OESTERREICHISCHE NATIONALBANK

Stability and Security.

FINANCIAL STABILITY REPORT

11

June 2006

EUROSYSTEM

The OeNB's biannual *Financial Stability Report* provides regular analyses of Austrian and international developments with an impact on financial stability. In addition, it includes studies offering in-depth insights into specific topics related to financial stability.

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Imprint

Publisher and editor:
Oesterreichische Nationalbank
Otto-Wagner-Platz 3, AT 1090 Vienna
Günther Thonabauer, Communications Division
Internet: www.oenb.at
Printed by: Oesterreichische Nationalbank, AT 1090 Vienna

DVR 0031577

Vienna, 2006

EMAS
Geprüftes Umweltmanagement
A-000311

Contents

Reports

Growing Financial Market Volatility 6

Robust International Economy in a More Volatile Financial Environment

- Continued Robust GDP Growth despite Oil Price Shock 8
- Emerging Markets: Smaller Net Capital Inflows after Peak in 2005 11
- Central and Eastern Europe: Cool Breeze for Currencies in March 2006 17

Good Financial Position of the Real Economy Sectors

- Risk Situation of Enterprises Stable 23
- Strong Growth in Households' Net Financial Assets 31

Austrian Financial Intermediaries' Business Develops Well

- Austrian Banks See Sustained Profit Growth 37
- Insurance Companies and Mutual Funds Benefit from Favorable Capital Market Sentiment 59

Special Topics

Main Features of Recent Banking Sector Developments in Selected Southeastern European Countries 66
Peter Backé, Thomas Reininger, Zoltan Walko

Systemic Risk Monitor: A Model for Systemic Risk Analysis and Stress Testing of Banking Systems 83
Michael Boss, Gerald Krenn, Claus Puhr, Martin Summer

Operational Risk and Contagion in the Austrian Large-Value Payment System ARTIS 96
Stefan W. Schmitz, Claus Puhr, Hannes Moshammer, Martin Hausmann, Ulrike Elsenhuber

Annex of Tables 115

Notes 129

Editorial close: May 24, 2006

REPORTS

Growing Financial Market Volatility

Robust International Economy

Industrialized countries have so far proved to be fairly resilient to the increased price of crude oil. Although inflation rates increased on the back of rising oil prices, contagious effects on other goods and second-round effects in wage setting remained limited. In addition to a further surge in oil prices, above all, a disorderly correction of the high U.S. current account deficit and a significant rise in long-term bond yields could however dampen growth.

Yield Increases in International Financial Markets

Since September 2005, international bond markets have seen a rise in long-term interest rates, mirroring market players' expectations of economic recovery, but also fueled by recently emerging inflation and interest rate concerns especially in the U.S.A.

In addition, yield spreads on corporate bonds against government bonds of similar maturity widened slightly, although they were still low on a long-term basis. This reflected two factors: first, a favorable corporate profit situation, involving improved debt ratios with, at the same time, rather modest investment; second, institutional investors' continued high levels of willingness to assume credit risk ("the quest for yield") are also likely to have played a part.

Robust corporate profitability also fueled stock performance on international stock exchanges, superseding the effects of elevated oil prices. The Austrian Traded Index (ATX) continued to outperform leading international stock indices in the course of 2005 and in the first quarter of 2006 until stock prices started to tumble in mid-May 2006.

All in all, there was growing nervousness in the international financial markets in spring 2006, the visible sign of which was the liquidation of carry trades (in which investors borrowed in low interest rate countries and invested in higher-yielding bonds from countries like Hungary, Iceland or New Zealand) and increased volatility in the precious metal markets.

Sound Financial Position of Austrian Enterprises and Households

In 2005, financial market developments favorably influenced the performance of Austrian investors' portfolios. This held true for both institutional investors (such as insurance companies or mutual funds) and households. However, increased investment in capital market instruments and insurance products did not only generate high valuation gains for households but also enhanced their risk exposure.

In recent quarters, the Austrian economy gained momentum. As businesses continued to post growing profits, their internal financing potential was high over the reporting period. Along with the increase in equity raised externally, this has boosted the corporate sector's capital position. In 2005, the share of capital market instruments (bonds and stocks) as a percentage of external financing doubled.

Financing terms were favorable in the period under review. Provided profit growth continues to be positive, the debt-bearing capacity of enterprises should remain high, even if interest rates rise further. In addition, the corporate sector further reduced its interest rate risk in 2005 by enhancing the share of equity financing and increasingly making recourse to the bond market.

As regards the financing of households, the continued rise in foreign currency borrowing entails risks of which households should be made more aware of. In light of its considerably stronger net asset position, however, the household sector's financial situation has not deteriorated on the whole.

Austrian Banks Show Dynamic Profit Growth

Despite the latest problems at BAWAG P.S.K.[1] and Hypo Alpe-Adria Bank, the profitability of the Austrian banking system improved substantially in 2005. Contributing factors were not only the further expansion of international business but also enhanced profits on the domestic front, which were mostly attributable to income from participating interests as well as fees and commissions, whereas fierce competition kept the domestic interest margin low.

Yet again, the results of Austria's leading banking groups in Central and Eastern Europe (CEE) made a major contribution to the sector's improved profitability. In 2005, Austrian banks continued to expand their operations in this region. Business in CEE already accounts for 35% of the Austrian banking system's operating profit. Focusing their activities in particular on the new EU Member States, Austrian banks have reduced the risks arising from the institutional, legal and economic environment in these markets. At the same time, however, an even more dynamic performance by Austrian banks is visible in CEECs that have not joined the EU (yet). In these countries, though, expected higher returns of course also involve higher risk. Furthermore, the correction of external imbalances that have been building up in some CEECs both within and outside the EU may diminish banks' revenues.

As before, the capital adequacy levels of Austrian banks are high, and the results of stress tests confirm that the banking system is able to withstand shocks. In 2005, Austrian banks' credit risk decreased, whereas their market risk increased moderately.

From an overall perspective, the Austrian banking system is thus currently in good shape. External assessments of Austrian banks support this finding even if the ratings of some credit institutions have recently fluctuated under the influence of the latest developments. However, the valuation of Austria's major exchange-listed banks continued to rise sharply in 2005, reflecting investor confidence in their business model.

[1] *See also Box "BAWAG P.S.K. and Hypo Alpe-Adria: No Threat to Financial Stability."*

Robust International Economy in a More Volatile Financial Environment

Continued Robust GDP Growth despite Oil Price Shock

GDP growth in *industrialized countries* stabilized following the global economy's dynamic recovery until 2004 and, in early 2006, was at a good level by historical standards of around 2.75%. In other words, the economies of industrialized countries have so far been fairly resilient to the growth-dampening effects of crude oil prices, which have soared since early 2004. In view of expected growth in demand, political risks and ongoing capacity constraints in the mineral oil sector, high prices and elevated levels of price volatility may be anticipated for both crude oil and mineral oil products also in the future. The range of oil price forecasts for mid-2007 is USD 42 to USD 79 per barrel (Consensus Forecasts). The overall positive performance of the global economy may be connected not least with historically favorable financing conditions. Since mid-2004, however, key interest rates in the U.S.A. have been raised substantially, and monetary policy in the euro area and in Japan has also been tightened to some extent in recent quarters. Although inflation rates increased on the back of rising oil prices, contagious effects on other goods and second-round effects in wage setting remained limited to date. Clearly, various factors have so far cushioned a significant portion of the inflationary pressure induced by the high price of oil. These are, for example, the diminished importance of oil in industrialized economies, fiercer international competition in labor and goods markets, current overcapacity and the level of unemployment, high profit margins as well as the credibility of central banks in ensuring price stability.

As for the three biggest economic areas, the *U.S.A.*, which is further advanced in the economic cycle, particularly saw growth momentum gradually slow somewhat from an initially high level. In the *euro area*, the economy, following a more sluggish first half of 2005, recovered primarily thanks to growing exports and somewhat more dynamic investment. In *Japan*, by contrast, economic recovery has been gathering momentum since 2004. In recent quarters, unemployment fell in these three economic areas, whereas capacity utilization increased. Core inflation trended slightly upwards from a low level in the euro area and the U.S.A., whereas in Japan an end to the current deflationary period is beginning to emerge. For 2006 and 2007, the European Commission currently expects the economy to continue to develop favorably, with growth rates hovering around the long-term average and inflation remaining modest. Compared with fall 2005, this means the forecasts for the following two years have not changed in essence. In the euro area, growth should be driven first and foremost by corporate investment and the favorable international environment, whereas inflation should remain low owing to continued wage moderation. Growth in the U.S.A. is likely to slow a little due to key interest rate hikes, higher long-term interest rates and, consequently, less dynamic real estate markets and weaker private consumption growth.

The majority of risks to this positive growth outlook point to the downside, whereas the risks to infla-

Table 1

European Commission Economic Forecasts of November 2005 and April 2006

	GDP growth (% on previous year)				Inflation rate (% on previous year)			
	2006		2007		2006		2007	
	Nov. 05	Apr. 06	Nov. 05	Apr. 06	Nov. 05	Apr. 06	Nov. 05	Apr. 06
U.S.A.	3.2	3.2	2.7	2.7	2.9	2.9	2.2	1.6
EU-12	1.9	2.1	2.1	1.8	2.2	2.2	1.8	2.2
Japan	2.2	2.8	1.8	2.4	0.3	0.7	2.0	1.0

Source: European Commission.

tion point to the upside due to possible second-round effects arising from the high price of oil. The downside risks to growth include, apart from the effects of the higher oil price, a disorderly correction of the high U.S. current account deficit as well as a rapid and dramatic rise in long-term bond yields with negative consequences for real estate prices, which have rocketed in many countries. According to the IMF, the global financial system's resilience to shocks is high, above all thanks to the robust profitability and sound balance sheets of financial intermediaries and enterprises in the recent past.

Globally Rising Interest Rates, Volatile Stock Prices

From September 2005 to May 2006, the U.S. Federal Reserve raised *key money market* rates five times in succession to 5.0% (by a total of 125 basis points). In the euro area, key interest rates were raised to 2.5% (by 25 basis points each in December and March). By contrast, the Bank of Japan (BoJ) announced in March that it would phase out its policy of quantitative easing[1] and maintain its zero interest rate policy for the time being. In May, the Federal Reserve indicated that, in light of high commodity prices, the possibility of further expansion in already high levels of capacity utilization and the ensuing inflation risk further interest rate hikes could be necessary. In early May, the ECB Governing Council noted that its monetary policy was accommodative and that the risks for price stability still pointed to the upside. In the U.S.A., interest rates for maturities of up to two years continued to rise in tandem with key interest rates, with rates for longer maturities increasing by a smaller extent. The U.S. money market's yield curve now signals a tightening of monetary policy that is well advanced according to market opinion. In the euro area, the slope of the money market yield curve became markedly steeper during 2006, indicating expectations that key interest rates would be further raised in the coming quarters. In Japan, the money market yield curve

[1] *The policy of quantitative easing consists in conducting open market operations to manage financial institutions' demand deposits held at the BoJ, with the aim of ensuring a liquidity position that significantly exceeds the reserve requirements.*

also became steeper, indicating greater expectations that the BoJ may abandon its zero interest rate policy at an earlier stage. Long-term interest rates in the U.S., euro area and Japanese *government bond markets* exhibited a gradually rising trend and noticeably increased by some 100 basis points in the past few months. Since September 2005, inflation risk premia derived from inflation-indexed bonds with a ten-year maturity have risen only slightly in both the U.S.A. and the euro area despite the high price of oil. This is likely to be connected with continued low, albeit slightly increasing core inflation rates and central banks' sustained credibility in guaranteeing price stability. In the euro area long-term real interest rates measured by the yields on these bonds have risen from a historical low of about 1% since September, while in the U.S.A. the previously existing trend of gradually rising long-term real interest rates has continued. These increases reflect expectations of a sustained economic upturn, a correction of very low maturity premia and monetary policy tightening measures in both economic areas that have already been implemented and that are anticipated for the future. Although risk premia on corporate bonds in the U.S.A. and the euro area edged up slightly in the past few months, they remain low on a long-term basis. This is likely to be attributable not least to the robust profitability and improved debt ratios of enterprises in the recent past. Moreover, high levels of institutional investors' willingness to assume credit risk in order to meet yield targets ("hunt for yield") are also likely to play a part.

Global stock market uncertainty, as measured by implied volatility, increased notably – from very low levels – in May, triggered most likely by inflation and interest rate concerns, which, consequently, did not result in a further rise in benchmark bond yields, but – first and foremost – in a revaluation of high-risk portfolio investments.

Before the corrections in the *stock markets* starting in mid-May 2006, the broad indices DJ EURO STOXX (euro area) and TOPIX (Japan) posted substantial further gains of some 17% and 36%, respectively, between Sep-

Chart 1

Stock Prices in the U.S.A., the Euro Area and Japan

Source: Thomson Financial.

tember 2005 and April 2006, while in the U.S.A., gains based on the S&P 500 were considerably smaller, coming to around 5% like in previous quarters. Despite stock price decreases, at end-May 2006, all three stock markets posted gains compared with September. U.S. monetary policy tightening, which is further advanced, is likely to have contributed to this quite different performance. In the past few quarters, price/earning ratios increased slightly in the euro area and decreased somewhat in the U.S.A.; they are currently hovering around their historical averages since 1990. In Japan, despite the previous quarters' very high gains, price/earning ratios continue to remain below their long-term average since 1990. In all three economic areas, robust corporate profitability has underpinned stock prices.

In the *foreign exchange markets*, the euro first continued to slide against the U.S. dollar compared with its exchange rate of mid-2005 and, in November 2005, reached around USD 1.18, its lowest level since November 2003. It then appreciated and by end-May attained a level of over USD 1.28 per euro. In the recent past, the USD/EUR exchange rate correlated relatively closely with the interest rate differential between both economic areas, which was basically determined by their respective monetary policies. In addition, the U.S. current account deficit has increasingly been seen as a potential risk by the markets which could harm the U.S. dollar in future. Despite growing expectations of an early end to the BoJ's zero interest rate policy, dynamic economic recovery and the reform of China's exchange rate regime, the Japanese yen appreciated against the U.S. dollar to a lesser extent than the euro, thus depreciating somewhat against the euro. The JPY/EUR exchange rate is currently hovering around its historical highs. The G-7 statement of April 21, 2006, which urged greater exchange rate flexibility on emerging market economies with high current account surpluses, inter alia sparked a temporary appreciation of the Japanese yen against the U.S. dollar and the euro. By contrast, the Chinese yuan remains very strongly oriented to the U.S. dollar and did not gain much ground against the latter currency. The Swiss franc remained stable against the euro in the past few months.

Commodity and precious metal markets saw – in part substantial – price increases over reporting period. The gold price, for instance, climbed to USD 725 per fine ounce. Inflation concerns, which have surfaced more clearly recently, and increased uncertainty in higher-risk segments of the capital market have led to higher volatility also in these markets.

Emerging Markets: Smaller Net Capital Inflows after Peak in 2005

Robust, Only Slightly Weaker GDP Growth in 2006

The IMF expects that emerging market economies (EMEs) will experience continued economic momentum in 2006, fueled by robust demand from industrialized countries, and accordingly revised its growth forecast sharply upward for these countries. At almost 7%, the real GDP growth of EMEs in 2006 is expected to fall only slightly short of the previous year (2005: 7.2%). The IMF anticipates that EMEs will witness continued momentum also in 2007 and accordingly upgraded its growth forecast (with weaker inflation) sharply

to 6.6%. However, this outlook conceals substantial changes in regional and individual forecasts, in which the influence of commodity price changes and country-specific factors are reflected. A significant risk to EMEs is a possible energy crisis due to geopolitical uncertainties. A further risk factor is a rapid and sizeable rise in the still low long-term interest rates of industrialized countries, to which EMEs contribute, as they are major net savers. Recent volatility in higher-risk segments of the capital market highlights many EMEs' vulnerability. The stable macroeconomic environment and high liquidity in the international financial markets had resulted in notably less risk diversification, e.g. measured by bond spreads. The critical question for EMEs is whether the recent rise in volatility only leads to increased diversification between investments in different risk categories or to a general decline in venture capital investment.

In 2005, *Asian economies (excluding Japan)* continued to expand. In addition to the U.S.A. and, latterly, Japan, Asian economies remained the most important engine of global growth. This expansion was primarily attributable to exports, which more than offset the general sluggishness of domestic investment (except for China). Inflationary pressures remained moderate although divergences between individual countries increased owing to the different size of the pass-through of oil prices to consumer prices. In China, the expansion of surplus capacity (particularly, in the steel and automotive industries) represents a potential risk to the economy. The upward revision of China's average annual real GDP growth by 0.5 percentage point to 9.9% between 1993 and 2004 saw the country become the world's fourth-largest economy after Germany in nominal terms. Following GDP growth of again 9.9% in 2005, China's rate of expansion is likely to further continue in 2006, according to the IMF. Growth prospects also look favorable in India. In 2006, the IMF anticipates that current account surpluses and external net inflows in the region as a whole will further boost foreign exchange reserves by more than USD 250 billion. To a large extent, these inflows are sterilized at considerable costs. Capital losses will also loom on the horizon if the U.S. dollar continues to soften against these currencies.

In *Latin America*, rapid economic growth continued apace. Growth continues to be driven by exports, increasingly supported by strengthening domestic demand, which, in certain key countries, is also fueled by a less restrictive monetary policy. After their external position had improved for several years, Brazil and Argentina used a part of their rapidly growing currency reserves to make an early repayment of their IMF loans totaling more than USD 25 billion at end-2005. However, continued elevated levels of foreign debt mean that this region remains vulnerable in the event of global interest rates rising sharply.

In the *Middle East*, buoyant oil prices are currently stoking GDP growth, accompanied by clear improvements in the current account and fiscal situation. Implementing a prudent structural policy geared at channeling high liquidity into productive investments (also within the non-oil sector) constitutes the biggest challenge in the region. In *Africa*, institutions should be strengthened and governance improved, according to

the IMF. At the same time, a cut in agricultural subsidies (including cotton) as well as additional financial support are urgently required.

Despite the appreciation of several regional currencies[2], growth in *European EMEs* is also likely to remain robust in 2006 thanks to generally vibrant domestic demand. In 2005, GDP growth in Turkey, in particular, accelerated dramatically to more than 7%, driven by strong credit growth. However, Turkey's high current account deficit continued to deepen at the same time. With the IMF's assistance, structural reforms (particularly as regards banks and social insurance) will be further pursued.

High Private Net Capital Inflows Dominated by Direct Investment

In 2005, *private net capital inflows* to EMEs accelerated, reaching a historical high. The IMF attributes this to EMEs' greater resilience to shock, which also feeds through to improved ratings (improvements in both fiscal and monetary policies, external positions and financial systems). In 2006, the IMF expects that net inflows will be lower on account of investments brought forward to 2005 and the announcement of early foreign debt repayments.

FDI net inflows have continued to grow in all EME regions (except for the Commonwealth of Independent States – CIS), owing to lower risk assessments as well as improved business and investment conditions. Enterprises in both developed economies and EMEs have also stepped up their diversification efforts (securing supply with primary products). In addition, cross-border mergers and acquisitions are still considered to generate substantial earnings. Inflows into EMEs remain concentrated in the oil and gas, telecoms and banking sectors. According to the IMF, net inflows have also continued to be positive for "portfolio investment" and "other flows" (trade credits, bank credits, derivatives), which both are more volatile items. However, the latter suffered a visible decline, as financing gaps have been increasingly plugged via local capital markets and foreign debt has been repaid early. In view of these early repayments and oil-exporting countries' investment of high levels of revenue in foreign markets, the overall increased net capital inflow is particularly worth highlighting. From a regional perspective, Asia has ceded its leading position in terms of net capital inflows to European EMEs. The economies of the Middle East and the CIS are likely to be net capital exporters in 2006 as a result of higher revenue from the export of oil and gas as well as other commodities, and the early repayment of foreign debt.

Claims of Austrian Banking Sector Lead in Some CEECs

At end-September 2005, the ten new EU Member States accounted for almost two-thirds of the Austrian banking sector's total claims on EMEs and developing countries. Including Central and Eastern Europe (CEE) and the CIS, this share rises to almost 94%. According to data compiled by

[2] *For further details about developments in Central and Eastern Europe (including Russia), please consult the next chapter.*

Table 2

Private Capital Flows to Emerging Markets and Developing Countries according to the IMF[1]

USD billion

	2002	2003	2004	2005	2006[2]	2007[2]
Net capital flows according to the IMF	97.3	160.4	230.6	254.0	178.8	153.8
By instruments						
Direct investment	149.5	157.5	184.3	213.3	220.6	217.5
Portfolio investment	−78.6	−3.7	34.5	38.5	−4.7	−3.2
Other flows	26.5	6.6	11.8	3.2	−37.1	−60.5
By regions (countries)						
Latin America and the Caribbean	−2.1	15.5	6.0	25.2	34.6	28.1
Europe	53.5	52.3	71.0	108.2	94.7	84.4
CIS	16.1	16.7	8.0	24.9	−13.7	−21.3
Middle East	4.1	7.9	12.2	11.4	−8.7	−10.1
Africa	4.9	4.6	13.0	30.4	16.6	21.1
Asia	20.8	63.5	120.3	53.8	55.2	51.6
Memorandum item						
Current account balance	138.5	229.4	310.5	511.2	576.5	569.8
Reserve assets[3]	−194.7	−351.6	−515.4	−580.2	−584.2	−562.3
of which China	−75.7	−117.2	−206.3	−208.5	−220.0	−220.0

Source: IMF (World Economic Outlook).

