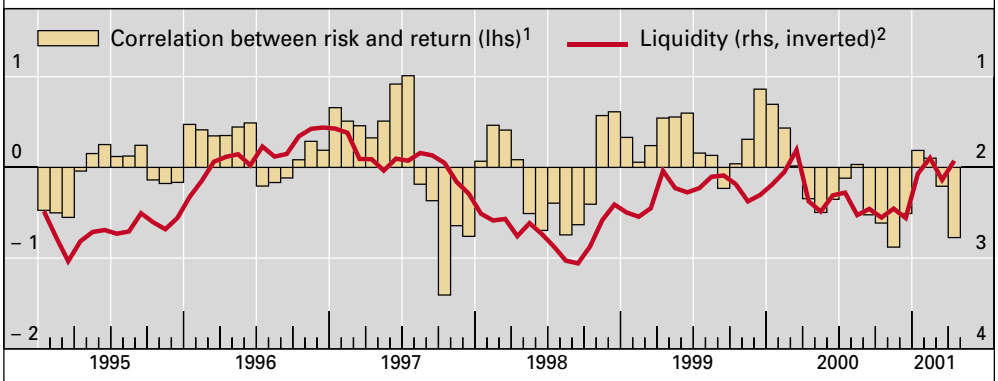
Stock markets, exchange rates and high-tech exports in emerging market economies

	Stock market indices[1,2]	US dollar exchange rates[1]	High-tech exports[3]
	weekly percentage changes		in percentages
Asia[4]	0.38	0.10	41
Hong Kong	0.54	0.03	30
India	0.37	–0.02	3
Indonesia	0.32	0.11	9
Korea	0.51	0.37	41
Philippines	0.18	0.04	60
Singapore	0.34	0.08	77
Taiwan	0.39	0.08	50
Thailand	0.39	0.07	34
Latin America[4]	0.42	0.15	19
Argentina	0.34	–0.10	0.4
Brazil	0.52	0.38	3
Chile	0.34	0.21	0.1
Mexico	0.47	0.11	29

[1] Correlations with the Nasdaq over the period January 2000 to mid-April 2001. [2] In US dollar terms. [3] Share of economy's total exports to OECD countries. [4] Average correlation and sum of exports of the economies shown.

Sources: Datastream; International Finance Corporation; OECD; national data. Table V.2

Investors' attitude towards risk and liquidity



[1] Slope coefficient of a cross-sectional regression of realised returns on historical volatility for a number of asset classes. [2] GDP-weighted average of overnight real rates in the eurocurrency market for the United States, Japan, Germany, France and the United Kingdom.

Sources: Datastream; national data; BIS estimates. Graph V.13

currencies, such as the won, the Chilean peso and the real. However, there is no evidence that the correlation between changes in dollar exchange rates and returns on the Nasdaq depended on the share of the high-tech sector in domestic output. Changes in investors' attitude towards risk and in leverage opportunities in the course of 2000 may also have been unfavourable to emerging market currencies (Graph V.13). Net portfolio outflows appear to have hurt some Asian currencies, particularly the won, towards the end of 2000 (see Chapter III).