[1] *This table shows aggregate balance-of-payments data sets of 131 nonindustrialized countries, including the major 44 EMEs. Given repeated revisions of the national balances of payments, which also affect the data sets of previous years, the capital flows may differ substantially afterwards.*

[2] *Forecast.*

[3] *− = increase.*

the Bank for International Settlements (BIS), Austrian banks moved up from fifth to second place (behind Germany) in terms of claims on this region (including Turkey) within the space of six months. In some countries, the Austrian banking sector even took the lead. This is not only due to the Austrian banking sector's further expanded business operations in this region, but also to new, harmonized reporting and survey methods. Reporting is now carried out on a consolidated basis depending on the location of the group's headquarters, which is why both cross-border claims and claims of Austrian banking subsidiaries within the host countries which are denominated in another currency than that of the host country are now included. This provides a better reflection of both the creditor's perspective and the actual distribution of risk.

Below-Average Income Growth of European Foreign Currency Bonds

The mood in international Eurobond markets remained upbeat during most of the reporting period under review, i.e. from September 2005 to end-March 2006[3]. By end-February 2006, the average yield differential of EME issuers' government bonds denominated in U.S. dollars against U.S. benchmark bonds (measured by J.P. Morgan's EMBI Global index) had narrowed from 235 basis points to some 180 basis points. By end-March, this spread had widened by a slight margin to 190 basis points and after a temporary narrowing in the course

[3] *The period under review chosen refers to the detailed analysis of the development of primarily Central and Eastern European foreign currency bonds. The turbulence in the international financial markets in May 2006 can be analyzed only in part.*

Table 3

Claims of BIS Reporting Banks on Central and Eastern Europe and on Turkey [1]

% of GDP of the recipient country

	AT	DE	IT	FR	NL	SE	BE	UK	Europe [2]	US	JP
CEE plus Turkey	6.6	9.0	3.3	2.8	2.1	1.6	3.2	1.2	33.7	1.5	0.6
Central and Eastern European EU Member States											
Poland	3.2	12.3	6.0	1.2	4.5	0.9	2.9	0.4	38.5	2.3	1.1
Slovakia	37.5	9.9	19.2	1.5	5.7	0.1	8.2	1.4	83.8	2.3	0.2
Slovenia	20.2	15.9	2.4	5.2	0.5	0.1	3.7	0.2	49.0	0.2	0.7
Czech Republic	21.8	10.3	1.5	18.3	2.7	0.0	21.6	1.4	78.6	2.5	0.4
Hungary	16.8	25.6	8.6	3.1	3.0	0.1	9.5	0.9	70.9	2.0	1.1
Other CEECs											
Bulgaria	6.8	10.7	5.8	2.3	1.4	0.0	0.4	0.1	42.3	1.2	0.2
Croatia	49.4	19.4	44.9	1.5	0.8	0.0	0.5	0.6	118.3	0.7	0.9
Romania	5.6	4.9	1.7	4.2	4.1	0.1	0.1	0.2	27.0	1.2	0.2
Russia	0.8	4.4	0.2	0.6	0.9	0.1	0.1	0.3	9.0	0.8	0.4
Turkey	0.2	3.8	..	2.1	1.2	0.1	2.1	2.7	14.3	1.8	0.5

Source: BIS, Eurostat, Thomson Financial, national sources and own calculations.

Note: The claims shown here correspond to the „Consolidated international claims of BIS reporting banks" released by the BIS (BIS Quarterly Review March 2006, Table 9B). For every bank, these include the claims and off-balance sheet guarantees as well as the acceptances of liabilities by both parent and subsidiary companies on the borrowers and/or parties to whom the guarantees are made outside the group in the relevant countries. In the case of subsidiary companies in these host countries, only claims denominated in another currency than that of the host country are included.

[1] As at end-September 2005.

[2] The column „Europe" comprises the countries of origin listed here as well as Denmark, Greece, Ireland, Portugal, Finland, Spain, Switzerland and Norway.

of April came to 200 basis points in mid-May 2006. Between end-September 2005 and early March 2006, the yield differentials of Eurobonds denominated in euro (measured by J.P. Morgan's Euro EMBI Global index) narrowed from 70 to 54 basis points. By end-March, however, they had widened by a margin bigger than that for bonds denominated in U.S. dollars. As a result, the average yield spread at end-March 2006 was back at its level of end-September 2005. After a period of stability in the ensuing weeks, the yield spread expanded to some 80 basis points until mid-May 2006.

In regional terms, U.S. dollar-denominated bonds of Asian issuers and euro-denominated bonds of Latin American issuers posted the biggest declines in spreads between the end of September 2005 and end-March 2006. However, and unlike in earlier periods, European issuers' bonds denominated in both U.S. dollars and euro underperformed overall, although Turkish and (in the case of U.S. dollar-denominated bonds) Serbian bonds, which – after Ukrainian bonds – currently offer the highest yield spreads, ranked among global outperformers. In the reporting period, European bonds generated the lowest total return. For bonds denominated in euro, this implied a higher loss than for other regions. For bonds denominated in U.S. dollars, by contrast, this signified a paltry loss (as a single region), compared with a profit of more than 3% for the index as a whole.

Investors' worldwide sustained low risk aversion and risk perception vis-à-vis emerging markets and the ongoing quest for yield given low long-term interest rates in the U.S.A. and in Europe continued to remain key factors for a positive index development until end-February 2006. Fur-

thermore, improved fundamental data and debt profiles (extension of maturities, early repayment of outstanding foreign debt, early refinancing of future financing requirements) were also reflected in many countries' upgraded ratings. This, in turn, attracted more investors and fanned Eurobond prices. Overall, these factors led to a sharp increase in capital inflows to emerging market bonds during 2005 and early 2006.

A striking parallel trend between yield spreads and average ratings was observable at the level of the broad indices. However, closer analysis raises the question as to whether investors in recent months (actually since early 2003) have differentiated sufficiently between individual issuers and their fundamental data, when making their portfolio decisions. While the steady narrowing of yield spreads was accompanied by a further decrease in the distribution of individual countries' yield spreads, no such uniformity was observable for ratings (and, in the case of the Euro EMBI global index, not to the same degree).

With the record lows reached by yield spreads and a possible inadequate differentiation according to issuer credit rating in the allocation of portfolios, there is a risk that the Eurobond market will react relatively sensitively to a further increase in U.S., euro area and Japanese interest rates. First, this would increase the refinancing costs of investments in emerging markets and thus render carry trades less attractive. This investment strategy involves borrowing in a low interest rate currency and then taking a long position in a higher interest rate currency or in a currency with perceived potential for appreciation. While the former include primarily the Japanese yen and Western European currencies at present, EMEs and also highly developed and mostly booming economies are the destinations of such capital flows. Second, increased interest rates in industrialized countries would probably temper the quest for higher profit opportunities (especially when adjusted for risk). In contrast to the correction episodes in the spring of 2004 and 2005, which were followed by new

Table 4

Eurobonds: Spreads to Reference Bonds and Returns by Regions

	EMBI Global (in USD)						Euro EMBI Global (in EUR)					
	Share of total index in %	Yield differential in basis points		Total return in %	Rating	Duration	Share of total index in %	Yield differential in basis points		Total return in %	Rating	Duration
	March 31, 2006	March 31, 2006	Change since Sept. 30, 2005	Since Sept. 30, 2005	March 31, 2006	March 31, 2006	March 31, 2006	March 31, 2006	Change since Sept. 30, 2005	Since Sept. 30, 2005	March 31, 2006	March 31, 2006
Overall index	100.0	191	−44	3.4	BB+	6.93	100.0	69	−1	−1.6	BBB	5.52
Africa	3.4	250	3	0.5	BBB	3.71	3.6	65	1	−1.6	BBB+	4.51
Asia	14.0	181	−72	5.4	BB+	6.42	4.6	97	5	0.5	BBB	4.97
Europe	23.6	132	−4	−0.1	BBB−	6.76	66.6	49	11	−2.5	BBB	5.81
Latin America	56.8	208	−59	4.5	BB	7.39	25.2	127	−25	0.3	BB+	4.97
Middle East	2.2	338	34	6.2	B−	4.89	0.0	×	×	×	×	×

Source: Bloomberg, JP Morgan, OeNB calculations.

Note: Spread levels and changes, total returns, as well as other index features differ between the EMBI Global and Euro EMBI Global indices because they cover different currencies, instruments, countries, maturities, etc. and are based on different investor structures. The rating is calculated as the average of Moody's, Standard and Poor's and Fitch's ratings for long-term government foreign currency liabilities and are given in the rating categories Standard and Poor's uses.

record lows in Eurobond spreads, the current situation is marked by (even) smaller yield spreads with higher interest rates in the U.S.A., the euro area and in Japan. It is also notable that Eurobond spreads have tended to decline over the last few months in contrast to the rise in risk premia of other risk categories such as swap spreads or yield spreads of U.S. and euro area corporate bonds.

The slight increase in spreads in March 2006 is likely to have been connected with a higher increase in yields on long-term U.S. government bonds following breach of a technical mark.

Eurobonds of Central and Eastern European issuers remained largely unaffected by the most recent turmoil in EMEs in the second half of May. Only the yield spreads of issuers with comparatively low ratings (Ukraine and Serbia) widened notably (by 40 to 50 basis points).

Central and Eastern Europe: Cool Breeze for Currencies in March 2006

During the reporting period from end-September 2005 to end-March 2006, most Central and Eastern European currencies under review managed to build on their appreciation in the first nine months of 2005. The Czech and Slovak koruna gained most in value, appreciating by 3.4% and by 3.1%, respectively, against the euro during this period. Whereas high direct investment inflows were the key determinant for the Czech currency, for its Slovak counterpart, joining the exchange rate mechanism (ERM) II with effect from November 28, 2005, was a key factor for its appreciation. ERM II entry came as a surprise to many market players and triggered the currency's appreciation by 1.5% on the very day of its joining. In the weeks thereafter, the Slovak koruna continued to firm against the euro. In addition, the Russian ruble, the Croatian kuna and the Romanian leu also firmed during the reporting period (by some 1% to 2%). The appreciation of the ruble relative to the euro should be seen against the backdrop of the ruble's orientation to a basket of currencies consisting of euro and U.S. dollars at a ratio of some 45% to 55%, respectively, against which the currency rose by 2.5%. Exceptions were the Hungarian forint and the Polish zloty, which from end-September 2005 to end-March 2006 softened against the euro by 6.1% and 0.6%, respectively, although by end-February the forint had initially depreciated by 1.4% and the zloty had appreciated by 3.5%. Finally, the Slovenian tolar maintained its high level of stability within ERM II, and the pegging of the Bulgarian lev to the euro in the framework of a currency board arrangement did not change during the entire period under observation.

Every currency under review, except for the Slovenian tolar and the Bulgarian lev, depreciated – some even markedly – against the euro in March 2006. The forint and zloty lost the most in value, while the ruble and kuna were the least affected. As with Eurobonds, these losses are likely to have been sparked by the further steep rise in long-term interest rates in the U.S.A. and the euro area, along with greater expectations that interest rates would rise in both these regions and in Japan, which triggered losses not only in many emerging markets but also in small open economies such as Iceland and New Zealand. These developments were exacerbated by carry trade liquidation and

Chart 2

Exchange Rates against the Euro (Euro per Unit of National Currency)

December 31, 2003 = 100

Source: Thomson Financial.

country-specific risk factors such as – in the case of New Zealand or Iceland – high current account deficits and substantial exposure to volatile (commodity) markets. Also the forint and the zloty were particularly exposed to this unfavorable international development owing to country-specific factors (high, albeit declining external financing requirements and lax fiscal policies in Hungary, political uncertainty in Poland). However, these exchange rate losses were not accompanied by a general loss in the value of Central and Eastern European assets. The currencies of most CEECs were hardly affected by renewed turmoil in EMEs in May 2006; only the Polish zloty and the Romanian leu suffered to some extent, but even these exchange rate losses were comparatively modest (some 2% to 3%).

The currencies under observation performed in an overall favorable *macroeconomic environment*. In the Czech Republic, Slovakia and Bulgaria, GDP growth came to 5.5% to 6.0% in 2005, while the growth rate in Hungary, Slovenia and Croatia was around 4.0%. Only the Romanian and Polish economy cooled noticeably compared with 2004. At 4.1%, however, growth in Romania was relatively robust and in both countries reaccelerated in the second half of 2005. The pattern of growth varied widely between these countries. Whereas in the Czech Republic and in Slovenia growth was primarily led by (net) exports, domestic demand represented the sole or clearly predominant positive contribution to growth in Slovakia, Croatia, Bulgaria and Romania. In Bulgaria and Romania, the contribution to growth by net exports was markedly negative. In Hungary and Poland, both domestic demand and net exports were key components of growth.

In the Czech Republic, Poland and Slovenia, the *performance of the combined current and capital account* relative to GDP was a strengthening factor for the exchange rate. In 2005, all three countries posted a decline in their need for external financing, with their deficits being reduced to a very small size (1% to 2% of GDP). In addition, net direct investment in-

flows more than offset the remaining deficits both in the Czech Republic and in Poland. In Hungary, although the external deficit was smaller than in 2004, it also remained relatively high at 6.5% of GDP. In addition, only about three-fourths of Hungary's deficit was financed by direct investment (and this only thanks to revenue generated by a one-off major privatization in the fourth quarter), which resulted in the further deepening of net external debt. In 2005, Slovakia saw a dramatic deterioration in its combined current and capital account, the deficit of which climbed to 8.8% of GDP (from 3.2% in 2004). The deterioration was primarily caused by the income and current transfers accounts, although, unlike in the above mentioned countries, the goods and services balance also deteriorated in Slovakia. The deterioration in the income balance is partly attributable to an adjustment in the statistical compilation method (improved accounting of reinvested profits as outflows in the income balance and inflows under direct investment). However, net direct investment inflows in Slovakia were only marginally higher in 2005 than in the previous year, meeting only less than 50% of the country's need for external financing. Among the other countries under review, this development was very negatively marked especially in Bulgaria, where the deficit deepened from 5.8% of GDP in 2004 to 11.8% in 2005. In contrast to the period from 2002 to 2004, net direct investment inflows did not completely meet the increased need for external financing. Romania's external position also deteriorated, albeit to a far lesser extent, resulting in an increase in foreign debt for the first time in three years. Foreign debt continued to climb also in Croatia, although growth in direct investment inflows more than offset the increase of the current account deficit. Russia, by contrast, continued to post high surpluses in its combined current and capital account, primarily due to the positive effect of high oil prices.

Notable *interest rate differentials*, together with the existence of liquid investment opportunities, are likely to prop up the relevant currencies primarily in Hungary, Poland and Romania. In Hungary, in particular, portfolio capital inflows induced by the high interest rate differential are likely to have helped meet the need for external financing and thus to have prevented a sharper depreciation in the reporting period than actually occurred. In Slovakia, the short-term interest rate differential gradually widened relative to the euro area before the central bank raised rates at end-February 2006 out of concern that inflation would rise. This factor could prop up the Slovak koruna. In early February 2006, the Romanian central bank also deemed it necessary to raise interest rates owing to the unfavorable inflation development. The interest differential which has thus increased, together with the opening of the government bond auctions to foreign investors from mid-March 2006, could also fuel inflows of capital. In view of Romania's deepening current account deficit, it remains to be seen to what extent the central bank will tolerate the policy of allowing the leu to firm, which should help to meet the inflation target. In Russia, only partly sterilized foreign exchange market interventions by the central bank helped vigorously boost both foreign exchange reserves and money supply in 2005. Possibly out of concern for the

associated inflation risks, the central bank allowed the ruble to firm considerably relative to its basket of currencies in the first three months of 2006. However, the volume of capital inflows seems to have been sizeable, as the accumulation of foreign currency reserves nonetheless continued in this period.

In many CEECs, *foreign currency lending by domestic banks to domestic customers* represents another aspect of the interest rate differential relative to the foreign market. At 35% to 80%, the share of foreign currency loans to domestic businesses and households is particularly high in Croatia (including local currency loans indexed to the euro), Romania, Bulgaria, Hungary and Slovenia. In all these countries, the volume (and, in Croatia, Hungary and Slovenia, also the share) of these loans expanded vigorously in 2005. This is likely to have propped up the currencies concerned on account of borrowers converting amounts into local currency.

Overall, the firming of currencies in several countries during the last six months is likely to be in step with the improvement in these countries' external position. In certain countries, however, a correction of high external deficits or the reversion of unfavorable developments in 2005 appears necessary in order to reliably ensure exchange rate stability in the medium term and to limit the increase in foreign debt. Furthermore, countries with a high need for external financing after allowing for net direct investment inflows (Slovakia, Bulgaria) or with relatively high foreign debt (Bulgaria, Croatia, Hungary) will remain vulnerable to further deterioration in the international capital market climate. The continued rise in both short-term and long-term interest rates in industrialized countries would most probably curb capital inflows into the region or could even spark capital outflows in its wake.

From the perspective of the new EU Member States, exchange rate stability is also essential in relation to their future adoption of the euro. Currently, seven new EU Member States (Estonia, Latvia, Lithuania, Malta, Slovakia, Slovenia and Cyprus) participate in ERM II. The convergence test of these and other EU Member States which are not part of the euro area is scheduled to take place in two rounds in 2006: Lithuania and Slovenia in May 2006, the remaining countries most probably in October. In May, the European Commission released a positive recommendation for Slovenia to adopt the euro; in July 2006, the Ecofin Council will take a final decision upon whether Slovenia will join the euro area in 2007.

Yield Differentials of Local Currency Government Bonds hardly affected by Currency Weakness

In the Czech Republic and in Poland, the yield differentials of ten-year local currency government bonds against euro area benchmark bonds were some 20 basis points and 40 basis points lower, respectively, at end-March 2006 than at the beginning of the reporting period at end-September 2005. In the Czech Republic, this meant slightly lower yields than in the euro area. By contrast, Polish bonds offered a yield spread of some 115 basis points. In Hungary and Slovakia, however, yield differentials widened by some 30 to 40 basis points, albeit from very different initial levels. In Slovakia, the yield differential in-

creased from 3 to some 40 basis points, whereas the differential in Hungary grew from 300 to some 330 basis points. Apart from this, currency weakness in March 2006 did not greatly rub off onto the bond markets. Yield differentials in Hungary and Poland, whose currencies were the most affected, climbed by only 3 to 10 basis points, and the volume of Hungarian government bonds in foreign ownership has grown steadily since early February. In response to turmoil in EMEs in May, the yield differential between local currency bonds and euro area benchmark bonds widened temporarily by some 15 to 40 basis points in these four countries. However, only in Poland and Slovakia was the spread at the end of May higher than at the end of April (increase by about 15 basis points).

Various factors were responsible for the widening and narrowing of yield differentials in individual countries. *Inflation (HICP)* developed favorably for the bond market in Hungary and Poland. In Poland, the inflation rate fell from almost 2% in September 2005 to 0.9% in March 2006; in Hungary, by contrast, it declined from 3.6% to 2.4% over the same period. In March 2006, furthermore, these two countries' core inflation rates (excluding unprocessed foodstuffs and energy prices) were only 0.4% and 1.1%, respectively. However, the drop in Hungary's inflation in early 2006 was strongly influenced by a temporary factor – the cut in the highest VAT rate. In 2007, inflation is expected to climb back to some 3%. In the Czech Republic and particularly in Slovakia, however, inflation rose by 0.4 percentage point and by 2.0 percentage points, respectively, between September 2005 and March 2006. In part, this was due to the rise in energy prices, but inflation excluding energy and unprocessed foodstuffs also went up (by 0.3 and 0.6 percentage point, respectively). Although the inflation outlook in these four countries is basically positive, certain risks should not be ignored. In view of the relatively high share of energy prices in these countries' baskets of goods, it first remains to be seen to what extent the continued rise in energy prices will have an effect on core inflation in the medium term. Second, the growth in domestic demand in all four countries (and above all in Slovakia) has been fueled by more robust lending growth in the last few months. Third, the reduction or the plugging of the negative output gap in these four countries is currently countering persistent disinflation. Furthermore, in 2005, Hungary and Slovakia also posted relatively high growth in unit labor costs, which could increase inflationary pressure on the costs front if the trend continues. Passing on the pressure on costs to consumers could be favored by the latest acceleration in domestic consumer demand.

In 2005, *budgetary developments* in the Czech Republic, in Poland and Slovakia were a favorable factor for the bond market. All three countries posted budget shortfalls of less than 3% of GDP.[4] These were smaller than in 2004 (above all, in Poland) and lower than predicted in fall 2005 (particularly so in the Czech Republic

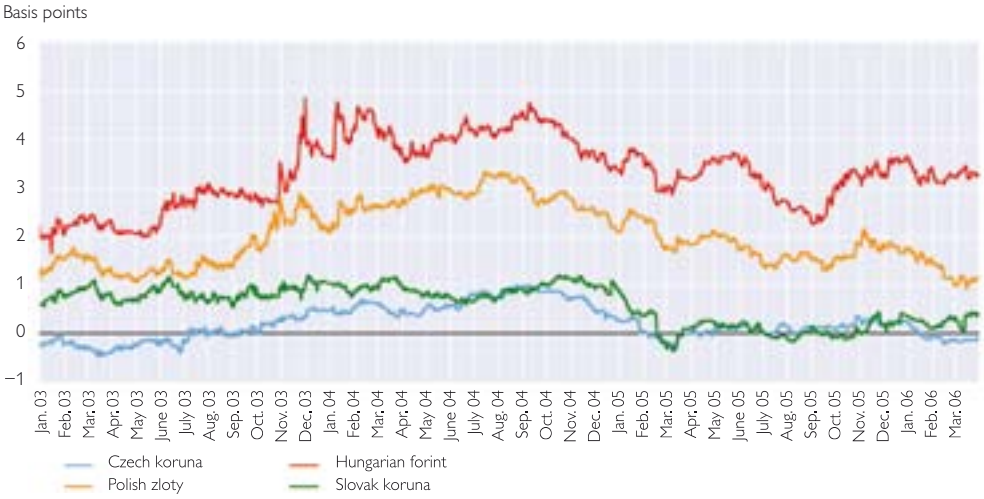
[4] *The shortfall amounted to 2.6% of GDP in the Czech Republic, 2.5% (4.4% including pension reform costs) in Poland and 2.9% (3.5% including pension reform costs) in Slovakia.*

and in Poland). According to official sources in the Czech Republic, however, the shortfall is expected to deepen substantially this year. By contrast, Poland's deficit should deteriorate by only a slight margin compared with 2005, and Slovakia's should prove stable. Hungary's budget deficit, however, deepened from 5.4% of GDP in 2004 to 6.1% in 2005 (and from 6.6% to 7.5% including pension reform costs). The plan to reduce the shortfall in the 2006 budget by around 1 percentage point appears ambitious. Moreover, Hungary needs to present a revised convergence program by September 1, 2006, at the latest, as the Ecofin Council did not find the program submitted at end-2005 to include sufficiently conclusive information.

For these four markets, the *international investment climate* remained favorable during most of the reporting period. As also with the Eurobond and currency markets, potential future shifts in the portfolios of international investors in response to a further rise in industrialized countries' short-term and long-term interest rates represent a risk for local currency bond markets. This applies particularly to Poland and Hungary, where foreign investors hold a larger share of the outstanding volume of government bonds.

Chart 3

Yield Spreads of 10-year Government Bonds against Euro Benchmark Bonds



Source: Bloomberg.

Good Financial Position of the Real Economy Sectors

Risk Situation of Enterprises Stable

Corporate Investment Gained Momentum

In the first half of 2006, cyclical developments in Austria were dynamic. While growth had mainly relied on exports in the past years, domestic demand picked up in 2006 as well. Enterprises had already intensified their investment activities in the second half of 2005. Current leading indicators, such as the WIFO Investment Survey, point to a further marked revival in the first half of 2006. In the light of rather low capacity utilization, replacement investments and streamlining measures are probably the main motives behind a vast majority of these investment projects.

In addition to capital investments, enterprises have recently also increased their financial assets to a significant extent. In 2005, financial investment exceeded EUR 12 billion and was thus 2½ times higher than the comparable figure of the previous year. These investments also included a series of strategic equity investments in Austrian and foreign enterprises (see box "Enterprises' Financial Assets on the Rise").

Internal Financing Potential Remains High

The profit situation of Austrian enterprises continued to be favorable in 2005. Unit labor costs developed moderately, and low nominal interest rates helped keep financing costs down. The development of the profit margin[5] and the gross operating surplus[6] appear to point to a further increase in profits in 2005.

Enterprises' Financial Assets on the Rise

Does the continuous increase in Austrian enterprises' financial assets, which was only briefly interrupted in 2004, indicate that Austrian businesses – like enterprises in other countries – tend to invest more in financial assets instead of real capital? We will briefly look into this question using financial accounts data.

First of all, one must bear in mind that in the financial accounts, financial investment also includes several positions that do not constitute financial assets in a narrower sense. On the one hand, they record the comprehensive foreign direct investment (FDI) of the corporate sector. If, in a first approximation, we sum up unquoted equity and loans[1] granted to foreign borrowers by Austrian companies, we see that they account for almost three quarters of financial investments in the period from 2001 to 2005. On the other hand, the position "financial investments" includes strategic holdings in Austrian enterprises, which declined between 2001 and 2003 and have changed little ever since.

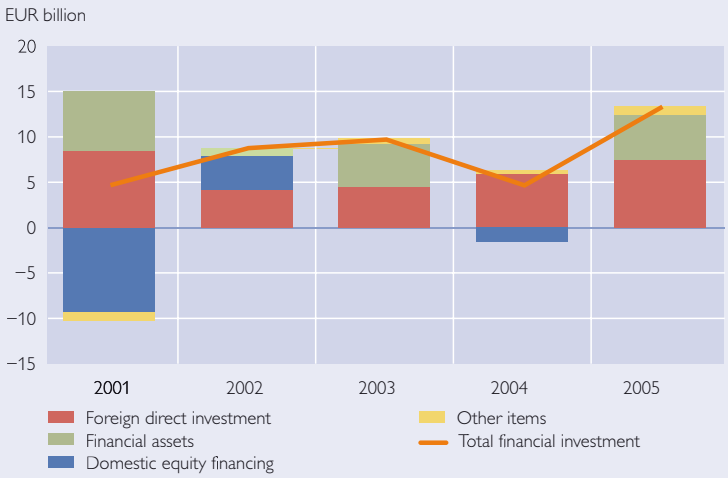
[1] *To a considerable extent, these loans are intragroup loans that have a close economic link to equity capital transactions.*

[5] *The profit margin is the ratio of the deflator of gross value added to unit labor costs.*

[6] *The gross operating surplus is the surplus created by corporate operations after the remuneration of the production factor labor. It can be determined by deducting the compensation of employees and taxes on production (less subsidies) from GDP, and is the national accounts' equivalent of gross operating income. The gross operating surplus is an approximation variable for measuring absolute profits.*

Chart 4

Financial Investment of the Corporate Sector 2001–2005



Source: OeNB.

Note: Foreign direct investment: unquoted equity securities, corporate sector lending abroad.
Domestic equity financing: unquoted equity in Austria.
Financial assets: deposits, short-term and long-term securities, mutual fund shares, quoted shares.
Other investment: currency, insurance technical reserves, other claims.

In the past five years, financial assets[2] accounted for around 42% of new financial investment. In spite of low and decreasing (nominal) interest rates, around one third of enterprises' financial investment went into interest-bearing assets (deposits, short-term and long-term securities), while mutual funds also gained importance. The relatively strong rise in deposits by around EUR 3 billion annually since 2003 might indicate that unexpectedly high profits have been invested in the short term. This development and the strong decline in financial assets in 2004 may be related to the expiration of the investment growth subsidy at end-2004.

[2] *Financial assets include deposits, money market instruments, capital market instruments, mutual fund shares and quoted equity securities.*

External Financing Strongly Relies on Equity

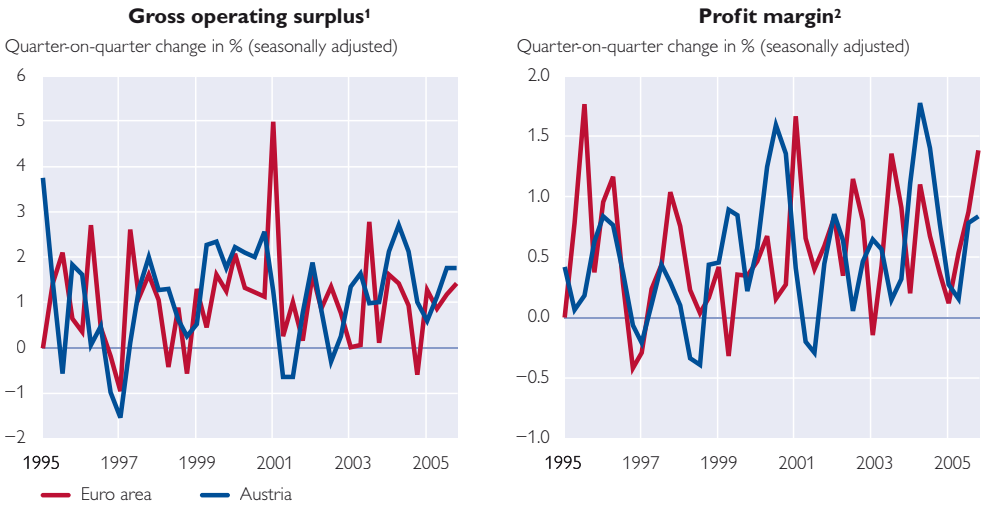
Even though – thanks to their high profits – Austrian enterprises were able to finance their business activities largely from their own income, their demand for external financing went up in the face of strengthening investment and equity financing. In 2005, total external financing of the Austrian corporate sector grew by more than 40% against the previous year, reaching EUR 17.5 billion.

Around one third of external financing stemmed from equity instruments, and approximately one quarter each from bonds and bank loans. The percentage of capital market instruments (bonds and shares) in external financing doubled to 37% in 2005.

Shares issued at Wiener Börse AG between October 2005 and March 2006 totaled around EUR 1.1 billion. Even if there were only few new issues by Austrian nonfinancial corporations, the number of capital increases was considerable. A major part of the latter was attributable to real estate companies. In the last quarter of 2005 and the first quarter of 2006, the robust issuance activity as well as continued strong price increases drove up the market capital-

Chart 5

Indicators of Profitability Performance in the Corporate Sector



Source: Eurostat.

[1] *Including mixed income of the self-employed.*
[2] *GDP deflator less unit labor costs.*

ization of nonfinancial corporations listed at Wiener Börse AG by more than EUR 10 billion to just below EUR 70 billion, which corresponds to around 28% of GDP.[7]

In 2005, bonds again made a major contribution to the funding of the corporate sector as a whole, with the picture being shaped by a few large-scale issues. According to the OeNB's securities issues statistics, the outstanding volume of bonds issued by nonfinancial corporations went up by 23% against the previous year. In many cases, the motivation for issuing bonds was to benefit from the currently relatively low interest rate level over a longer period of time. Moreover, several issues also served to finance mergers and acquisitions.

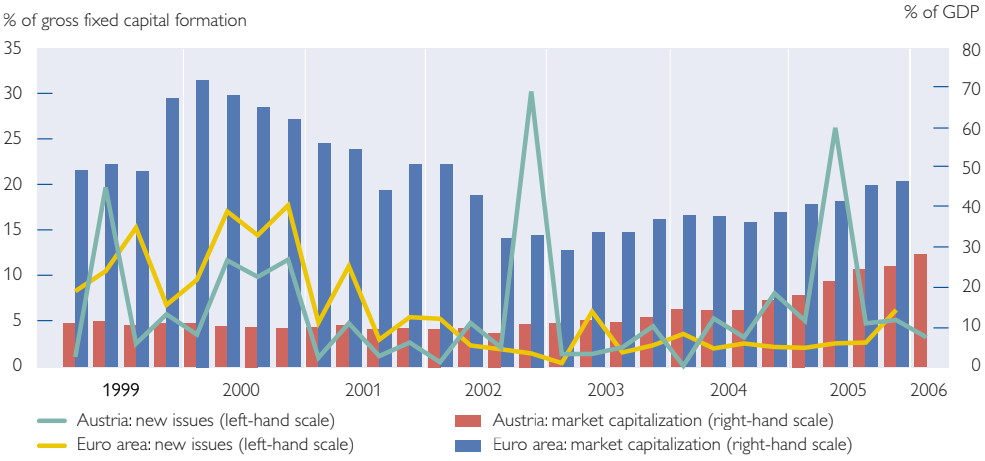
The annual growth rate of bank loans granted to the corporate sector has been above 3% since December 2005 and reached 3.6% in March 2006.[8] Until recently, the dynamism in this segment lagged behind that observed in the euro area. According to the Austrian results of the Eurosystem bank lending survey, in recent quarters enterprises increasingly took out loans to fund mergers and acquisitions or to restructure companies. Further important motives for borrowing funds were the funding of fixed capital formation as well as the need to finance inventories and work-

[7] *The market capitalization of all stocks listed on Wiener Börse AG (including financial corporations) came to more than 49% of GDP at end-March 2006.*

[8] *MFI balance sheet statistics data. Analyzing loans to enterprises and households has become more complicated owing to a change in the balance sheet statistics that requires the reporting of gross instead of net risk provisions as of June 2005. Since then, Austrian MFIs have reported their entire risk exposure inclusive of risk provisions. The figures quoted here are based on an estimation using the monthly balance sheet report. See Alois Klein. 2006. EZB-MONSTAT – die Auswirkungen der meldetechnischen Umstellungen im Bereich der Kreditpositionen zum Berichtstermin Juni 2005 auf bestimmte Kreditaggregate. In: Statistiken – Daten & Analysen Q1/06. OeNB. 13–15.*

Chart 6

New Issues[1] and Market Capitalization of Quoted Shares of Nonfinancial Corporations



Source: ECB, OeNB.

[1] *Capital increases and new listings.*

ing capital. Bond issues, however, reduced enterprises' demand for bank loans.

Financing Conditions Remain Favorable

The conditions for external financing have remained positive for Austrian companies, both for borrowing funds and for issuing equity capital.

After the interest rate charged on loans to enterprises had continued to decrease slightly until the fall of 2005, it went up moderately after the rise in key interest rates of December 2005 and March 2006 (see Chart 8). The interest rate level in Austria remained very low both historically and when compared with the euro area. In real terms, lending rates declined throughout 2005, as inflation rates were expected to go up.

A comparison of banks' retail interest rates and interest rates for largely risk-free financial assets provides an indicator of the average risk premium contained in banks' interest rates.[9] The difference between interest rates for corporate loans and swap rates of comparable maturities shows that the risk premium has continuously decreased since the second half of 2005. This might reflect an improvement in the economic outlook over the past months.

By and large, this result matches the findings of the bank lending survey, according to which banks have slightly tightened lending conditions for SMEs since the third quarter of 2005, while keeping them stable for big enterprises. Risk factors play an increasing role in laying down the conditions of corporate lending. While banks reduced the interest margins for lending to borrowers with average credit ratings for four consecutive quarters, they raised them for riskier loans in most cases.

Financing conditions on the stock exchange remained favorable as well in the first months of 2006. Follow-

[9] *In addition to the credit risk, the interest margin also reflects the specific competitive situation of the Austrian loan market which, while not influencing risk adjustment as such, does have an impact on its volume.*

ing a 53% rise in stock prices in 2005, the ATX further increased by 16% in the first quarter of 2006. Given the price gains, the price/earnings ratio went up (despite the positive profitability performance of the enterprises listed at Wiener Börse AG) until the third quarter of 2005, followed by a slight decline. In a longer-term comparison, the price/earnings ratio was still relatively high and constantly remained above the reference value for the entire euro area. This means that, on average, equity financing was less expensive in Austria than in the euro area.

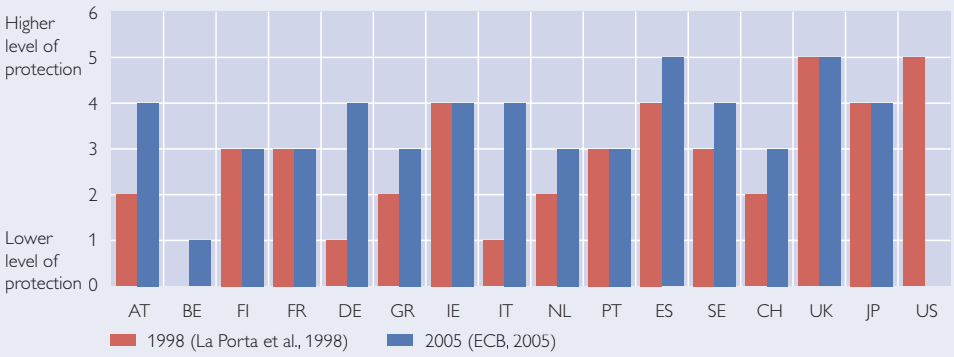
Corporate Governance in Austria Improved

A typical characteristic of corporations is the separation of ownership and management. Corporate governance refers to the rules that define the rights and responsibilities of supervisory board, managing board and shareholders. Thus, corporate governance can play a significant role in securing financial market stability and financing enterprises via the capital market, which is one of the reasons why major initiatives to improve the rules of corporate governance have been launched at the EU level.

One aspect of improved corporate governance is the stronger protection of minority shareholders. The chart below shows an index based on a paper by La Porta et al. (1998) [1] *that measures the level of minority shareholder protection. For 2005, the ECB (2005) updated this indicator using the OECD Corporate Governance and Company Law Database (see also Fritzer, 2006).*[2]

Chart 7

Minority Shareholder Protection



Source: See footnotes 1 and 2.

Note: This index is based on the sum of quantified data for the following variables: (1) proxy by mail allowed at the general meeting (1 = yes; 0 = no); (2) shares not blocked before general meeting (1 = yes; 0 = no); (3) cumulative voting or proportional representation (1 = yes; 0 = no); (4) oppressed minorities mechanism to counteract management decisions (1 = yes; 0 = no); (5) preemptive rights to purchase new issues of stock (1 = yes; 0 = no); (6) percentage of share capital to call an extraordinary shareholder meeting (1 = the minimum percentage is less than 20%; 0 = all other options). The index scale ranges from 0 to 6, with lower values indicating fewer rights for small shareholders.
The 2005 update for the United States is not available yet. The underlying data were originally published by the OECD. This reproduction, however, does not necessarily reflect the official views of the governments of the respective Member States.

[1] *La Porta, R., F. López-de-Silanes, A. Shleifer and R. Vishny. 1998. Law and Finance. In: Journal of Political Economy 106(6). 1113–1155.*

[2] *ECB. 2005. Assessing the Performance of Financial Systems. In: ECB Monthly Bulletin. October. 75–89.*
Fritzer, F. 2006. The Financial System and the Institutional Environment as Determinants of Economic Performance: Austria in Comparison. In: Monetary Policy & the Economy Q1/06. OeNB. 136–158.

In Austria, the protection of minority shareholders[3] has significantly improved since the end of the 1990s (in chart 7, higher values represent more rights for minority shareholders). Based on this indicator, Austria is now among the euro area countries with the strongest protection of minority shareholders. Only the voting options for shareholders at the general meeting (e.g. no electronic voting) and the voting right of minority shareholders (no cumulative voting in the election of CEOs) do not correspond to the highest possible standards.

In recent years, the Austrian stock market has become more important for corporate funding – a trend which is also due to the improved protection of minority shareholders. In country comparisons, several studies have found a strong positive correlation between the protection of small shareholders (as measured by this index) and stock market liquidity.[4]

However, the index does not measure all aspects that play a role in capital market developments. The revised Austrian Code of Corporate Governance, which became effective at the beginning of 2006, comprises 81 rules, of which more than 30 were modified. The Code now includes enhanced disclosure requirements vis-à-vis shareholders (e.g. disclosure of information on the technical qualification of candidates for the supervisory board; disclosure of the remuneration scheme in the annual report in addition to the disclosure of the full remuneration of the managing board) and rules strengthening the independence of the supervisory board (e.g. members of the supervisory board must not be members of the managing board of the enterprise or its subsidiaries; the chairperson of the supervisory board must not be a previous CEO of the enterprise). Moreover, the competences and responsibilities of the managing board were defined more clearly (e.g., as a rule, members of the managing board must not be members of the supervisory board of other enterprises).

Like in many other countries, the Code of Corporate Governance is conceived as "soft law" in Austria and therefore, largely relies on voluntary compliance.[5] Thus, Austrian enterprises listed on the prime market of Wiener Börse AG are obliged to disclose whether they comply with the Austrian Code of Corporate Governance and, if not, provide an explanation.

The revised Code of Corporate Governance has the potential to make (listed) enterprises more transparent for investors and might thus also raise the attractiveness of Wiener Börse AG. However, as the Code is designed as "soft law," its effectiveness largely depends on the voluntary compliance of enterprises.

[3] There is no harmonized definition of minority shareholders. Often this term denotes shareholders that hold less than 10% of voting rights.

[4] La Porta, R., F. López-de-Silanes, A. Shleifer and R. Vishny. 1997. Legal Determinants of External Finance. In: Journal of Finance 52(3). 1131–1150. This paper is a classic insofar as it provides empirical proof of the positive correlation between shareholder protection and financial market liquidity.

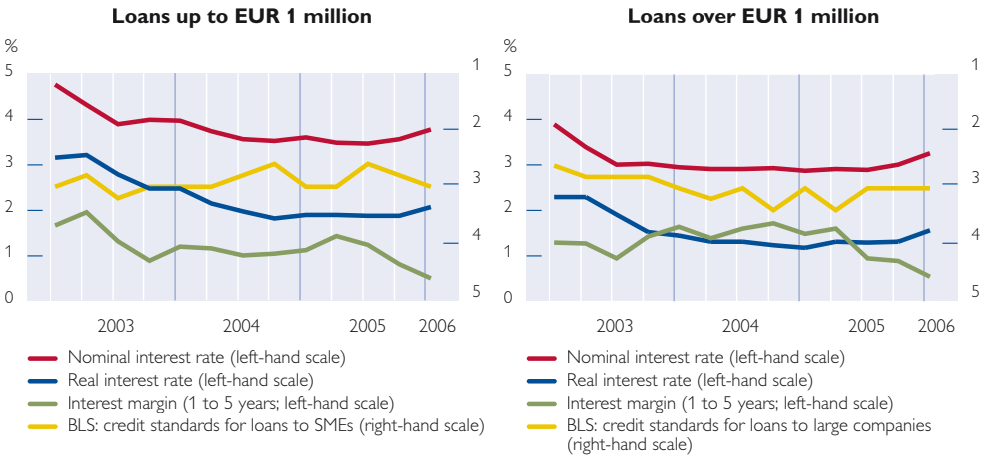
[5] The Austrian Code of Corporate Governance comprises three categories of rules: (1) Legal requirements (L): These rules are based on mandatory legislation, but only apply to Austrian and listed corporations. For enterprises not listed at the Vienna stock exchange, these rules are to be interpreted as C rules (see (2)). (2) Comply or explain rules (C): These rules must be followed; if not, any deviation must be explained stating the reasons. (3) Recommendations (R): These rules are pure recommendations.

A similar picture emerges from the spread between the earnings yield[10] and the government bond yield, whose development can be interpreted as an indicator of the stock market risk premium. The yield spread slightly narrowed in the second half of 2005 and, as the conditions for equity financing took a slightly more favorable course than the general interest rate level, it widened slightly in the first quarter of 2006.

[10] The earnings yield is the inverse of the price/earnings ratio.