Markets remained broadly calm

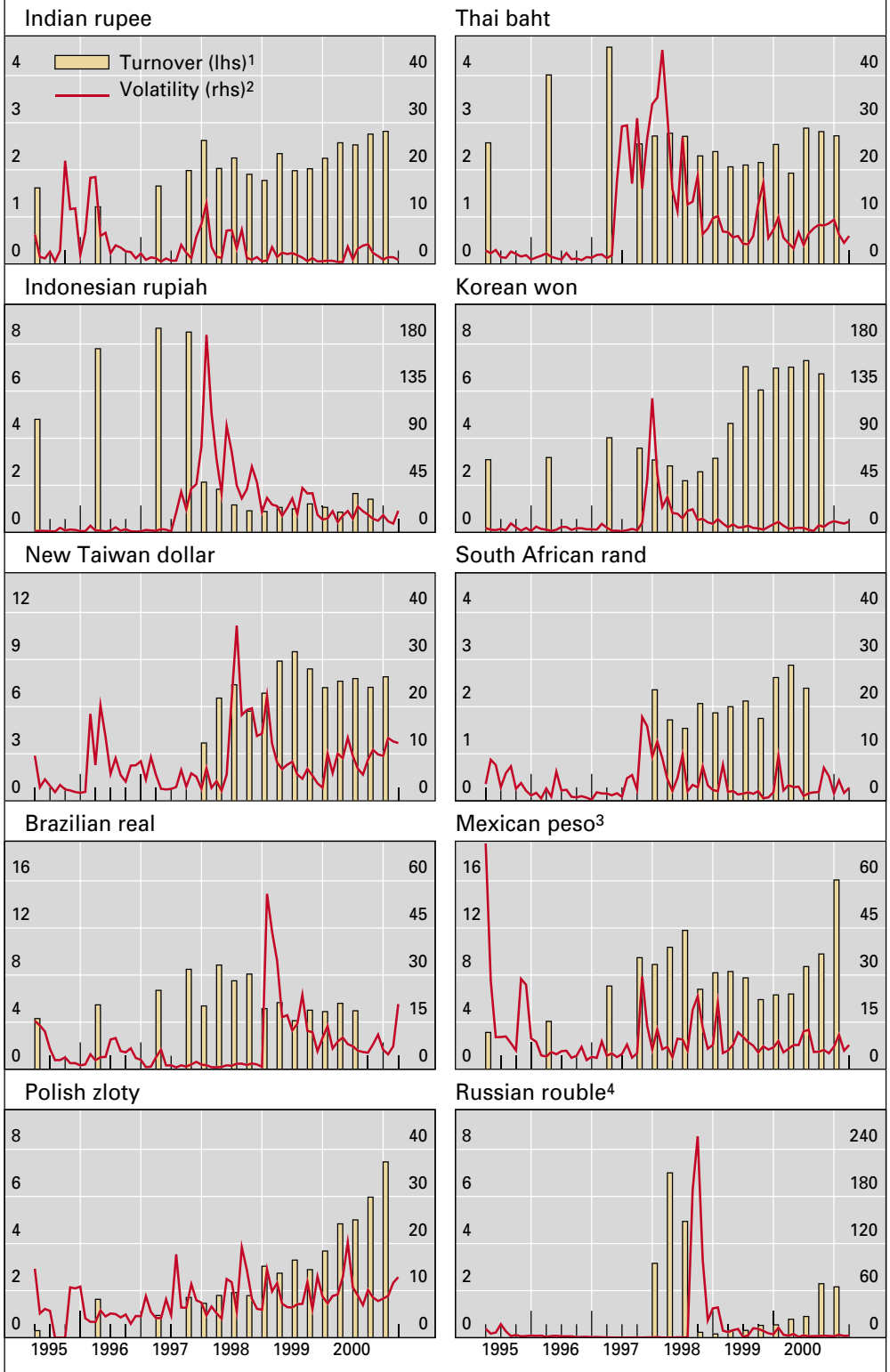
Notwithstanding the depreciation of a number of currencies, foreign exchange markets remained broadly calm during the period under review, as in most of 1999. Short-term volatility continued to be generally low and trading activity increased somewhat (Graph V.14). Trading in markets that had dried up following the crisis in 1998, such as Russia, revived. However, a sudden and sharp crisis hit Turkey in February 2001. When the Turkish lira's crawling peg proved unsustainable, the currency fell by more than 40% against the dollar and the euro (see Chapter III). Even so, this episode had remained localised at the time this chapter went to press.

The role of the exchange rate as an anchor

That the Turkish crisis did not spill over to other markets arguably reflected two factors. First, the reduction in position-taking in foreign exchange markets during the period under review, and the seemingly greater capacity of international financial markets to distinguish between different qualities of credit, may have attenuated the spread of the turbulence (see Chapter VI). Second, the resilience of foreign exchange markets may have been enhanced in recent years as exchange rate policies have become more flexible, consistent with the trend in emerging market countries towards floating more freely and relying more on new monetary policy frameworks to anchor inflation (see Chapter III).

There are two pieces of statistical evidence that exchange rates have become more flexible than before the Asian crisis. First, the volatility of exchange rates vis-à-vis their main reference currency has tended to be somewhat higher in absolute terms, as well as compared to the volatility of

Turnover and volatility in emerging markets



[1] Estimates of local turnover in the domestic currency as reported by the respective central banks, net of double-counting, per trading day in the month shown (in billions of US dollars) except: for South Africa, Brazil and Mexico, including other currencies; for Indonesia and Poland, on a gross basis and, for 1995 and 1996, annual averages; for Thailand, 1995 second half and 1996 annual averages; for Russia, since 1999, interbank trading volumes only. [2] One-month standard deviation of annualised daily percentage changes in the exchange rate against the US dollar. [3] Since October 2000, turnover includes small swaps. [4] Break in series due to an increase in the number of reporting dealers since October 2000.