Chart 8

Conditions for Corporate Loans

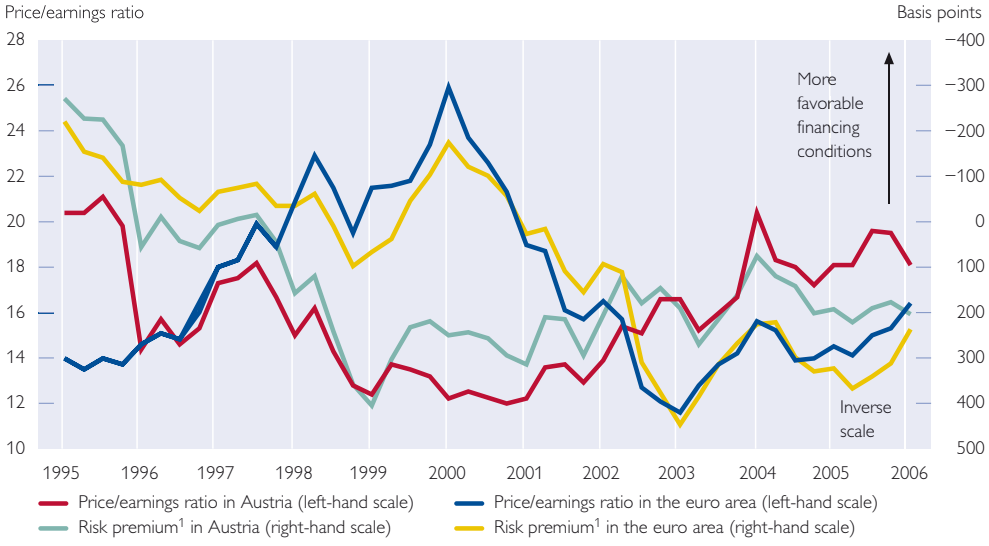


Source: OeNB, ECB, Statistics Austria, Consensus Economics.

Note: Scale ranging from 1 (tightened considerably) to 5 (eased considerably).
Real interest rate: Nominal interest rate less the OeNB's HICP forecast for the year following the forecast date.
Interest margin: Interest rate charged for loans with a maturity from 1 to 5 years less three-year swap rate.
BLS credit standards: Changes in the credit standards for loans to enterprises over the last three months.

Chart 9

Financing Conditions on the Stock Market



Source: Thomson Financial, OeNB.

[1] *Earnings yield (inverse of the price/earnings ratio) less government bond yield.*

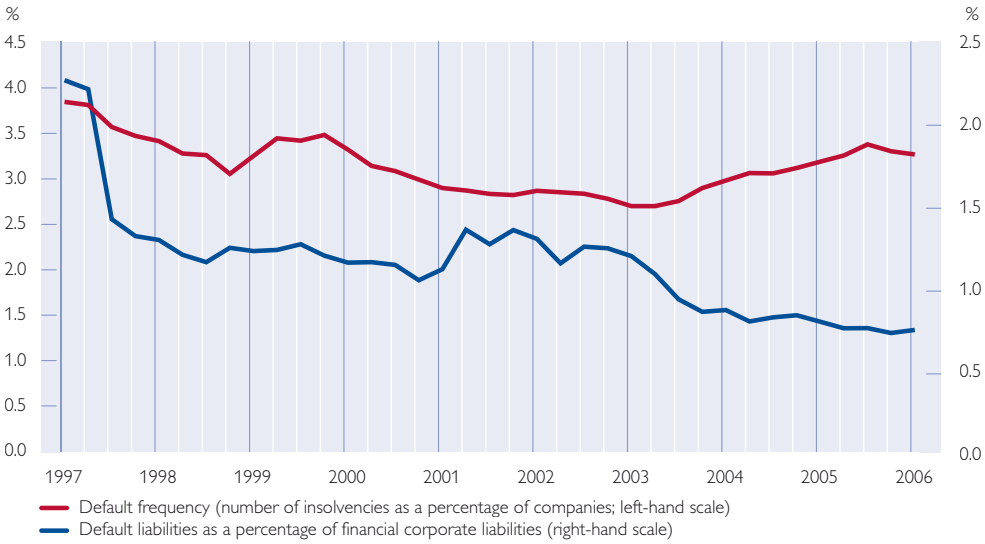
Default Liabilities Decreased

Default liabilities went down by 4.5% in 2005; in the first quarter of 2006 they were around 30% lower than in the same period of the previous year. This was not least due to the fact that there have been fewer large-scale insolvencies recently. Chart 10 shows that, already for several years now, there has been a downward trend in the share of default liabilities in overall corporate financial liabilities (according to the financial accounts). In the fourth quarter of 2005, this share reached a low of 0.73%.

Chart 10

Corporate Defaults

Four-quarter moving averages, annualized



Source: KSV, OeNB.

Default frequency, by contrast, has been on the rise over the last two years. In the first quarter of 2006, the number of newly opened insolvency proceedings went up by 6.1%, while the number of no asset cases increased by 5.7%. Altogether, the insolvency rate — in relation to the total number of enterprises — came to 3.3% (annualized) in the first quarter of 2006. As insolvencies usually constitute a lagging economic indicator, this increase reflects the weak economic development of the past years.

Financial Position of Enterprises Remains Sound

In broad terms, the assessment of the financial position of the corporate sector has not changed since the publication of the Financial Stability Report 10 (December 2005). Although corporate liabilities showed a relatively strong increase in 2005, the corporate sector's net financial position considerably improved against the previous year because financial investments grew significantly over the same period. Moreover, enterprises' potential for internal financing remained high given their continued favorable income situation. Together with higher external equity financing, this led to a further increase in the capital position of the corporate sector. [11]

[11] *This rise was not only caused by new borrowing, but rather the strong increases in stock prices on Wiener Börse AG, the Vienna stock exchange, which drove up the value of holdings and thereby corporate liabilities by EUR 21 billion in 2005.*

Financing conditions remained favorable for enterprises. Borrowing went up again so that the interest burden on enterprises slightly increased in absolute terms in 2005, but this rise was clearly below the growth in profits. As long as profitability stays this high, enterprises should continue to have a high debt repayment capacity and be able to afford an increase in interest payments should interest rates rise and/or borrowing increase in the future. If profitability decreased, this would not only reduce the funds available for repaying loans, but also lead to an increase in the corporate sector's interest costs owing to banks' stronger risk orientation in the definition of lending conditions.

In 2005, however, the corporate sector could further reduce its interest rate risk by increasingly resorting to equity and longer-term types of financing.

Strong Growth in Households' Net Financial Assets

Subdued Development of Private Consumption

While HICP inflation was significantly less dynamic during the first months of 2006, it amounted to 2.1% in 2005. This weakened households' purchasing power so that private spending did not gain any momentum despite tax reliefs provided by the second stage of the latest tax reforms. In real terms, the growth rate of consumption was only 1.4%. The considerable wage increases agreed in the latest round of wage settlements should gradually lead to strengthened consumer confidence and a slight upturn in private consumption (provided that oil prices do not accelerate further).

The increase of the saving rate which went hand in hand with subdued consumption resulted in a clear improvement in households' net financial positions (financial investments minus new borrowing). In the second half of 2005, their financial investments totaled EUR 7.8 billion and, hence, were twice as high as new borrowing.

The next section discusses the development of households' liabilities, followed by a presentation of their financial assets and, finally, conclusions.

Favorable Financing Conditions for Home Loans

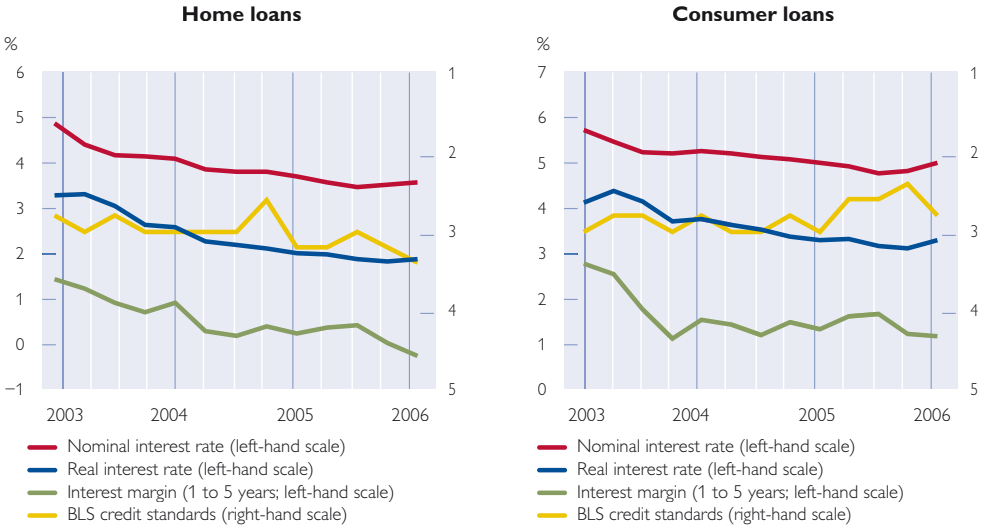
The downward trend in (ex ante) real interest rates[12] for home loans and consumer loans observed in the past years came to a halt in early 2006 (see chart 11). Real interest rates for home loans remained more or less stable, while those for consumer loans increased slightly. The results of the bank lending survey indicate that, since the beginning of 2005, developments have not been uniform for home loans and consumer loans. While the survey's findings point to unchanged conditions for home loans, the terms for consumer loans were tightened in the first three quarters of 2005. The survey results for the first quarter of 2006, however, suggest that loan conditions have been relaxed again. Banks' interest margin[13] for

[12] *The ex ante real interest rate (nominal interest rate minus HICP forecast) was calculated on the basis of the OeNB's inflation forecast.*

[13] *The correct reference rates for loans with a maturity of 1 to 5 years are interest rate swaps with the same maturity. Like the ECB, we chose the three-year euro interest rate swap rate for data reasons.*

Chart 11

Conditions for Loans to Households

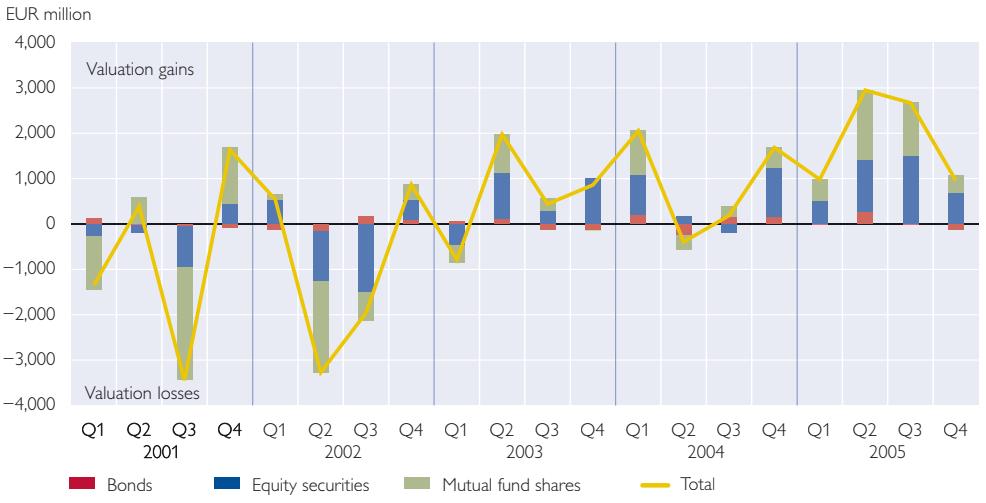


Source: Statistics Austria, ECB, OeNB.

Note: Scale from 1 (considerably tightened) to 5 (considerably relaxed).
Real interest rate: nominal interest rate less the OeNB's HICP forecast for the year following the forecast date.
Interest margin: Interest rate for loans with a maturity of 1 to 5 years less 3-year swap rate.
BLS credit standards: Changes in the standards for loans to households over the last three months.

Chart 12

Valuation Gains and Losses in Households' Financial Assets



Source: OeNB.

medium-term home and consumer loans showed a rather flat development in 2005. This tendency continued for consumer loans in early 2006, while the interest margin slightly narrowed for home loans. All in all, and especially in a long-term comparison, financing conditions for home loans may be considered favorable, while loan standards have been slightly tightened for consumer loans.

New Debt Incurred Primarily for Housing Investments

In 2005, bank loans to households achieved a growth rate corresponding to the level of the previous years. The annual growth rate was 7.0% in

March 2006. Expansion has slightly decelerated in the past 12 months. The main purpose of borrowing remains home financing. With an annual growth rate of 8.8%, home loans have seen a dynamic development. By contrast, consumer loans registered a noticeable slowdown and, in March 2006, were only 3.8% above the reference value of the previous year. This could be related to slightly more restrictive credit standards for consumption purposes.

The demand for foreign currency loans remained high. At the end of 2005, foreign currency borrowing reached a share of 31% in total loans. In the past year, the Swiss franc essentially dominated the expansion of foreign currency borrowing, whereas loans denominated in Japanese yen continued to decrease.

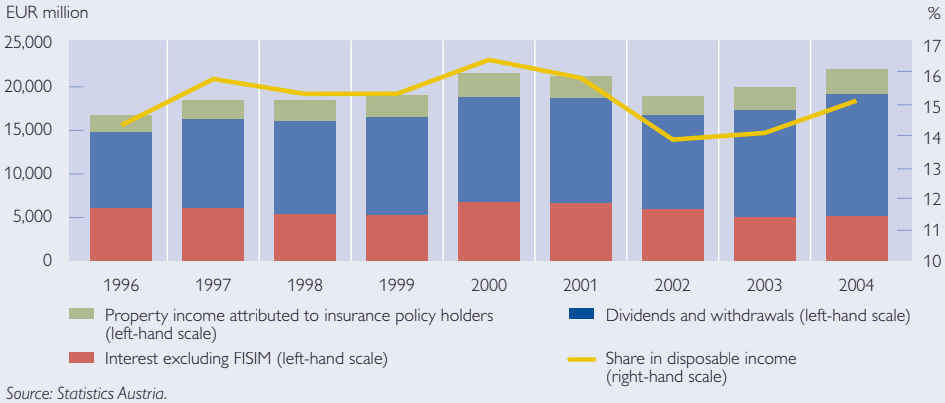
Households' Investment Income Rises

In macroeconomic terms, financial assets are an important part of disposable income. In the past years, a considerable share of households'[1] real income growth came from the development of (gross) investment incomes. It should be noted, however, that financial assets and, as a result, investment incomes are distributed unevenly.[2]

The most significant elements of investment incomes are dividends and withdrawals from companies (i.e. the part of corporate profits distributed to or withdrawn by the owners). Their share in total investment income rose from 52% in 1996 to almost two-thirds in 2005; in 2003 and 2004, dividends and withdrawals accounted for the entire growth of investment income. The interpretation of this indicator, however, is made rather difficult by the fact that, because of data problems, it has to be calculated as a residual value.

Chart 13

Household's Investment Income



Source: Statistics Austria.

The second most important position is interest income. Its share in the investment income of households decreased from 37% in 1996 to 23% in 2005. This weak development mainly reflected the decline of interest levels in the past years, which was only partly offset by the – relatively low – increase in households' interest-bearing financial assets.

[1] *Here, households not only include individuals and groups of individuals in their capacity as consumers, but also sole proprietorships and partnerships (without legal personality) as well as private nonprofit organizations, such as private foundations.*

[2] *See Beer, C., P. Mooslechner, M. Schürz and K. Wagner. 2006. Austrian Households' Financial Wealth: An Analysis Based on Microeconomic Data. In: Monetary Policy & the Economy Q2/06. OeNB (forthcoming).*

The third type of investment income is property income attributed to insurance policy holders. Its share in total investment income was more or less constant throughout the entire period under review, ranging from 11% to 13%. It should be noted, however, that this is a purely hypothetical value which reflects the investment performance of insurance companies and pension funds.

In this analysis, the development of stock prices on Wiener Börse AG has no influence on investment incomes because valuation gains arising from securities do not form part of investment income. They are not transactions, but changes in the value of financial assets.

In the past years, investment incomes showed a relatively high correlation to the related financial investments. This is particularly true for investments in interest-bearing financial assets, which to a large extent were fuelled by interest income as, for example, credited interest on deposits remained on accounts and only a relatively small share was used for consumption. On account of declining interest rates and the dwindling importance of interest-bearing assets in financial investment, however, this correlation has been less pronounced recently. A relatively stable link could also be discerned between income from insurance yields and property income attributed to insurance policy holders. By contrast, there was a considerable gap between dividends and withdrawals on the one hand and equity investment on the other. To a large extent, this can probably be attributed to the fact that a major part of shareholdings represent no pure financial investments for households and that corporate profits are primarily re-invested in the form of retentions, i.e. they are not distributed at all.

High Investments in Insurance Products

According to the financial accounts, financial investments by households amounted to EUR 7.8 billion in the second half of 2005. In this period, the demand for mutual fund shares and insurance products was particularly strong, accounting for more than half of financial investments. Households increased their claims on mutual funds by EUR 2.1 billion and their claims on insurance companies and pension funds by a total of EUR 2.5 billion. By contrast, direct investments in listed shares and bonds were considerably lower (second half of 2005: EUR 0.8 billion).

High Valuation Gains from Capital Market Investments

Because of the good performance of capital markets, investments in equity securities and mutual fund shares yielded high valuation gains for households. In the second half of 2005, the valuation gains reached EUR 3.8 billion for mutual fund shares and stocks, while bonds recorded a negative performance (–EUR 111 million).

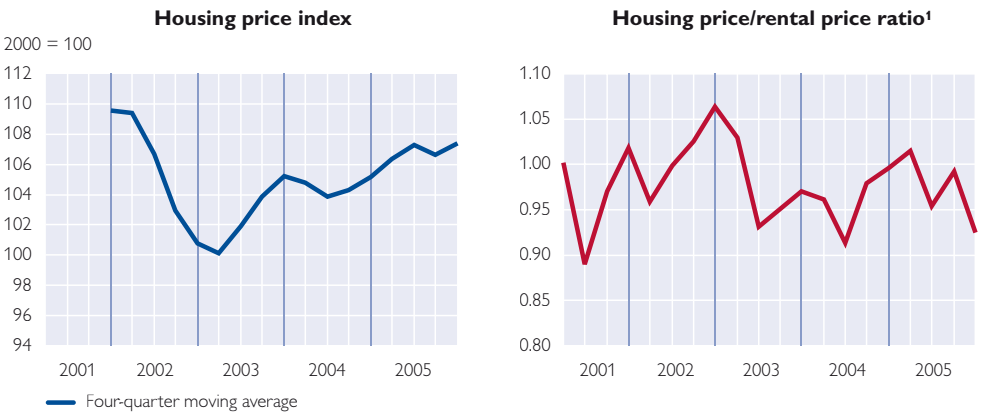
Both valuation gains and increased investments in capital market instruments resulted in an increase of the share of stocks, bonds, mutual fund shares and insurance products in households' overall financial assets, while the share of cash and deposits slightly decreased.

Real Estate Price Developments Subdued

In some euro area countries, real estate prices developed very dynamically. Spain has recorded two-digit growth rates for several years, while Austria as well as Germany are among those countries with rather subdued price developments in these markets. In 2005, prices for buying Austrian apartments showed a slight upward trend (see chart 14).

Chart 14

Indicators for Real Estate Prices

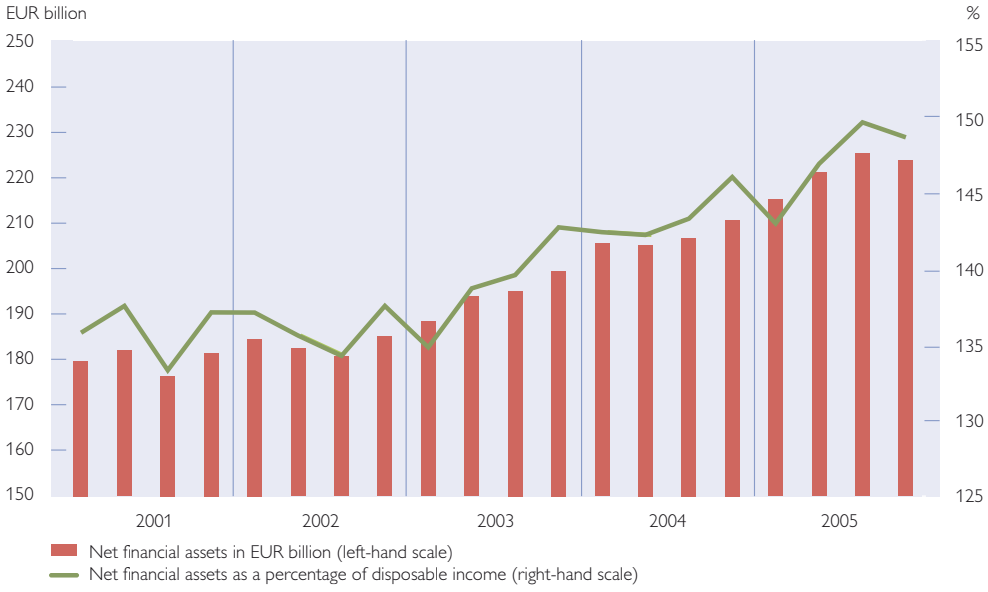


Source: Vienna University of Technology, AiB, OeNB.

[1] *The housing price/rental price ratio is calculated by dividing the housing price index (new owner-occupied apartments) by the price index for rented apartments (2000 = 100).*

Chart 15

Households' Net Financial Assets



Source: Statistics Austria, OeNB.

An indicator of an excessively high valuation of the real estate market is an increase in the housing price/rental price ratio. If housing prices rise significantly faster than rental prices – over a prolonged period –, they deviate from their fundamental market value.[14] However, as chart 14 shows, the housing price/rental price ratio does not display an upward trend in Austria so that there are no indications that the real estate market is overvalued.

[14] *See, for example, McCarthy, J. and R.W. Peach. 2004. Are Home Prices the Next 'Bubble'? In: Federal Reserve Bank of NewYork Economic Policy Review. 1–17.*

Summary: Risk Exposure of Households Remains Stable

As financial investments of households clearly exceeded new debts and households additionally posted high valuation gains on capital market instruments in 2005, the net financial assets of the household sector increased to 149% of disposable income.

Strong investments on the capital market have resulted in high valuation gains, but are also accompanied by a moderate risk potential as evidenced by the valuation losses for bonds in the last quarter of 2005 (–EUR 111 million). If interest rates continue to increase, this development could accelerate.

Given the high share of variable-interest loans, loan costs are subject to significant interest rate risk. Moreover, Austrian households' financial liabilities involve certain foreign currency risks given the undiminished demand for loans denominated in foreign currencies.[15] However, as the debt ratio of Austrian households is rather low in comparison with the euro area, this risk is probably limited.

As the risk factors indicated above were offset by the strong growth in the net financial assets, one can say that the risk exposure of households has remained broadly unchanged.

[15] *A major part of foreign currency loans is denominated in Swiss francs, a currency which has been largely stable against the euro in the past. In early 2006, however, the Swiss franc slightly appreciated against the euro.*

Austrian Financial Intermediaries' Business Develops Well

Austrian Banks See Sustained Profit Growth[16]

Total Assets of Banks Continue to Grow Strongly

The Austrian banking sector's total assets continued to expand notably in 2005. Posting a year-on-year increase of 11.1% – the largest rise seen since the end of 2000 – the unconsolidated total assets of Austrian credit institutions reached EUR 725 billion in December 2005. The five largest banks[17] recorded slightly below-average total asset growth of 10.4% at the end of 2005, accounting for 44.2% of the aggregate banking sector's total assets on an unconsolidated basis. Austrian credit institutions' consolidated total assets rose by 15.6% year on year and thus also hit a new peak of EUR 847 billion at end-2005.[18]

The substantial increase in unconsolidated total assets is in particular attributable to an expansion of foreign business on both the asset and the liability side (by 22.7% and 20.2%, respectively, year on year).[19] On the asset side, claims on foreign banks increased by 19.3%, and more recently, so did claims on foreign nonbanks (+22.8%). Loans to domestic nonbanks climbed by 4.7% in December 2005 (2004: +5.0%), with particularly foreign currency loans continuing their strong growth. At 4.1% year on year, the increase of claims on domestic banks was considerably weaker than that of claims on foreign banks.

On the liability side, the expansion of foreign liabilities in December 2005 was carried both by liabilities to foreign banks (+27.3%) and to foreign nonbanks (+19.1%) as well as by securitized foreign debt (+14.2%). Austrian banks' domestic issues, in particular in foreign currency, also trended upward strongly in the period under review (+22.7% year on year).

By contrast, at 4.5% and 4.8%, respectively, liabilities to domestic banks and deposits of domestic nonbanks grew at a slower pace. Foreign nonbanks' deposits expanded in 2005; the reported data do not confirm, however, that this increase can be linked to a rise of German households' deposits with Austrian banks in the wake of the entry into force of the so-called tax honesty law in Germany, as repeatedly assumed by national and international media.[20]

The nominal value of Austrian banks' special off-balance sheet operations, which have been fluctuating strongly over time, came to EUR 1,506.1 billion in December 2005,

[16] *Since the final financial statements of Bank für Arbeit und Wirtschaft und Österreichische Postsparkasse AG (BAWAG P.S.K.) and Hypo Alpe-Adria International AG were not available at the cut-off date for this report, data may be subject to revisions. However, such revisions will not affect the general assessment of the Austrian banking system.*

[17] *Bank Austria Creditanstalt AG (BA-CA), Erste Bank der oesterreichischen Sparkassen AG (Erste Bank), Raiffeisen Zentralbank Österreich AG (RZB), BAWAG P.S.K. and Österreichische Volksbanken AG (ÖVAG).*

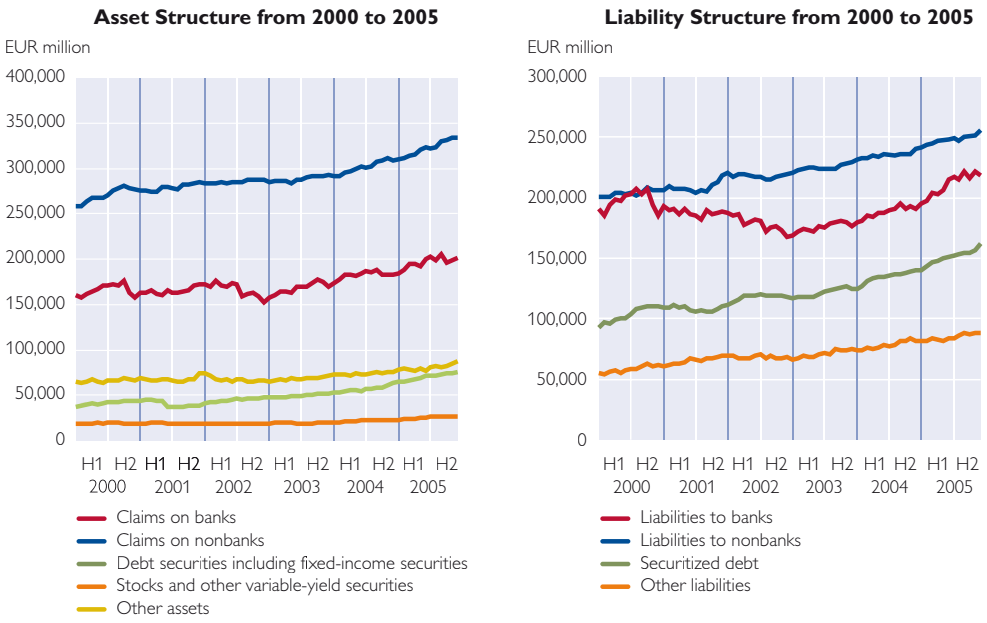
[18] *As banks use different accounting systems, aggregated data may provide a slightly distorted picture.*

[19] *An expansion of cross-border activities recently was also reported at the international level (see BIS Quarterly Review March 2006, p. 15–30).*

[20] *On the whole, foreign nonbank deposits are considerably more volatile than domestic nonbank deposits.*

Chart 16

Balance Sheet Structure of the Austrian Banking Sector (on an Unconsolidated Basis)



Source: OeNB.

double the amount of unconsolidated total assets;[21] factoring out the extensive operations of one major bank, this ratio stood at 1.5. All in all, compared with 2004, credit institutions' special off-balance sheet operations edged up by 2.7% in 2005.

Austrian Banks' Profitability Rises

Current problem cases notwithstanding, 2005 was, on the whole, another successful year for the Austrian banking system. Continuing the long-standing trend, business in Central and Eastern Europe (CEE) gained further importance (see the section entitled "Growing Exposure of Austrian Banks to Central and Eastern Europe"). At the same time, Austrian banks continued their strategy of enhancing the profitability of domestic operations.

The consolidated result reflects in particular Austrian credit institutions' successful business activities in Central and Eastern Europe. The operating profit of the consolidated aggregate sector[22] increased by 14% to EUR 7.8 billion in 2005. Since total assets also rose considerably as a result of acquisitions and dynamic business environments in the new EU Member States, the acceding and accession countries and other Eastern and Southeastern European countries, the consolidated operating profit margin[23] remained 0.92% in 2005, which was roughly the same level as in 2004. The consolidated cost-to-income ratio improved from

[21] *It must be noted, though, that the nominal value does not provide a direct indication of the underlying risk of the derivatives business.*

[22] *The aggregation of data from consolidated financial statements prepared in compliance either with the Commercial Code or the International Accounting Standards may result in minor imprecision.*

[23] *Consolidated operating profit to total assets.*

64.6% in 2004 to 63.3% in 2005, with income growth (9.6%) clearly exceeding the increase in expenditures (7.4%). Next to fee income, which contributed most to the rise in revenues, interest income on a consolidated basis, which includes income from participating interests and also covers the highly profitable foreign business operations, also played an important role.

Profits from Fees and Commissions as Well as from Participating Interests Compensate for Narrowing Interest Margin

The analysis of unconsolidated earnings, which to a large part reflect domestic business operations, reveals that profitability has been improving notably since 2003. Above all, fee income and income from participating interests have evolved particularly well, while the contribution of unconsolidated interest income to profits has been declining for years.

In 2005 unconsolidated interest income edged down by 0.5% compared with 2004, and the interest margin in fact narrowed significantly, dropping by 0.11 percentage point from 1.21% to 1.10%. This contraction was only partly offset by the substantially faster rise in loans to nonbanks (+EUR 25.0 billion in the course of 2005), which considerably exceeded the growth of nonbanks' deposits (+EUR 15.7 billion). Interest rates on new business do not indicate a widening of the interest margin, either: Though interest rates both on deposits and most categories of loans went up slightly at the end of 2005 in response to market interest rates, interest rates on deposits went up more. Moreover, interest rates on new business in home loans with interest rates fixed for over 10 years and loans to enterprises with interest rates fixed for over 5 years continued to edge down. This development has gone hand in hand with the flattening of the yield curve in the money and bond markets, which has further reduced the contribution of term transformation to profits. Furthermore, banks increasingly rely on capital market funding, which is more expensive than refinancing through nonbank deposits. The high share of variable-rate loans also had a negative impact on the interest margin in the past. Compared with credit institutions in other euro area countries, banks in Austria still offer favorable interest rates for their customers.

Large banks with total assets of more than EUR 2 billion are affected most by narrow interest margins; their margin came to only 0.9% in 2005; by contrast, the interest margin for medium-sized banks (with total assets of between EUR 500 million and EUR 2 billion) and small banks (with total assets of up to EUR 500 million) was 1.41% and 2.13%, respectively.

In line with the trend observed in most developed banking markets, the contribution of interest income to banks' earnings has been continuously shrinking in Austria. In 2005, interest income accounted for a mere 45% of unconsolidated operating revenues, while fee income contributed 25% and participating interests 17%. Unconsolidated fee income rose by 16.4% in 2005, most of which stemmed from fee income on securities. Earnings from securities transactions and participating interests went up by a hefty 30.1%, with profit distributions by domestic subsidiaries accounting for somewhat more than half of this increase. Trading income contributed only 4% of unconsoli-

dated operating revenues, thus remaining a subordinate source of income for Austrian banks.

The share of operating profits used for credit risk provisioning has been declining since 1998. This reduction is linked to the favorable credit cycle for banks on the one hand and to the sharp boost in operating profits since 2003 on the other hand.

The unconsolidated return on assets (ROA) continued to improve in 2005. Similar to the interest margin, the unconsolidated ROA, which mostly reflects domestic profitability, was better for medium-sized and small banks – with the latter having benefited greatly from valuation gains on participating interests – than for large banks with total assets of over EUR 2 billion.

Continued Steady Loan Growth

For about one year, the aggregated growth of loans extended by banks operating in Austria has followed a consistent trend. At 4.7%, the annual growth rate of all Austrian banks' loans to nonbanks almost equaled the rate recorded in 2004 (5%); at year-end 2005, the total amount of loans taken out by nonbanks came to EUR 263.3 billion (see chart 17). Despite two ECB key interest rate hikes, which Austrian banks have largely followed, interest rate conditions remained favorable in the period under review; in Austria, average lending rates stayed below the euro area level.

Lending by the five largest (in terms of total assets) Austrian banks fluctuated somewhat more over the past few months than average lending

The Cyclical Nature of Bank Revenues

Bank revenues may be influenced by a range of different micro- and macroeconomic factors. The impact of cyclical developments on revenue growth at the aggregate level is investigated in this box. To this end, the influence of GDP growth on interest, fee and trading income as well as income from participating interests and on credit risk provisioning, operating revenues and operating profit at the level of the aggregate banking sector was estimated[1] (see table 5).

A significantly positive relationship[2] between the growth of all income categories and GDP growth one to four quarters previously could be established, with the exception of participating interests (not included in table 5), for which no statistically significant impact was found. The transmission of a change in GDP growth takes longest in the case of on interest income. Furthermore, banks might use credit risk provisions to smooth out income fluctuations over the business cycle (see column 2): a change in GDP growth in the previous fourth quarter has a significantly positive effect on the growth of risk provisions, which enter the profit and loss account with a negative sign. Fee and trading income respond more quickly to changes in GDP growth, with the response of trading income being most pronounced. Total revenues and operating profits also exhibit a positive, significant relationship with a change in GDP growth in the previous second and third quarters (see the last two columns).

Moreover, higher growth in one income category in general seems to involve a higher risk; the mean growth rate of the respective income category increases along with its standard deviation.

[1] *See also Stiroh, Kevin J. 2004. Diversification in Banking: Is Noninterest Income the Answer? In: Journal of Money, Credit, and Banking 36(5). 853–882.*

[2] *The significant coefficients are referred to by *, ** and *** in table 5. ***, for instance, means that the probability of wrongly identifying a significant impact is no higher than 1%.*

Table 5

Relationship between GDP Growth and Bank Revenues

	Dependent variable X(t)					
	Interest income	Credit risk provisions	Fee-based income	Trading income	Operating revenues	Operating profits
GDP(t)	0.301	0.070	−0.159	3.814	0.706	3.837
GDP(t-1)	−0.183	−0.997	1.115**	−13.664	−0.337	−2.492
GDP(t-2)	0.120	1.627	−0.254	19.894**	0.636	1.101
GDP(t-3)	0.191	−0.924	−0.637	13.249	1.599**	3.358*
GDP(t-4)	1.167***	3.708***		−10.261		
Constant	−0.012	−0.017	0.024*	0.028	−0.011	−0.026*
AR(1)	−0.496***	−0.122	−0.702***	−0.392*	−1.080***	−0.876***
AR(2)	−0.356**	−0.844***	−0.780***	0.204	−0.135	−0.041
MA(1)		−0.027	0.949***	−0.172	−0.021	−1.990***
MA(2)		0.576**	0.995***	−0.790***	−0.953***	0.995***
Mean value X(t)	0.002	0.018	0.025	0.145	0.017	0.027
Standard deviation X(t)	0.030	0.094	0.043	0.639	0.052	0.167
Adjusted R^2	0.203	0.298	0.222	0.445	0.514	0.537
Observations	43	43	43	43	43	43

Source: OeNB.

Note: The estimate is based on the equation

$$X_t = \alpha + \sum_{i=0} \beta_{i+1} BIP_{t-i} + \sum_{j=1} \delta_j X_{t-j} + \varepsilon_t + \sum_{k=1} \theta_k \varepsilon_{t-k},$$

with X_t denoting the seasonally adjusted quarterly growth rates of the respective unconsolidated income categories, BIP_t the seasonally adjusted quarterly GDP growth rates and ε_t the residuals. The lengths of the GDP lags were determined by adjusted R^2 and Akaike's information criterion and end after the fourth quarter at the latest. β_i denotes the coefficients of GDP growth, δ_j the coefficients of the autoregressive terms (referred to as AR(.) in the table) and θ_k the coefficients of the moving average terms (referred to as MA(.) in the table). The inclusion of the Auto-Regressive Moving-Average (ARMA) terms controls for autocorrelation in the residuals and ensures that they do not affect the estimates for the coefficients of GDP growth. All time series pass a unit root test; all ARMA processes are stationary and invertible.

*The sample used ranges from 1995Q1 to 2005Q3. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Since there are indications of a structural break after a change in the reporting scheme in 1995 for all estimates, only data after this change were used.*

The results remain broadly unchanged if the data are controlled for the general interest rate level and the slope of the yield curve. The covariance with GDP growth is close to zero in both cases, which ensures that the coefficient estimates are not distorted.

by the entire sector. At the end of 2005, the annual growth of loans by the five largest Austrian banks was 4% (2004: 3.8%) and thus below the average of all domestic banks together. The bank lending survey confirmed those banks' caution in lending. At 3.4%, the median loan growth rate toward the end of 2005 was lower than the average growth rates posted by the five largest banks and by the entire banking sector, respectively (see chart 17).

A breakdown by banking sectors shows that apart from the special-purpose banks, the Raiffeisen sector posted robust 9.2% annual loan growth, which is attributable to the activities of a single bank. State mortgage banks and Volksbank credit cooperatives also recorded above-average lending growth rates in December 2005 (6.6% and 5.5%, respectively). Loans by building and loan associations, which had decreased in 2003 and 2004, expanded by 2.8% at

Chart 17

Growth of Loans by Austrian Banks (year-on-year)

Source: OeNB.

year-end 2005. While in the past weak lending by building and loan associations was traced e.g. to the attractiveness of foreign currency loans, which these banks are permitted by law to grant only to a limited extent, an amendment to the Building and Loan Associations Act allowing these institutions to also grant loans to meet educational or private care needs seem to have had a positive impact on lending more recently.

A breakdown by economic sector reveals that lending to households and enterprises by banks operating in Austria was stable at the end of 2005. The annual growth of loans to households came to 6.7%, thus remaining broadly at the level of recent years. Loans to enterprises picked up somewhat compared with previous years, amounting to 3.3% in December 2005.

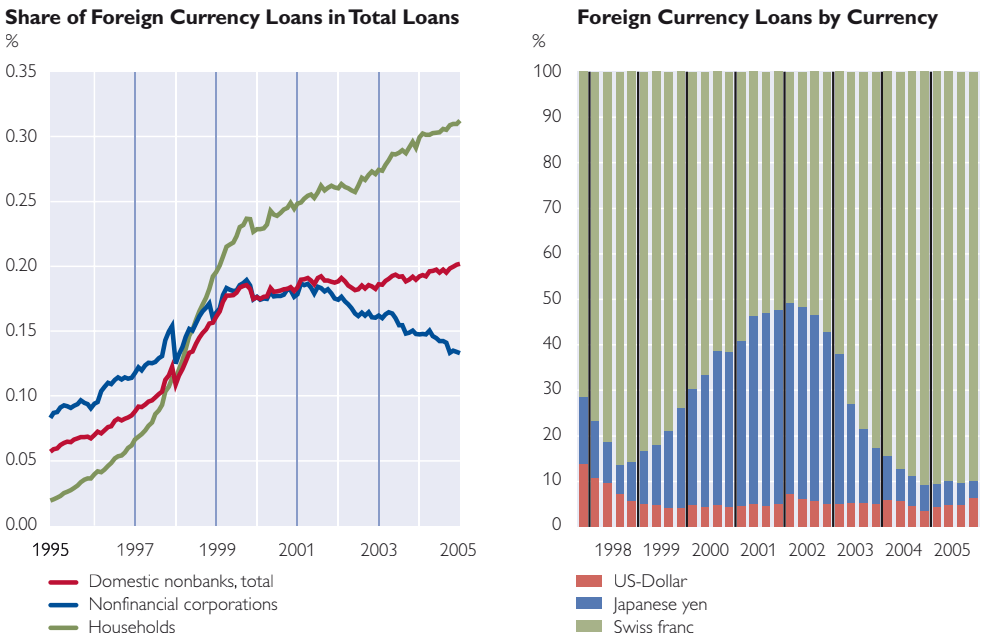
Sustained Strong Household Demand for Foreign Currency Loans

In 2005 foreign currency loans to nonbanks continued to expand much more rapidly (+11.2%) than loans denominated in euro (+3.3%). Both in absolute and in relative terms, the boom in foreign currency lending reached a new peak in January 2006, with the amount of loans outstanding coming to EUR 53.7 billion and foreign currency loans accounting for a share of 20.2% in the total volume of loans taken out by Austrian nonbanks. Like in previous years, this trend has been driven by household borrowing: While the share of foreign currency loans in lending to nonfinancial corporations continued to edge down in line with a trend observed for quite some time, its share in lending to households rose further – to 31.2% – from an already high level; 9 out of 10 foreign currency loans are denominated in Swiss francs.

The continued growth of foreign currency lending was not evenly distributed across regions: In Austria's western provinces, Tyrol and Vorarlberg, the share of household loans denominated in foreign currency declined slightly from a high level, whereas other provinces – Vienna, Lower Austria, Burgenland, Styria and Carinthia – recorded strong increases over the past few years. In the remaining two provinces, Salzburg and Upper Austria, household borrowing in foreign

Chart 18

Foreign Currency Loans in Austria



Source: OeNB.

currency was at a comparably low level.

The sustained boom in foreign currency lending has made it necessary to draw more attention to the risks this type of loan involves. Therefore, in cooperation with the Financial Market Authority, the OeNB created a brochure that provides a clear and concise overview of the risks of foreign currency loans; the brochure is available at bank branches throughout Austria. By providing such information, the OeNB aims at raising consumers' sensitivity to and awareness of the risks this type of borrowing entails.

Lower Risk Provisions for Loans to Nonbanks in All Sectors

Excluding special effects connected with the BAWAG P.S.K. troubles, the ratio of unconsolidated loan loss provisions to outstanding loans granted by Austrian credit institutions to nonbanks[24], as reported to the OeNB, diminished slightly in 2005 compared with the ratio established for 2004 (3.3%). This decline mirrored developments in the euro area and the favorable lending conditions prevailing in 2005.

In greater detail, loan loss provisions exceeded 20% of the loan volume to nonbanks in the case of three

[24] *Specific loan loss provisions for loans to nonbanks are included in banks' monthly reports; they show which risk provisions are in place for cases in which a borrower's solvency is doubtful. As specific loan loss provisions tend to be very low for interbank loans (totaling EUR 91.7 million in December 2005; –4.4% year on year) they were not included in the analysis presented here.*

Foreign Currency Loans and Repayment Vehicles

Contrary to conventional loans denominated in euro, which are redeemed in installments, loans denominated in foreign currency are often bullet loans. During the term of the loan, the borrower makes regular contributions to a separate investment plan, e.g. a life insurance plan or a mutual fund, to build up a lump sum to repay the loan at maturity. Whether the repayment vehicle will in fact pay off the loan fully depends on the return it yields. This implies that the borrower is exposed to a double risk: on the one hand, currency fluctuations may increase the sum repayable at maturity; on the other hand, the repayment vehicle may earn a smaller return than expected.