Sources: Central banks; Datastream; BIS calculations. Graph V.14

Exchange rate and interest rate volatility in emerging markets[1]

	Exchange rate volatility				Interest rate volatility[2]		Ratio[3]	
	Jan 1995–Dec 1996		Jul 1999–Mar 2001		Jan 1995–Dec 1996	Jul 1999–Mar 2001	Jan 1995–Dec 1996	Jul 1999–Mar 2001
	bilateral[4]	effective[5]	bilateral[4]	effective[5]				
Hong Kong	0.2	3.0	0.1	3.6	10.9	15.8	0.02	0.01
Indonesia	1.4	4.0	13.9	14.4	0.9	3.3	1.55	4.26
Korea	2.4	3.9	4.7	5.4	14.2	5.6	0.17	0.83
Philippines	1.3	3.1	5.9	6.7	42.8	15.4	0.03	0.38
Singapore	1.9	2.5	2.7	3.3	46.1	35.7	0.04	0.08
Taiwan	2.0	3.2	2.1	3.4	24.2	6.6	0.08	0.32
Thailand	1.0	…	4.1	…	27.7	32.3	0.04	0.13
Argentina	0.1	2.1	0.1	3.5	29.9	58.8	0.00	0.00
Brazil	3.0	4.6	6.2	6.6	42.0	4.3	0.07	1.45
Chile	3.4	…	4.7	…	8.6	14.1	0.40	0.33
Mexico	9.2	10.3	4.9	5.4	38.9	18.9	0.24	0.26
Czech Republic	3.0	3.0	4.1	3.9	7.9	3.6	0.38	1.12
Hungary	4.1	4.0	2.2	2.2	4.8	6.9	0.85	0.32
Poland	5.1	4.9	7.3	6.8	10.2	9.3	0.50	0.78
South Africa	4.3	…	5.9	…	5.7	3.4	0.77	1.77

[1] Calculated as the standard deviation over calendar months of annualised weekly percentage changes. [2] Of three-month (for Brazil, overnight) rates. [3] Of bilateral exchange rate volatility to interest rate volatility. [4] Against the US dollar (for the Czech Republic, Hungary and Poland, against the euro). [5] Trade-weighted.

Sources: National data; BIS calculations. Table V.3

domestic short-term interest rates (Table V.3). Second, although emerging market currencies have continued to be less variable in dollar terms than in nominal effective terms, the volatility of bilateral dollar exchange rates has risen faster than that of nominal effective exchange rates. Hence, while the dollar has continued to play an important role for emerging market currencies in Asia and Latin America, its influence appears to be somewhat smaller now, and that of effective exchange rates greater, than before the Asian crisis.

Nevertheless, while freer than in the past, exchange rate management appears not to have been entirely forsworn. In 2000 and early 2001, exchange rate volatility continued to be low in absolute terms, as well as relative to dollar/yen or euro/dollar volatility.

Liquidity in foreign exchange markets

The issue of whether liquidity in foreign exchange markets had declined, and if so what the implications might be, remained prominent during the period under review. Broadly speaking, a market can be considered liquid when large transactions can be executed with little impact on prices. However, no data are available that would allow liquidity in this definition to be measured directly for foreign exchange markets. Instead, attention has traditionally focused on other measures which indicate only indirectly whether a market is liquid or not: trading volumes, which are related to depth; bid-ask spreads, which measure tightness; and volatility, which is generally considered to be a measure of risk.

Foreign exchange market turnover							
	Daily turnover, in billions of US dollars					Annual average changes, in percentages	
	1989	1992	1995	1998	2000 e	1989–98	1998–2000
Total outright	590	820	1,190	1,500	1,100	11	–14
Spot	350	400	520	600	450	6	–13
Forwards/swaps	240	420	670	900	650	16	–15

Sources: Lehman Brothers Foreign Exchange Research (for 2000); BIS. Table V.4

A preliminary look at these indirect measures of liquidity provides a mixed picture. In 2000 and early 2001, turnover in global foreign exchange markets continued to be well below the levels reached before the financial turbulence in autumn 1998 (Table V.4). This would be the first reversal of this sort since the first comprehensive survey of foreign exchange market activity was conducted in 1989. In addition, volatility increased in some market segments. Both of these developments might imply that markets had become less liquid. However, spreads in foreign exchange markets remained tight, suggesting no change.

In order to form a more accurate view on market liquidity, this evidence should be examined against the background of three major structural changes in foreign exchange markets over the last few years: the launching of EMU, the rapid growth of electronic broking in the interbank markets, and the trend towards concentration in the banking sector.

The changing structure of foreign exchange markets

The impact of EMU

The main impact of the establishment of EMU appears to have been on trading volumes. On 1 January 1999, the consolidation of the 11 legacy currencies eliminated at a stroke about 8% of global turnover, and this decline was not subsequently reversed by any increase in trading in the euro compared to that in its predecessor currencies. The share of trading in the euro against the dollar in 2000 appeared to be lower than that of its predecessors in London and Zurich but higher in Frankfurt and Tokyo (Table V.5). The euro/yen market remained very small, like the mark/yen market in 1998. Trading in dollar/sterling seems to have grown at the expense of euro/sterling in recent years.