The use of repayment vehicles also limits the extent to which data on foreign currency loans in Austria can be accurately interpreted. Since the bulk of euro-denominated loans are redeemed in installments, the amount of loan outstanding decreases over time; this is not the case with bullet loans denominated in foreign currency, which are therefore always recorded in their full amounts. Assuming that making contributions to a repayment vehicle represent repayment installments, the stock of foreign currency loans compared with the amount of euro-denominated loans outstanding is overestimated, since the latter is recorded on a net and the former on a gross basis. The OeNB investigated the impact of this discrepancy by conducting a survey among selected banks and running a simulation based on these data. The results showed that after netting off the amounts of foreign currency loans outstanding against the amounts paid to repayment vehicles, the share of foreign currency lending in total lending decreased only slightly, with the decrease ranging from 0.9 to 2.5 percentage points. This applies less to loans to nonfinancial corporations than to loans to households, since a higher share of the latter relies on repayment vehicles. Still, the fundamental risk of foreign currency loans remains: Since the loans and repayment vehicles are not denominated in the same currency – and the data compiled suggest that this is almost always the case – borrowers are exposed to the full foreign exchange risk.

banks, while 48 banks reported a ratio of between 10% and 20%. However, as most of those incidents concerned smaller banks belonging to one of the sectoral groupings, the underlying risks may be considered as low for the stability of the Austrian financial market. At Austria's five major banks, the ratio of loan loss provisions to claims on nonbanks again lay below the banking sector average.

Specific loan loss provisions for loans to nonbanks totaled EUR 10.6 billion in December 2005. Claims on domestic nonbanks denominated in euro accounted for the lion's share of this amount (84.5%), followed by euro claims on foreign nonbanks (7.6%), foreign currency claims on foreign customers (4.1%) and foreign currency claims on domestic nonbanks (3.8%).

On balance, the aggregated loan portfolio of Austrian banks can be considered to be satisfactory.

Market Risk Broadly Rising in 2005

Interest rate risk in the banking books of Austrian credit institutions increased slightly in the second half of 2005 against the backdrop of volatile and generally declining interest rate trading. By contrast, stock trading activity continued to pick up in this period. During the year 2005 as a whole, market risk indicators were found to have risen in all business areas, but overall the increase in risk can be assessed as moderate.

BAWAG P.S.K. and Hypo Alpe-Adria: No Threat to Financial Stability

In the past few months, two Austrian banking groups made headlines:

1 In the fall of 2005, BAWAG P.S.K. granted the U.S. broker Refco a loan in the triple-digit millions. Refco filed for bankruptcy protection only a few days later. In the course of the bankruptcy proceedings, Refco's creditors sued BAWAG P.S.K. for a total of USD 1.3 billion. In the wake of the media reports about this (and additional) lawsuits, and about substantial previously undisclosed losses in the late 1990s, customer withdrawals surged toward the end of April 2006, whereupon the OeNB announced that it would ensure that BAWAG would immediately have the necessary cash on hand in the event of a liquidity bottleneck. As the events unfolded, it became clear that BAWAG P.S.K. – Austria's fourth-largest bank, for which the Republic of Austria is liable with an amount of around EUR 5.5 billion since BAWAG's acquisition of the formerly state-owned P.S.K. – would not be in a position to ensure compliance with capital adequacy provisions for the current year and to close the balance sheet for 2005, as it would have to allocate substantial funds to provisions in order to cover prospective damage claims. As a consequence, the Austrian federal government, the Financial Market Authority, the OeNB and representatives of the Austrian financial sector drew up a financing package for BAWAG comprising a federal act to safeguard BAWAG's future which provides for an authorization of a federal government guarantee of up to EUR 900 million and the provision of capital in the amount of EUR 450 million by Austrian banks and insurers.

In early June, a comprehensive settlement of Refco-related claims against BAWAG P.S.K. could be reached pending the conclusion of the last formalities. This settlement was instrumental for the unimpeded access to and release of frozen BAWAG P.S.K. assets in the U.S.A. and made it possible for the bank to finalize its financial statements for 2005 on the basis of the above-mentioned federal act.

2 In fall 2004, Hypo Alpe-Adria International AG incurred losses in the triple-digit millions of euro on liabilities from structured swaps (swaps containing components of foreign currency options). After it had become known in late March 2006 that these losses had only been partly recognized in the financial statements for 2004, the accounts for 2004 were reopened and the losses were booked on an accrual basis. The certified financial statements for 2004, which were approved by the supervisory board on May 26, 2006, posted an annual loss of EUR 99 million. The certified financial statements for 2005, which were approved by the supervisory board on the same day, showed a pretax profit of EUR 217 million.

Neither of these two cases represented a threat to financial stability in Austria. The financing package for BAWAG P.S.K. succeeded in fending off a run on the bank and represented the first step in reestablishing customer confidence. Moreover, the conclusion of the settlement made it possible to continue with plans to sell the bank. The planned restructuring measures are expected to result in an upgrade of BAWAG P.S.K.'s financial strength rating, which had been downgraded by Moody's from D– to E+. At the editorial close, supervisory and judicial reviews of both BAWAG P.S.K. and Hypo Alpe-Adria were still underway to ensure that matters would be fully clarified and settled. Moreover, comprehensive on-site examinations by the OeNB and the FMA were conducted to turn up more facts.

In the Austrian banking system as a whole, the asset-weighted average of the Basel ratio for interest rate risk in the banking book[25] climbed from 6.4% to 6.6% in the latter part of 2005. Yet this rise falls far short of offsetting the marked drop from 7.5% to 6.1% recorded in the second half of 2004. The larger banks,[26] too, reported only a broadly moderate rise in nontraded interest rate risks during 2005: The number of larger banks with a Basel ratio exceeding 10% rose from 7 to 9 in this period; not a single one reached a ratio of 20%. At the end of 2003, as many as 12 larger banks still reported a Basel ratio above 10%, and 2 institutions even exceeded the 20% threshold.

Turning to interest rate risk in the trading book, the development of the corresponding capital requirements was rather volatile in the second half of 2005, following an initial peak: These requirements jumped from EUR 610 million in early 2005 to EUR 810 million in mid-year and then dropped to EUR 703 million at year-end. It should also be noted that interest rate trading activity was dominated by a few larger banks at end-2005.

With regard to equity price risk in the trading book, finally, capital requirements rose to a historic high of EUR 121 million in the second half of 2005. Compared with the period of lowest stock trading activity since banks started to report such data in 2002–2003, average capital requirements trebled in 2005. Yet individual positions continue to be comparatively small, e.g. in relation to the interest rate risk positions in the trading book, and combined stock trading figures would not imply a higher risk potential at the aggregated level. At year-end 2005, stock trading activities were also dominated by a handful of larger banks, actually even more so than interest rate trades.

The direct foreign exchange risk, to which banks are exposed due to their outstanding foreign currency positions, remained broadly stable in the second half of 2005 at medium levels from a historical perspective. The associated capital requirements rose from EUR 53 million in early 2005 to EUR 97 million in mid-year and finally stood at EUR 93 million at year-end.

Payment and Securities Settlement Systems' Business Remains Dynamic

In the second half of 2005, 224.2 million transactions worth a total of EUR 6,068.6 billion were processed through the payment and securities settlement systems that are subject to payment systems oversight by the OeNB. Compared with the first half of 2005, this corresponds to a rise by 8.8% in terms of volume and by 4.4% in terms of value; this increase reflects both a higher level of transaction activity and a higher number of payment systems subject to OeNB oversight. Apart from running and overseeing the payment system ARTIS/TARGET,[27] the OeNB is cur-

[25] *Defined as the decline in economic value following a parallel downward yield curve shift in all currencies by 200 basis points relative to a bank's eligible capital.*

[26] *Banks reporting total assets of more than EUR 2 billion at end-2005.*

[27] *ARTIS: Austrian Real Time Interbank Settlement; TARGET: Trans-European Automated Real-time Gross settlement Express Transfer.*

Table 6

Transactions and System Disturbances

July to December 2005	Transactions		System disturbances
	Number in million	Value in EUR billion	Number
ARTIS/TARGET	2.1	5,335.1	8
Securities settlement systems	1.1	152.5	0
Retail payment systems	214.9	15.6	29
Participation in international payment systems	6.1	565.4	3

Source: OeNB.

rently responsible for overseeing three securities settlement systems, 16 retail payment systems, five payment infrastructure providers and 15 Austrian banks participating in international payment systems.

With a transaction value of EUR 5,335.1 billion, ARTIS/TARGET remained the single most important payment system in terms of value. As measured by the number of transactions, direct debit payment systems led the field with 111.2 million transactions. With regard to securities settlement systems, above all Central Counterparty Austria (CCP.A) managed to benefit from the favorable stock market conditions. Over-the-counter business, in contrast, declined.

In addition, Austrian banks routed a total of 6.1 million transactions worth EUR 565.4 billion through international payment systems in the second half of 2005. With 4.3 million transactions, the retail payment system STEP2 was the single largest provider in terms of volume, while EURO1, the biggest international large-value payment system next to TARGET, processed the highest transaction values with EUR 468.1 billion.

In the second half of 2005, altogether 40 system disturbances[28] were registered – all minor incidents, however, with no impact on the stability of Austria's financial system.

Growing Exposure of Austrian Banks to Central and Eastern Europe[29]

Central and Eastern European countries (CEECs) continue to grow in importance for the Austrian banking market. According to the business segment reports of the six major Austrian banks active in Central and Eastern Europe (CEE),[30] total assets in this segment have grown to around EUR 136 billion on a consolidated basis (+33.4%), thus accounting for 16.1% of the Austrian banking system's consolidated total assets in December 2005 (December 2004: 13.9%). Corresponding pretax prof-

[28] *System disturbance is defined as an interruption of the system during running times that lasts more than 30 minutes and is induced by the payment system, or as any interruption of the system that is induced by failure and occurs within the 30-minute period before the end of accounting.*

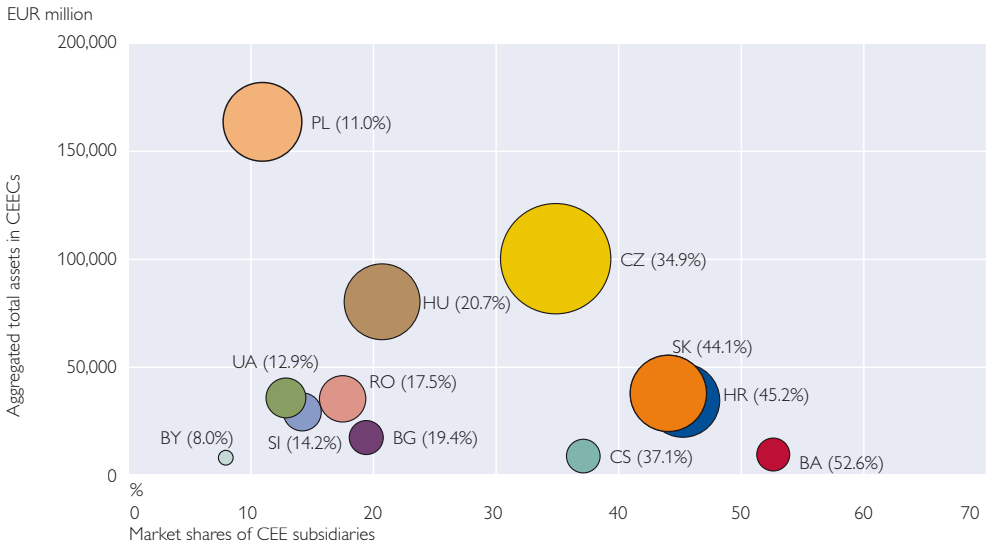
[29] *Based on the reports of condition and income Austrian banks have published on a quarterly basis since early 2002. These reports contain selected items from the consolidated annual reports of parent banks and their fully consolidated subsidiaries abroad.*

[30] *Bank Austria Creditanstalt AG (BA-CA), Erste Bank der oesterreichischen Sparkassen AG (Erste Bank), Raiffeisen Zentralbank Österreich AG (RZB), Bank für Arbeit und Wirtschaft und Österreichische Postsparkasse AG (BAWAG P.S.K.), Österreichische Volksbanken AG (ÖVAG) and Hypo Alpe-Adria International AG.*

Chart 19

Market Shares of Austrian Banks' CEE Subsidiaries

As at December 31, 2005



Source: OeNB.

its surged by 54.7% to EUR 2.2 billion, as a result of which the CEE business segment accounted for a share of 35% in the consolidated pre-tax profits of all Austrian banks in December 2005 (December 2004: 26.9%).

The rising exposure of the Austrian banking sector to Central and Eastern Europe is attributable to the growth of existing subsidiaries and further large acquisitions in 2005 on the one hand, and to the growing volume of direct lending [31] on the other. Aggregated total assets put the 3 biggest Austrian financial institutions (BA-CA, Erste Bank and RZB) in the top ranks among the roughly 20 major international banks that do business in the area. In total, 11 Austrian banks with 61 fully consolidated subsidiaries operated in this market at end-2005. Of these, 29 were active in EU Member States of the latest enlargement round [32] (+3 compared with 2004), 15 in EU acceding and accession countries [33] (+2) and 17 in other CEECs [34] (+3). Between them, they currently hold approximately 15.7% of total banking sector assets in Central and Eastern Europe, or indeed as much as 23.0% if Russia is factored out. The diameter of the circles in chart 19 reflects the importance of individual countries as measured by the total assets of the respective CEE subsidiaries. For instance, compared with the 52.6% market share of Austrian banks in Bosnia and Herzegovina, Austrian credit institu-

[31] *Loans granted by Austrian banks to borrowers resident in other countries.*

[32] *Czech Republic (CZ), Hungary (HU), Poland (PL), Slovakia (SK) and Slovenia (SI).*

[33] *Bulgaria (BG) and Romania (RO) as well as Croatia (HR).*

[34] *Albania (AL), Belarus (BY), Bosnia and Herzegovina (BA), Russia (RU), Serbia and Montenegro (CS) as well as Ukraine (UA).*

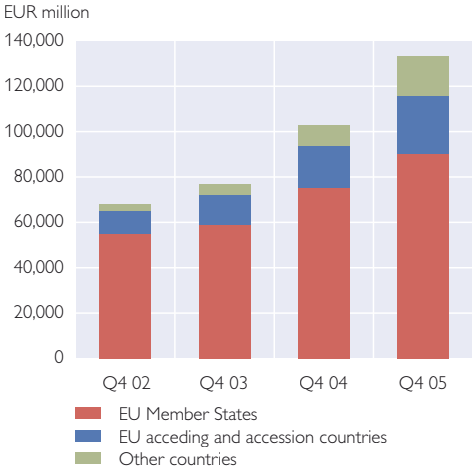
tions account for a mere 11.0% share of the Polish market. This relationship is, however, put in perspective by a comparison of total banking assets, which add up to EUR 163 billion in Poland, but only to EUR 6 billion in Bosnia and Herzegovina. Moreover, chart 19 reveals the Czech Republic to be the single most important foreign market of Austrian banks.

Austrian banks' concentration on the new EU Member States is evident from the latter's share of 67.9% in the aggregate total assets (approximately EUR 133 billion), followed by a share of 19% in EU acceding and accession countries, and a share of 13.1% in other CEECs at the end of December 2005. Overall, total assets grew by 29.6% year on year, which corresponds to a drop of 4.4 percentage points in the growth rate. Subsidiaries in EU acceding/accession countries and in other CEECs actually posted more dynamic growth rates. The latter managed to almost double their asset totals in 2005, albeit starting from lower levels (see chart 20).

Chart 20

Total Assets of Austrian Banks' CEE Subsidiaries

As at December 31, 2005



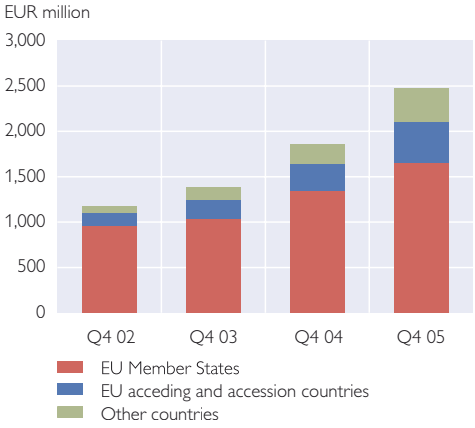
Source: OeNB.

Aggregated operating profits of CEE subsidiary banks reveal the same picture: They rose by 33.8%, at roughly the same pace as in 2004, to about EUR 2.5 billion. Here, too, subsidiaries in EU acceding/accession countries and in other CEECs posted higher growth rates at +56.7% and +72.4%, respectively, than subsidiaries based in EU Member States with +22.6% (see chart 21).

Chart 21

Operating Profit of Austrian Banks' CEE Subsidiaries

As at December 31, 2005



Source: OeNB.

The cost/income ratio of fully consolidated subsidiary banks in the CEECs improved from 58.7% in December 2004 to 56.7% in December 2005; this rise is attributable to a sharper increase in operating income (+27.8%) than in operating expenses (+23.6%).

Direct lending by Austrian banks to Central and Eastern European borrowers, finally, tells the same story as lending by subsidiaries. As much as 59.0% of the total loan volume of EUR 27.1 billion are attributable to the new EU Member States, followed by 24.2% to EU acceding and accession countries and 16.8% to other CEECs (see table 7). Direct loan growth to borrowers in EU acceding/

Table 7

Credit Exposure to Central and Eastern European Countries

As at December 2005
EUR billion

	Rest of the world	Central and Eastern Europe													
			EU Member States						EU Acceding and Accession Countries				Other Countries[3]			
				CZ	HU	PL	SI	SK		BG	HR	RO		BA	RU	UA
Direct loans[1]	71.8	27.1	16.0	5.1	2.9	3.4	2.8	1.8	6.6	0.5	4.3	1.8	4.6	0.4	2.9	0.2
Share in foreign loans (%)		37.8	22.3	7.1	4.0	4.7	4.0	2.5	9.1	0.7	6.0	2.5	6.4	0.6	4.1	0.3
Indirect loans[2]	63.6	58.6	39.9	14.6	9.4	7.4	2.3	6.2	10.9	1.6	7.5	1.8	7.9	1.8	2.0	2.1
Share in foreign loans (%)		92.2	62.7	23.0	14.8	11.6	3.6	9.7	17.1	2.5	11.7	2.9	12.4	2.8	3.1	3.3
Total	135.4	85.8	55.9	19.7	12.3	10.8	5.1	8.0	17.5	2.1	11.7	3.6	12.4	2.2	4.9	2.3
Share in foreign loans (%)		63.3	41.3	14.5	9.1	8.0	3.8	5.9	12.9	1.5	8.7	2.7	9.2	1.6	3.6	1.7

Source: OeNB.

[1] *Nonsecuritized loans granted by Austrian banks to foreign nonbanks.*
[2] *Nonsecuritized loans granted to nonbanks by subsidiaries of Austrian banks.*
[3] *In addition to Bosnia and Herzegovina (BA), Russia (RU) and Ukraine (UA), the item „Other Countries" also includes Albania (AL), Serbia and Monetenegro (CS) and Belarus (BY).*

accession countries and other CEECs was considerably more robust at 39.7% and 95.0%, respectively (again starting from lower levels) than the corresponding growth rate in the new EU Member States at 17.6%.

Austrian banks' strong concentration on the new EU Member States in CEE lowers, above all, the associated risks with regard to the institutional, legal and thus economic conditions in those markets. In this respect, it is even more important to monitor the more dynamic activity of Austrian banks in those countries which have not (yet) joined the EU. The latest large acquisitions, such as the purchase of Banca Comerciala Romana by Erste Bank in December 2005 or that of the Russian Impexbank by Raiffeisen International in January 2006, happened after the cutoff date for data of this analysis (December 31, 2005). Further acquisitions in Eastern and Southeastern Europe are in the pipeline, as are, in fact, sales of CEE subsidiaries. Cases in point are the sale of BA-CA's Polish subsidiary and of its Croatian subsidiary Splitska Banka, both of which BA-CA must sell as a precondition for assuming responsibility for UniCredit Group's business in Central and Eastern Europe. Austrian banks continue to expand in Central and Eastern Europe, but they are increasingly moving to Eastern and Southeastern European countries. In this process, the institutional, legal and economic conditions in those markets are going to pose increasing risks for Austrian banks in the long term: The promise of higher profits simply comes at the price of higher risks.

Banks in Central and Eastern Europe Remain Highly Profitable [1]

In a context of broadly favorable macroeconomic conditions, (inflation-adjusted) the growth rates of credit to the private sector continued to rise throughout 2005 in all countries under review in this section with the exception of Hungary, Bulgaria and Romania. Yet in the second half of 2005, credit growth accelerated also in Hungary and Romania, and Bulgaria continued to post high real credit growth rates exceeding 20% year on year, a rate surpassed only by Romania. Slovenia and Slovakia also reported above-average credit growth rates, while the Czech Republic, Hungary and Croatia posted two-digit credit growth rates. The latest increase of credit growth rates in Romania and Croatia actually came in the wake of central bank measures to curb credit growth. Poland registered comparatively low credit growth in 2005, with the growth rate of credit to the corporate sector going down again. In early 2006, however, Poland reported a robust acceleration of credit growth and above all, for the first time since early 2004, an acceleration of lending to corporate customers.

Foreign currency loans to domestic nonbanks continue to characterize lending to residents in a number of countries. In fact, in Croatia, Romania, Bulgaria, Hungary and Slovenia, the share of foreign currency loans granted to resident businesses and households is particularly high, ranging from 35% to 80% (in the case of Croatia, the figure includes local currency loans linked to the euro). In Croatia, Hungary and Slovenia this ratio even increased during 2005, starting from already comparatively high levels at the end of 2004. In Romania and Bulgaria, by contrast, the share of foreign currency loans dropped somewhat, partly in response to central bank measures taken during 2005 with a view to curbing (foreign currency) loan growth. These developments notwithstanding, the foreign currency ratio remains high with around 50%. In Poland, Slovakia and above all in the Czech Republic the share of foreign currency loans is substantially lower (within a range of 10% to 25%), partly reflecting (especially in the case of the Czech Republic) the lower interest rate differentials to the euro area. Still, households have taken out substantial loans in foreign currencies in Poland, and the share of foreign currency loans increased slightly in Poland and in Slovakia during 2005. Through their foreign currency loans to domestic sectors, banks are exposed to credit risk in the form of indirect foreign currency risk to the extent that borrowers – increasingly households and small and medium-sized enterprises – are insufficiently hedged against adverse exchange rate developments. Risks are exacerbated by loans in currencies not linked to the euro (such as Swiss francs) as well as by rising direct borrowing abroad (mostly by larger companies). The underlying credit risk appears to be limited in Slovenia, provided that the country introduces the euro as expected at the beginning of 2007.

Banks' performance improved in most countries under review in 2005. To be sure, net interest income (in percent of assets) shrank in a number of countries, but banks were able to offset this deterioration with cost efficiency gains and, in some countries, also through an increase in noninterest income and a decrease of risk provisioning costs. The latter benefited from an ongoing decline in the share of nonperforming loans.[2] However, this trend could change in the future as loan portfolios mature or as credit growth slows down.

[1] *This section examines the performance of the entire banking sector in the Czech Republic, Hungary, Poland, Slovakia, Slovenia as well as in Bulgaria, Croatia and Romania, rather than focusing only on the performance of Austrian banks' subsidiaries in these countries.*

[2] *Nonperforming loans are defined as substandard, doubtful and loss loans. In view of differences in both national classification rules and the range of loans included in this classification, a cross-country comparison is difficult.*

Nominal Return on Equity

%

	2002	2003	2004	2005	H1 04	H1 05
Bulgaria	**14.6**	**14.8**	**16.6**	**18.4**	18.5	18.6
Croatia	**13.7**	**14.5**	**16.1**	**15.6**	17.9	14.5
Poland	**5.3**	**5.5**	**17.4**	**20.8**	17.7	21.2
Romania	**21.0**	**17.7**	**17.7**	**15.6**	20.5	19.7
Slovakia	**11.5**	**10.5**	**12.3**	**13.5**	13.8	14.6
Slovenia	**8.5**	**8.2**	**8.7**	**11.1**	..	..
Czech Republic	**27.1**	**23.4**	**23.1**	**24.9**	22.4	29.3
Hungary	**16.1**	**18.7**	**23.8**	**22.3**	25.8	27.3

Note: Based on profits after tax. Intrayear data are annualized linearly.

Net Interest Income

% of annual average bank assets

	2002	2003	2004	2005	H1 04	H1 05
Bulgaria	**3.9**	**4.7**	**4.9**	**4.5**	4.9	4.4
Croatia	**3.3**	**3.3**	**3.0**	**2.9**	3.1	3.0
Poland	**3.4**	**3.1**	**3.2**	**3.1**	3.2	3.1
Romania	**3.4**	**4.7**	**4.8**	**3.5**	5.4	3.7
Slovakia	**2.7**	**2.9**	**2.8**	**2.2**	2.9	2.2
Slovenia	**3.7**	**3.2**	**2.8**	**2.5**	2.9	2.7
Czech Republic	**2.4**	**2.1**	**2.3**	**2.2**	2.2	2.3
Hungary	**4.3**	**4.0**	**4.3**	**4.1**	4.0	3.9

Operating Costs

% of annual average bank assets

	2002	2003	2004	2005	H1 04	H1 05
Bulgaria	**4.5**	**4.5**	**4.2**	**3.6**	4.1	3.5
Croatia	**2.7**	**2.6**	**2.3**	**2.2**	2.4	2.2
Poland	**4.1**	**3.9**	**3.7**	**3.7**	3.6	3.7
Romania	**6.6**	**6.9**	**6.1**	**5.3**	6.0	5.3
Slovakia	**2.5**	**2.6**	**2.4**	**2.1**	2.5	2.1
Slovenia	**3.2**	**2.9**	**2.7**	**2.5**	2.6	2.4
Czech Republic	**1.9**	**1.9**	**1.9**	**1.8**	1.8	1.8
Hungary	**3.8**	**3.4**	**3.3**	**2.9**	3.0	2.8

Net Change in Loan Loss Provisions

% of annual average bank assets

	2002	2003	2004	2005	H1 04	H1 05
Bulgaria	0.1	0.3	0.7	0.8	0.5	0.9
Croatia	0.3	0.3	0.3	0.2	0.2	0.2
Poland	1.5	0.9	0.4	0.2	0.4	0.3
Romania	0.2	0.6	0.7	0.5	0.6	0.2
Slovakia	−0.4	−0.5	−0.4	−0.3	−0.6	−0.1
Slovenia	1.1	0.8	0.7	0.7	0.8	0.8
Czech Republic	0.3	0.0	0.4	0.5	0.4	0.3
Hungary	0.3	0.3	0.5	0.2	0.5	0.1

Nonperforming Loans

% of total loans

	2002	2003	2004	2005	H1 04	H1 05
Bulgaria	3.6	4.2	3.6	2.8	2.4	2.8
Croatia	5.9	5.1	4.6	4.0	5.1	4.3
Poland[1]	21.1	21.2	14.7	11.0	17.2	13.2
Romania	2.3	8.3	8.1	8.3	8.5	8.2
Slovakia	11.0	9.1	7.0	5.5	7.8	6.9
Slovenia	7.0	6.5	5.5	4.7	6.0	5.3
Czech Republic	8.5	5.0	4.1	4.0	4.6	4.3
Hungary	3.7	3.0	2.9	2.7	3.4	2.8

[1] *In the case of Poland, nonperforming loans also include so-called irregular claims.*

Source: National central banks.

Note: Data are not comparable between countries. Intrayear data are annualized linearly.

Capital Adequacy of Austrian Banks Remains Satisfactory

Capital ratios are key indicators for assessing the Austrian banking sector's risk-bearing capacity. At end-2005, the unconsolidated capital ratio, which relates own funds to risk-weighted assets as reported by banks, was 14.5% for all Austrian banks[35] (2004: 14.7%, see chart 22). The ratio has thus been well above 14% for more than two and a half years, which is not only considerably higher than the regulatory minimum of 8% under the Austrian Banking Act, but also high by European standards.

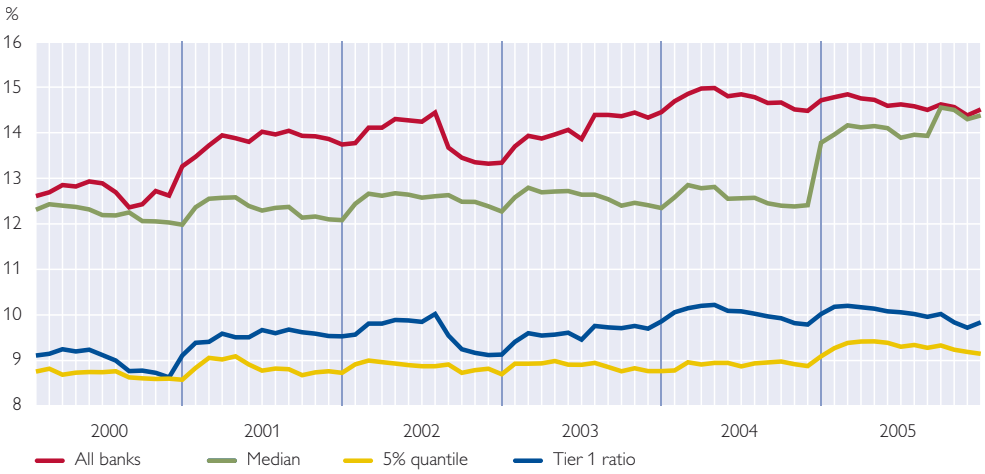
The corresponding consolidated capital ratio was 11.7%, which represents a decrease from the latest quarterly figures of above 12%, but is nonetheless a considerable capital buffer for stress or crisis situations.

This slight decline is attributable to a stronger increase in risk-weighted assets than in the capital ratio. Different factors are responsible for this increase in risk-weighted assets, depending on the bank (acquisitions, shifts in the loan portfolio, etc.).

[35] *Excluding special purpose banks, which are not considered in the calculation of the capital ratio.*

Chart 22

Austrian Banks' Unconsolidated Capital Ratio



Source: OeNB.

The median unconsolidated capital ratio – on which outliers have little effect – came to 14.4% at end-2005, which reflects a relatively strong convergence of capital ratios in the Austrian banking industry (see chart 22). Moreover, this figure compares favorably with the corresponding ratio of major euro area banks[36], which came to 11.1% at end-2005 (2004: 11.5%).

Austrian banks' core capital ratio, finally, which relates tier 1 capital (core capital) to risk-weighted assets, was also high by euro area standards. In December 2005, the unconsolidated core capital ratio of Austrian banks stood at 9.8% (2004: 10%), while the corresponding value of major euro area banks came to 7.9% at end-2005 (2004: 8.3%).

All in all, the trend development of Austrian banks' aggregated capital ratio is satisfactory also by euro area standards.

New Stress Testing Methodology Confirms Austrian Banking System's Good Resilience to Shocks

The OeNB has developed a dedicated software program ("Systemic Risk Monitor" or SRM for short) to assess systemic risk in the Austrian banking sector and conduct corresponding stress tests. The underlying model is described, and first results are presented, in a special topics contribution in this Financial Stability Report. The stress tests described in this article are based on a Monte Carlo simulation, which allows determining the aggregate loss distribution. In addition, SRM may also be used to conduct sensitivity stress tests, which establish the loss resulting from a change in one particular risk factor, while assuming all other risk factors to be constant.

The stress tests developed by the IMF in the context of the Financial Sector Assessment Programs (FSAP),

[36] *This value refers to the capital ratio of a representative sample of major euro area banks as given in the ECB's Financial Stability Review 2006.*

Financial Stability Analysis and International Financial Reporting Standards

Under regulation (EC) No. 1606/2002 on the application of international accounting standards, listed companies governed by the law of an EU Member State have had to follow International Financial Reporting Standards (IFRS) in preparing their consolidated financial statements for accounting periods starting on or after January 1, 2005. Companies that have only debt securities publicly traded are exempt from this requirement until January 1, 2007. One aim of this regulation is to enhance the comparability and transparency of financial statements prepared by publicly traded companies and to improve the efficiency of the European capital market. While this is basically an advantageous development from a financial stability point of view, the implementation of IFRS will, however, also have an influence on banking data. In the following, we will therefore summarize the potential IFRS impact on the stability indicators used in Financial Stability Report assessments.

***Total asset growth** may become more volatile in those cases in which fair value accounting and impairment testing of goodwill and loans are applied. The required detailed disclosure of derivative positions may lead to further changes in total assets.*

***Provisions for losses on loans** which are rated at fair value and subject to impairment testing are to be recognized only on an incurred loss basis. Thus, the level of loan loss provisioning, which is an indicator of credit risk, may fall.*

***Banks' capital levels** may change owing to the new valuation rules and the reclassification of individual equity items as debt. Even though the IFRS impact is currently restricted to an accounting effect – capital adequacy is still assessed in line with the statutory provisions laid down in the Austrian Banking Act – the planned first-time application of IFRS accounting rules to calculating the consolidated capital ratio for supervisory purposes may have unintended transition and valuation effects. To eliminate these effects, the Committee of European Banking Supervisors (CEBS) developed prudential filters to maintain the current definition and quality of regulatory capital.*

***Bank performance** indicators will certainly be affected by the reclassification of balance sheet items resulting from the adoption of IFRS.*

As many as eight Austrian banks now prepare their consolidated annual accounts in line with IFRS (some already since 2000). In response to the rising importance of IFRS, Austria is going to adjust the prevailing statutory provisions and implement a new supervisory reporting framework (which will take effect in 2007/2008). The OeNB will continue to closely monitor the IFRS impact from a financial stability perspective both at the individual bank level and at the systemic level.

used in Financial Stability Report analyses so far, are also based on sensitivity stress tests.[37] There are, however, several differences in methodology and data input, which are attributable (1) to the specific modeling approach of SRM and (2) to methodological improvements.

[37] *For a description of the stress testing methodology developed for the FSAP, see the OeNB's Financial Stability Report 7.*

Table 8 shows the results of both approaches over time. With regard to credit risk, the key difference between the two tests is that the FSAP framework uses the ratio of loan loss provisions to outstanding loans as a credit risk factor and determines the risk exposure profile by raising this ratio by a certain percentage, while the SRM method relies on increasing default probabilities in domestic industries and in regional sectors abroad. Furthermore, the SRM model does not permit conducting stress tests for indirect credit risk associated with foreign currency lending, so that it is impossible to run stress tests for accumulated credit risk.

Table 8 shows that a simulated decrease in the capital ratio relative to the domestic credit exposure between end-2003 and end-2005 causes domestic credit risk to rise slightly, while the credit exposure to Central and Eastern European countries (CEECs) declines somewhat with both testing methods. The impact on the capital ratio is smaller for the SRM tests than for the FSAP stress tests, which is partly attributable to the use of different credit risk factors. Furthermore, while the FSAP approach also includes indirect credit exposure to the CEECs, the SRM approach accounts only for direct credit exposure to CEECs, thus excluding

Table 8

FSAP and SRM Stress Test Results for the Austrian Banking System over Time

	FSAP stress tests			Systemic Risk Monitor		
	End-2003	End-2004	End-2005	End-2003	End-2004	End-2005
	%					
Current capital ratio	14.45	14.71	14.51	14.45	14.71	14.51
	Decrease of capital adequacy ratio in the stress scenario (in percentage points)					
Credit risk						
Domestic credit exposure						
30% increase in credit risk[1]	0.87	0.92	0.93	0.71	0.79	0.73
Credit exposure in Central and Eastern Europe						
40% increase in credit risk[1]	0.28	0.27	0.27	0.18	0.10	0.12
Foreign currency loans						
10% appreciation of the Swiss franc against the euro	0.28	0.30	0.29	..	..	..
20% appreciation of the Japanese yen against the euro	0.16	0.07	0.05	..	..	..
Accumulated credit risk						
Simultaneous analysis of all three credit risk components[2]	1.38	1.39	1.37	..	..	..
Market risk						
Interest rate risk						
Euro: Upward parallel shift of the yield curve by 130 basis points	0.61	0.35	0.35	0.39	0.36	0.32
U.S. dollar: Upward parallel shift of the yield curve by 110 basis points	0.04	0.06	0.06	0.02	0.05	0.05
Swiss franc: Upward parallel shift of the yield curve by 150 basis points	0.04	0.01	−0.01	0.02	0.01	0.00
Japanese yen: Downward shift of the yield curve[3]	0.06	0.03	0.01	0.01	0.01	0.01
Equity price risk						
Domestic stock market crash, 30% decline in ATX	0.16	0.16	0.18	0.19	0.19	0.22
International stock market crash, 35% decline in international stock indices	0.22	0.21	0.22	0.26	0.26	0.29
Exchange rate risk						
Worst case estimate[4] for a 10% appreciation/depreciation of the euro	0.10	0.09	0.10	0.10	0.09	0.10

Source: OeNB calculations based on data reported to the OeNB.

[1] *FSAP: ratio of loan loss provisions to total outstanding loans, SRM: borrowers' average probability of default.*

[2] *The accumulated credit risk loss estimated by the FSAP stress tests equals the sum of the stress test losses established for the three components of credit risk, excluding banks' claims in currencies other than euro for domestic credit risk.*

[3] *In the case of the Japanese yen, no parallel downward shift in the yield curve was simulated so as to prevent interest rates from having negative values. The scenario consists of a cut by 20 basis points in short-term interest rates, by 40 basis points in medium-term interest rates and by 130 basis points in long-term interest rates.*

[4] *Reduction in absolute values of all banks' outstanding foreign exchange positions in 12 (FSAP) and 4 (SRM) major currencies.*

loans extended by Austrian banks' subsidiaries in the CEECs.

With the exception of the U.S. dollar, the stress test results for interest rate risk showed a slightly declining effect on the banks' capital ratio in the period under review, which may be at least partly attributable to the increasing significance of variable rate loans. The effects are generally somewhat lower for the SRM stress tests, as they cover only four maturity buckets (i.e. periods until the next interest-rate resets) for methodological reasons, while the FSAP stress tests cover 13 maturity buckets. With regard to equity price risk, the capital ratio increases slightly in both types of stress tests. The increases are somewhat more pronounced for the SRM stress tests, which rely on market prices for the valuation of equity portfolios, whereas the FSAP stress tests generally rely on book values. The stress tests for exchange rate risk produce uniform, almost constant results over time with both methods.

All in all, the data of end-2005 again confirm the satisfactory level of shock resilience in the Austrian banking system; the effects of the stress tests on the capital ratios remain relatively constant over time. This result is found by both testing methods – the FSAP stress tests, which have been in use until now, and the SRM stress tests on the basis of both sensitivity stress tests and Monte Carlo simulations (as documented in the article mentioned).

Ratings of Major Austrian Banks Changing

In addition to supervisory reporting data, financial stability analysis may also use publicly available information and indicators of international rating agencies such as Moody's, including long-term deposit ratings and the Bank Financial Strength Rating (BFSR).

The events in the Austrian banking market over the past half year have caused a number of changes in Austrian credit institutions' ratings (see table 9). When the takeover of Bayerische Hypo- und Vereinsbank AG (the parent company of BA-CA) by UniCredit Group led to insecurities regarding the future allocation of business in the CEECs, BA-CA's BFSR outlook was downgraded, while Moody's confirmed its long-term deposit rating of A2. The purchase of Banca Comerciala Romana by Erste Bank led Moody's to downgrade Erste Bank's BFSR from B– to C+ in early June, given the size of the deal relative to the bank's capital in combination with Romania's low sovereign rating. The ratings of BAWAG P.S.K. had been placed under review for possible downgrade by Moody's owing to the granting of a large-scale loan to REFCO (as already reported in Financial Stability Report 10). The group's BFSR was lowered from C+ to C in January 2006, and when the bank confirmed the size of losses it had made in Caribbean offshore deals over the past years, the long-term deposit rating was downgraded from A2 to A3, while the BFSR was again lowered to C– in March 2006. Up to the end of the latest review process, BAWAG P.S.K. suffered two further BFSR downgrades, namely to D– at end-April and to E+ at end-May 2006. Following news of treasury losses at Hypo Alpe-Adria, its BFSR was downgraded from C+ to D– for poor risk management. The rating remains under review for possible downgrade.

Table 9

Austrian Major Banks – Selected Ratings

As of June 10, 2006

	Deposit Rating		BFSR[1]	
	LT[2]	Outlook		Outlook
BA-CA	A2	stable	B–	negative
Erste Bank	A1	stable	C+	stable
RZB	A1	stable	C+	stable
BAWAG P.S.K.	A3	stable	E+	stable
ÖVAG	A2	stable	C	stable
Hypo Alpe-Adria International	Aa2	stable	D–	under review

Source: Moody's Investors Service.

[1] *Bank Financial Strength Rating.*
[2] *Long-term deposit rating.*

Stock Prices of Major Austrian Banks Continue to Rise

As of March 31, 2006, the three banks listed on the ATX Prime Market (BA-CA, Erste Bank and Raiffeisen International) reported a combined market capitalization of EUR 40.6 billion, almost twice the value recorded in March 2005 (+EUR 19.7 billion).[38] This figure also includes EUR 1.1 billion of Raiffeisen International's IPO in April 2005 and around EUR 2.8 billion of a capital increase by Erste Bank in January 2006. Between end-March 2005 and end-March 2006, the market capitalization of domestic stocks traded on the Vienna stock exchange rose by EUR 52.5 billion to EUR 116.0 billion. Thus, the share of all three bank stocks increased from 34.2% to 35.0% of ATX Prime's total market capitalization in this period (see chart 23).

Over the past years, the implied volatilities of at-the-money call options[39] for banks listed on ATX Prime remained basically unchanged. The increase in implied volatilities for BA-CA in March following uncertainties regarding its organizational integration into UniCredit Group was only temporary. All in all, however, the level of implied volatilities for banks listed on ATX Prime exceeds that of the whole index and is also well above the level measured by the EURO STOXX Financial Services index. This may be attributable to Austrian banks' valuation gains in recent years resulting from their business activities in CEECs, among others.

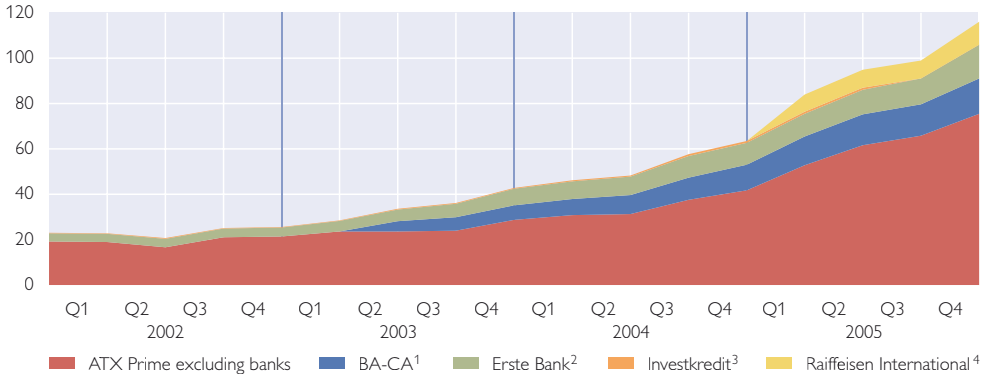
[38] *At end-March 2005, another bank (Investkredit) had been listed on the ATX Prime Market. Since it was delisted at end-2005 after its takeover by ÖVAG, it was not taken into account in 2005 for the sake of data comparability.*

[39] *Implied volatility refers to the market's assessment of future stock price volatility. Source: Bloomberg.*

Chart 23

Market Capitalization of Austrian Banks Listed on ATX Prime

As of March 31, 2006



Source: Wiener Börse AG.

1 *Relisted on July 9, 2003.*
2 *Including capital increases on June 12, 2002, and January 27, 2006.*
3 *Delisted at end-2005 after its takeover by ÖVAG.*
4 *IPO on the Vienna stock exchange on April 25, 2005.*

Insurance Companies and Mutual Funds Benefit from Favorable Capital Market Sentiment

Insurance Sector Continues to Recover

Demand for Life Insurance Products Increases as Financial Market Conditions Remain Advantageous

Even though a number of natural disasters occurred in the second half of 2005, the European insurance sector continued to pick up, with investment results increasing thanks to the benign financial market environment. Moreover, improved risk management had a positive effect on the stability of insurance companies. Damage covered by insurance reached a record value in 2005, affecting mainly U.S. property/casualty insurance companies and European reinsurers. Nevertheless, Standard and Poor's changed their outlook for the latter from "negative" to "stable" in April 2006.