In terms of the tightness of market spreads, there is no evidence that the introduction of the euro has changed market conditions in any significant way. Bid-ask spreads in the euro/dollar market in 2000 generally matched those on dollar/mark trading in 1998. This also appeared to be the case for transactions involving the yen or the Swiss franc. Trading in sterling was an exception, as spreads on euro/sterling during the period under review were appreciably wider than those on sterling/mark in 1998. There are also no indications that short-term volatility patterns of the euro's exchange rates were significantly different from those of the mark before 1999 (Table V.6).

Currency composition of foreign exchange turnover[1]								
	United Kingdom		Japan		Germany		Switzerland	
	April 1998	April 2000	April 1998	2000 Q2	April 1998	April 2000	April 1998	July 2000
	Percentage share in the total local trading volume							
Euro[2]/dollar	22	28	7	13	52	65	21	15
Dollar/yen	13	15	76	67	6	7	11	6
Dollar/sterling	14	33	3	...	4	2	5	11
Euro[2]/sterling	3	2	0	...	3	3	2	0
Euro[2]/yen	2	1	4	3	2	4	2	1

Note: For 2000, informal estimates.

[1] Spot, forward and swap transactions. [2] For April 1998, Deutsche mark.

Source: BIS. Table V.5

The growing role of electronic broking

The second major structural change has been the growing share of electronic broking in the interbank market at the expense of direct dealing and voice broking. In 2000, 85–95% of interbank trading in the major currencies was conducted using electronic brokers, compared to about 50% in 1998 and 20–30% in 1995. Two brokers, EBS and Reuters, currently dominate this market segment, with EBS mostly covering trading in the dollar, euro, yen and Swiss franc, and Reuters being used predominantly for transactions involving the pound. While market participants using traditional means of trading typically needed several transactions to obtain information on market prices, electronic brokers automatically provide traders with the best price available to them, depending on their and their counterparties' credit limits. As a result, foreign exchange dealers have tended to enter fewer transactions and turnover has declined. At the same time, the expansion of electronic broking, which is more cost-effective than traditional means of broking, has led to a substantial reduction in bid-ask spreads in the interbank market.

Concentration in the banking sector

The third structural development is the continuing trend towards concentration in the banking sector. This has had a direct impact on turnover, in that the number of foreign exchange traders has declined significantly in recent years. Moreover, together with the expansion of electronic broking, consolidation has led to a marked shrinkage in the number of banks that

Volatility in the major foreign exchange markets[1]			
	Dollar/yen	Euro[2]/yen	Euro[2]/dollar
1980–89	10.2	7.3	10.9
1990–99	11.2	10.7	9.5
1997	11.5	11.4	8.6
1998	17.5	15.4	8.2
1999	12.6	14.2	9.3
2000–2001 Q1	9.6	16.7	13.4

[1] Standard deviations of annualised daily returns computed over calendar months. [2] Prior to 1999, Deutsche mark.

Sources: ECB; BIS calculations. Table V.6

quote two-way prices on a wide range of currency pairs. There are currently not more than 20 global players in foreign exchange markets that can provide such services, a noticeable decrease compared to the mid-1990s. The impact of consolidation on trading volumes has been compounded over the last few years by the reported withdrawal of capital from market-making and position-taking and by the reduction in the number and activity of market participants, in particular macro hedge funds. However, it is difficult to discern any impact of these changes on bid-ask spreads or exchange rate volatility.

No noticeable change in market liquidity to date

Assessing the overall impact of these structural changes on market liquidity so far is not straightforward. The evidence on turnover, bid-ask spreads and volatility, as well as market commentary, suggests that the euro's arrival did not bring about any significant change in market liquidity. The growing market share of electronic broking has certainly lowered trading volumes and narrowed spreads but its influence on liquidity appears less clear-cut. It is also difficult to see any noticeable effect of consolidation on liquidity. However, the last two trends do seem to have had two implications. On the one hand, the interbank market seems to function more efficiently now than in the mid-1990s. On the other hand, narrower spreads and hence lower profit opportunities have led to a reduction in resources devoted to market-making. These developments suggest that structural changes may actually have improved liquidity under normal conditions, like those during the period under review. Nevertheless, whether they have also exacerbated market participants' inability or unwillingness to provide liquidity under circumstances of stress remains an open question.

Looking forward

Looking ahead, the spread of electronic broking and the concentration of banks in the interbank market are leading to a reorientation of business towards customer transactions. One manifestation of this development is the increasing use of platforms for automated trading between banks and customers, which can be seen as a way of extending the advantages of electronic trading to this type of business. Two firms, Cognotec and Currenex, are currently active in this market, while two new competitors are about to enter: Atriax, which is backed by Reuters and three of the largest commercial banks, and FXall, which is supported by another group of major banks. How these developments may influence market liquidity in the future is yet another open question.