The development of Austrian insurance companies was positive in 2005, with insurance premium income across all insurance categories growing by 9.6%.[40] The driving force behind this favorable trend was the continued rise in retirement provision products, which were complemented by the introduction of occupational group insurance. An essential contribution to the dynamic development in the life insurance sector came from state-subsidized personal pension plans and from the growth of one-off payments. Moreover, strong growth in Central and Eastern European markets and the favorable development in international capital markets promoted business activity and profit performance. Payments by insurance companies climbed by a moderate 1.1% in 2005. This slow growth was attributable to the fact that natural disasters only occurred at a regional level and that there was no wave of expiring life insurance con-

40 *Source: Austrian Association of Insurance Companies, March 2006.*

tracts in 2005. Both ratings and stock price developments reflect the positive course Austrian insurance companies took in 2005. At the end of the first quarter of 2006, the rating outlook for the large Austrian insurers was stable. Stocks of insurance companies listed on the prime market segment of Wiener Börse AG continued to be dynamic, even if their upward trend flattened considerably.

Insurance Companies Increasingly Rely on Foreign Investment

In 2005, the highest growth rate (+12.4%) reported since the introduction of the OeNB's insurance statistics in 1996 drove up Austrian insurance companies' total assets[41] to EUR 76.8 billion. On the asset side, this increase can to a large extent be attributed to domestic equity securities and other domestic securities (+EUR 3.7 billion or +21.3%), to foreign fixed income securities (+EUR 2.6 billion or +16.5%) and to foreign equity securities and other foreign securities (+EUR 1.5 billion or +53.4%). Together, the latter three positions accounted for 73.5% of gross asset growth. Austrian insurance companies' stronger orientation toward foreign investment is mirrored by the share of foreign assets in total assets, which reached a record high of 32.7% in 2005. Accounting for close to 73% of foreign assets, fixed income securities played a dominant role. At 23.8%, their share in total assets was almost twice as high as that of domestic fixed income securities (12.1%). All in all, 35.9% of assets were invested in fixed income securities at end-2005. At 38.4%, (domestic and foreign) equity securities and other securities as well as domestic participating interests had an even higher share in total assets. Loans granted by insurance companies continued the trend of previous years, with their volume contracting by 12.5% to EUR 5.7 billion. While loans to the government went down by EUR 1 billion to EUR 4 billion, loans to domestic credit institutions expanded by EUR 0.2 billion, thus coming to EUR 0.4 billion. The total exposure of insurance companies vis-à-vis domestic banks climbed at a slower pace (+9% year on year) than total assets and reached EUR 10.6 billion. Thus, its share in insurance companies' total assets decreased slightly year on year, coming to 13.8% at end-December 2005. The share of insurance companies' investments with domestic credit institutions in Austrian banks' consolidated total assets fell slightly to 1.3%. Owing to positive business and profit performance and insurance companies' modest exposure vis-à-vis the banking sector, the risk of contagion between the banking and insurance sectors is still low.

Equity Funds Profit from Favorable Capital Market Environment

The continued beneficial financial market sentiment and investors' increasing confidence in mutual funds have had a positive effect on the European equity funds market. In 2005, assets under management by mutual funds[42] went up by 23% to a record high of EUR 6,566 billion. In its third

[41] *Excluding reinsurance business; based on quarterly reports (OeNB insurance statistics).*

[42] *Here, mutual funds comprise undertakings for collective investment in transferable securities (UCITS) and non-UCITS.*

Prudential Requirements for Financial Conglomerates

Over the last few years, there has been a strong trend toward the integration of banking, insurance and other financial services. Well-known international examples for this trend are ING, Allianz, Lloyds TBC and Fortis. Under a uniform structure, these enterprises provide both banking and insurance services. If an enterprise's individual business lines exceed specified size limits, such an enterprise is called a financial conglomerate. Since January 1, 2005, financial conglomerates have been subject to the requirements of the Financial Conglomerates Act. If an enterprise qualifies as a financial conglomerate, it must in particular comply with the following regulatory framework conditions:

Capital adequacy

Aside from capital adequacy at the level of individual financial institutions, a defined minimum capital level must be maintained across the entire financial conglomerate. There are three prudential methods that may be applied to determine the capital requirements on a financial conglomerate: the accounting consolidation method, the deduction and aggregation method and the book value and/or requirement reduction method. Each method may be used individually or in combination with one or both of the other methods. All three methods are essentially based on the capital requirements laid down in the individual sectoral frameworks (e.g. Basel II, Solvency II).

Intragroup transactions and risk concentration

A key focus of financial conglomerates oversight is the observation and supervision of conglomerate-wide risk concentration and intragroup transactions, as these intensify contagion risks and conflicts of interests within the conglomerate. To facilitate observation and supervision, the Financial Conglomerates Act contains the obligation (to be specified individually) to report risk concentration and intragroup transactions and requires official measures, but no additional regulatory capital backing.

Internal control mechanisms and risk management

Adequate risk management is indispensable if the risk transfer within a financial conglomerate is to make economic sense. A financial conglomerate should be able to establish management strategies and to adequately monitor and control risks (in particular those arising from intragroup transactions and risk concentration); moreover, it should have mechanisms in place that are suitable for reviewing capital adequacy across the entire financial conglomerate.

year, the uptrend in this area clearly gained momentum, with asset value increases and inflows acting as the main pillars of asset growth. While all funds categories recorded net inflows year on year, fixed income funds saw net outflows in the last quarter of 2005 owing to changes in the interest outlook for Europe. In the same quarter, equity funds, by contrast, recorded the highest inflows in five years. At 27%, their 2005 performance clearly exceeded the 12% reached by UCITS mutual funds.

Assets of Austrian Mutual Funds Grow Dynamically

The overall performance of the 27 Austrian investment companies was satisfactory in 2005. The assets held by Austrian mutual funds[43] (including fund-of-fund investments) grew by

[43] *In 2005, invested capital augmented by 22% to EUR 133 billion.*

25% to EUR 156.7 billion in 2005, thus recording the highest growth rate since 1999. Net inflows went up by 76.6% year on year and reached EUR 13.5 billion, and price gains soared by 101.3% to EUR 14.2 billion. Dividend payments rose by 8.7%, amounting to EUR 3.4 billion. The upward trend in financial markets boosted the capital-weighted average total performance of all Austrian mutual funds from 6.0% in 2004 to 10.1% in 2005. Performance was positive in each quarter of 2005. The positive market sentiment also contributed to the fact that only 30 out of a total of 2,087 mutual funds registered in Austria developed unfavorably. Equity funds and balanced funds showed above-average performance, with yields coming to 26.3% and 11.2%, respectively. By contrast, yields of fixed income funds, real estate funds, money market funds and alternative funds remained below average in 2005, ranging from 2.7% to 8.3%.

Holdings of Equity Fund Shares Remain Low in Austrian Mutual Funds

Following the European trend observed in 2005, retail funds in Austria – broken down by investment policy – recorded a decrease in the share of fixed income funds to 57.2% and of balanced funds to 18.2%, while the share of equity funds went up to 18.9%. In Austria, the fact that the redemption of shares in individual real estate funds was suspended in Germany did not affect net inflows; in fact the share of real estate funds in retail funds' assets doubled to 1% in the course of 2005. In terms of investment stocks, the share of equity funds in mutual funds registered in Austria was clearly lower than in other countries; figures for Germany (around 32%) and the U.S.A. (around 54%), for example, were considerably higher than the values recorded in Austria.

Severance Funds Continue to Develop Dynamically

In the fourth quarter of 2005, nine severance funds were licensed to operate in Austria. Their total assets came to EUR 727.32 million, up 87.8% against the comparable period of 2004. In 2005, the vested rights to future severance payments climbed from EUR 362.06 million to EUR 696.04 million (+92.2%). Eligible capital, by comparison, only augmented by 7.9% from EUR 20.16 million to EUR 21.76 million. Still its share of 3.1% in vested rights to future severance payments clearly exceeds the required 0.25%.

Severance funds invested the assets assigned to investment groups (EUR 696.49 million) mainly in (euro-denominated) mutual fund shares, which accounted for EUR 490.40 million or 70.4% of assets assigned to investment groups. Foreign currency-denominated mutual fund shares accounted for an additional EUR 47.77 million. Indirect investments thus accounted for a total of 77.26% of collective funds' assets.

At end-2005, the number of employers that had signed severance fund agreements was 284,531. Compared to the previous year (204,329 agreements), the number of agreements climbed by 39.25%. The three largest severance funds controlled a 75% share in the market, which means that they succeeded in maintaining high market concentration also in 2005 (2004: 74.5%). In 2005, severance fund agreements established around 3.26 million vesting periods for 1.74 million people. This corre-

sponds to a rise by 56.82% and 31.87%, respectively, against 2004.

The number of vesting periods not assigned to any of the severance funds went down from 215,728 in 2004 to 115,134 in 2005. Legislation reacted to the high number of unassigned vesting periods by amending the Company Pension Fund Act (Betriebliches Mitarbeitervorsorgekassengesetz – BMVG) and by introducing, in Article 27 letter a, the obligation for the Central Association of Austrian Social Insurance Institutions – under certain circumstances – to assign employers that fail to enter into a severance fund agreement to a fund of its choice. Still, at end-2005, almost 100,000 persons entitled to 115,134 vesting periods were not assigned to a severance fund.

Special Topics

Main Features of Recent Banking Sector Developments in Selected Southeastern European Countries

A Cross-Country Perspective [1]

Peter Backé,
Thomas Reininger,
Zoltan Walko

The purpose of this paper is to provide a comparative stock-taking exercise of recent banking sector developments in four current EU candidate countries (CC-4), namely the two acceding countries Bulgaria and Romania and the two negotiating candidates Croatia and Turkey. The paper finds that a strong increase in foreign liabilities allowed boosting domestic lending in particular to households. At the same time, banks' credit risk that results from nonbanks' foreign exchange exposure has significantly increased. Although in recent years (1) banks' profitability has increased, (2) their share of nonperforming assets has declined and (3) their capital adequacy ratios can currently be considered as still sufficiently high (despite the recent domestic credit expansion), considerable risks to macroeconomic and macrofinancial stability may arise if foreign liabilities and domestic credit growth continue to increase at such a rapid pace in the future.

Introduction

The four selected Southeastern European Countries (i.e. the two acceding countries Bulgaria and Romania and the two accession countries Croatia and Turkey, CC-4) have experienced robust economic growth, substantial progress with respect to disinflation, and a deepening of financial intermediation levels. At the same time, current account deficits have been sizeable and foreign indebtedness has been at intermediate to moderately high levels in most CC-4.[2] In this environment, the banking sectors in these countries have gone through a deep restructuring process over the past few years. The European Bank for Reconstruction and Development's (EBRD) Index of Banking Reform in transition economies (which is of course not available for Turkey) provides simple summarizing evidence of this development. It measures reform activities by a broad range of banking indicators and can take values between 1 and 4+, with 1 representing little progress and 4+ representing full convergence of banking laws and regulations with the standards of the Bank for International Settlements (BIS) and the availability of a full set of banking services. Judged by this indicator, the progress of reform between 1998 and 2004 was largest in Croatia. Bulgaria comes second, both in terms of the dynamics of the reform process and in terms of the level of the indicator in 2004. The reform process has advanced continuously in both countries. In Romania, the development of the indicator suggests a more stepwise approach to banking reforms, with

[1] *This paper is primarily based on publicly available information. Additional data were made available to the authors by Hrvatska Narodna Banka, Bulgarska Narodna Banka and Banca Națională a României.*

[2] *For more details about economic developments in these countries, see e.g. the publication series "Focus on European Economic Integration" of the Oesterreichische Nationalbank.*

Table 1

Structural Indicators of CC-4 Banking Markets (data for 2004)

	BG	HR	RO	TR	NMS-8 [1]	Euro area [2]
EBRD Index of Banking Reform	3.7	4.0	3.0	..	3.6	..
Bank branches per 100,000 inhabitants	13.9	23.4	13.8	8.5	11.2	46.1
Asset share of private banks [3]	97.7	96.9	93.2	63.1	92.5	..
Asset share of foreign-owned banks [3]	81.6	91.3	62.0	3.5	77.4	15.5
Asset share of five largest banks [3] [4]	52.2	65.0	59.8	60.0	68.6	53.0

Source: EBRD, World Bank, national central banks, Banking Regulation and Supervision Agency Turkey (BRSA), ECB.

[1] *NMS-8: arithmetic average, "Bank branches per 100,000 inhabitants" excluding Latvia.*
[2] *Euro area: arithmetic average excluding Luxembourg.*
[3] *NMS-8: 2003.*
[4] *Croatia: Asset share of the four largest banks.*

leaps forward in 1999 and 2004, but less progress in the years in between. According to the EBRD indicator, banking sector reforms in Croatia and Bulgaria were more advanced than those in the eight Central and Eastern European Member States of the European Union (NMS-8) taken together, whose (unweighted) average indicator stood at 3.6 in 2004.

The structural changes in the banking system have gone hand in hand with a consolidation process. Between 1998 and 2004, the number of banks fell significantly in Croatia and Turkey, and a more moderate decrease could also be observed in Romania, while in Bulgaria a similar consolidation had occurred already earlier. This consolidation process in the CC-4 banking industry has in part been promoted by banking crises, which shook the banking systems in these four countries at different points in time during the past decade. Several failed banks were closed down or merged with other banks during or after the crisis episodes. In addition, M&A activity has also been motivated by a fight for market share by bank owners, among them foreign investors. Moreover, bank privatization has also contributed to the decline in the number of banks in those cases where investors who already held stakes in banking institutions in the country acquired stakes in a newly privatized bank, which was subsequently merged into the existing holding.

While in 1997 and 1998 the Bulgarian and Romanian banking sectors were overwhelmingly state-owned, the share of privately-owned banks in total commercial bank assets rose to nearly 100% by the end of 2004. In Croatia privately-owned banks accounted for more than half of total banking sector assets already in 1997, and this share rose to nearly 100% by 2004. In Turkey the share of private banks in total banking assets is smaller than in the other three countries, and the privatization process has been less dynamic in recent years, with the share of privately-owned banks rising from 60% in 2000 to 63% in 2004. However, the favorable financial position of state-owned banks makes them attractive targets for private (domestic or foreign) strategic investors.

In Bulgaria, Croatia and Romania, a large number of foreign investors have participated in the privatization process. Consequently, the share of foreign-owned banks in total banking assets increased simultaneously to the share of privately-owned banks. At the end of 2004, foreign-

owned banks accounted for 80% to 90% of total banking sector assets in Bulgaria and Croatia. This share was lower (at slightly more than 60%) in Romania, due to majority domestic private ownership of the country's largest commercial bank, Banca Comerciala Romana. However, in the meantime, the sale of a controlling stake in this bank to Austrian Erste Bank boosted foreign ownership in the Romanian banking sector as well. Banks from the euro area belong to the key players in these banking markets, with Austrian, Italian, Benelux and Greek banks leading the league. By contrast, foreign involvement in the Turkish banking sector remains very limited, with majority foreign-owned banks accounting for only around 3.5% of total banking sector assets. Limited foreign ownership in the Turkish banking sector can partially be explained by the dominance of family conglomerates among privately-owned banks, who until recently have hardly shown any interest in involving foreign co-owners.

The Financial Sector Assessment Programs (FSAP) under the auspices of the International Monetary Fund (IMF) and the World Bank, which were conducted in Bulgaria, Croatia and Romania in 2002 and 2003, provided a first overall assessment of the achievements that had resulted from these structural changes. The FSAPs found that these countries had stable and generally well-capitalized and well-supervised banking sectors, which were to a considerable degree resilient against risks. At the same time, the FSAPs stated that banks needed to close existing gaps in their credit allocation and risk management systems, having a close eye not only on credit risks and market risks, but also on operational risks. In the area of supervision, the FSAPs highlighted the necessity to improve accounting, auditing and disclosure regulation and governance. They also called attention to the importance of regular stress testing for an early identification of systemic weaknesses. Similarly, the need for cooperation with foreign supervisory authorities was highlighted. Concerning the Turkish banking sector, the IMF Staff Report of the 2004 Article IV consultations found evidence that the banking sector had been substantially strengthened following the crisis of 2000–2001 and that the supervisory environment has improved. This notwithstanding, the IMF has identified four key areas which needed further reform or an acceleration of reform. These included (1) the further restructuring and privatization of state-owned banks, (2) correcting existing shortcomings in the supervisory framework to better enforce existing prudential requirements in particular with respect to risk management and capital cushions, (3) asset resolution and (4) reducing financial disintermediation.

Austrian banks have significantly contributed to the transformation of the banking sectors in Bulgaria, Croatia and Romania. Over the past few years, Austrian banks have increased their presence in these three countries by establishing subsidiaries: the value of total assets of these subsidiaries rose from EUR 4.7 billion at the beginning of 2002 to EUR 23.3 billion in September 2005. Austrian banks' subsidiaries in these three countries accounted for around 17% of the total assets of all foreign subsidiaries of Austrian banks. Their share in the pre-tax earnings of all foreign subsidiaries taken together stood at a similar level. The increase

in their total assets has secured the Austrian subsidiaries strong market positions in all three countries: at the end of September 2005, their share in total banking sector assets was at almost 45% highest in Croatia, compared with around 18% in Bulgaria and Romania. Including the acquisition of Banca Comerciala Romana by Erste Bank in December 2005, Austrian banks' market share in Romania has likely increased to around 40%. At the end of September 2005, Austrian banks had no subsidiaries in Turkey.

In addition to operating subsidiaries, Austrian banks have also strengthened their ties with all CC-4 by cross-border lending. The stock of cross-border claims on households and enterprises in the CC-4 (excluding claims on the subsidiaries of Austrian banks) rose from around EUR 2.9 billion at the beginning of 2000 to around EUR 9.7 billion by November 2005. Lending to borrowers in Turkey accounted for around half of this total, followed by lending to customers in Croatia (30%). A further EUR 3.8 billion went to Austrian banks' subsidiaries in these countries, mostly in Croatia. Although the combined value of the assets of Austrian banks' subsidiaries in the CC-4 and of direct lending to clients in these countries by Austrian banks represents less than 5% of Austrian banks' total assets, banking sector developments in the CC-4 are of increasing relevance for financial stability in Austria.

Against this background, the present paper aims at highlighting in a comparative way three main features of banking sector developments in these countries in recent years up to the end of 2004. Moreover, we compare these developments with those in the banking sectors of the eight Central and Eastern European new EU Member States and of the euro area.

First Feature: Acceleration of Domestic Lending (in Particular to Households) Boosted by Strongly Increasing Foreign Liabilities

Claims on households and nonbank corporations[3] play a prominent role in banking assets in Bulgaria and Croatia, accounting for about 55% of total assets at the end of 2004 (see table 2). This share is somewhat lower in Romania (46%), closer to the NMS-8 and the euro area average and significantly lower in Turkey (31%). In Romania, these comparatively low values correspond to a significantly higher share of claims on the central bank than in other countries, and in Turkey to a significantly higher share of claims on the general government, which is mainly attributable to high budget deficits. In turn, the share of total domestic claims in total assets in Romania and Turkey was about the same level as in Bulgaria and Croatia.

From the end of 2001 to the end of 2004, growth of lending to households and nonbank corporations accelerated in the CC-4, and the share of these claims in total assets increased markedly by between 4 and 20 percentage points. Growth of lending to households was particularly strong in all four countries. By contrast, the share of claims on non-

[3] *Nonbank corporations comprise both nonfinancial corporations and financial institutes that are nonbanks.*

bank corporations increased only in Bulgaria, while it remained relatively stable in Romania and Turkey, and decreased continuously in Croatia.[4] Structural changes have supported the shift from lending to nonbank corporations to lending to households over the past few years. On the supply side, privatization has promoted improved management and the technical skills of bank employees, which in turn has contributed to the development of retail lending, while relatively large interest rate margins and better collateral (e.g. in the form of guarantees, real estate) have also made lending to households an attractive new business. On the demand side, rising income levels and subsidized housing loan schemes have generated credit demand, while at the same time the corporate sector has gained better access to alternative financing sources (including financing from retained earnings following the improvement in profitability and financing abroad in the form of FDI equity or cross-border credits). Finally, the removal of bad loans from banks' balance sheets (for example to asset management companies) predominantly affected loans to the corporate sector. These changes in the asset structure and the underlying driving forces display a number of similarities to the developments in the NMS-8 over the last decade.

Lending to the general government plays a significant role only in the Turkish banking sector, which can be attributed to the fact that in the other three countries, the government debt burden is financed to a considerable extent from abroad and, in the case of Romania, that the level of public debt is relatively low.

Table 2

Commercial Banks' Domestic Claims

% of total assets, end-2004

	BG	HR	RO	TR	NMS-8 [2]	Euro area
Total domestic claims	74.8	80.7	84.7	78.9	77.0	79.4
Claims on domestic MFIs	11.9	15.2	36.5	7.4	15.2	28.9
Claims on domestic nonbanks	62.9	65.5	48.2	71.5	61.8	50.5
of which:						
Claims on the general government [1]	*8.7*	*10.1*	*2.4*	*40.1*	*14.7*	*9.9*
Claims on the domestic nonbank nongovernment sector [1]	54.3	55.3	45.7	31.4	47.2	40.6
of which:						
Claims on non-MFIs and nonfinancial corporations	*37.4*	*26.4*	*32.7*	*21.4*	..	*22.8*
Claims on households and NPISH [3]	*16.9*	*28.9*	*13.0*	*10.0*	..	*17.8*

Source: NCBs, ECB.

[1] *Excluding Estonia.*
[2] *Arithmetic average.*
[3] *NPISH: Nonprofit institutions serving households.*

[4] *However, it is worth pointing out that in contrast to borrowing from banks, Croatian nonfinancial corporations have heavily stepped up borrowing from the nonbank financial sector (for example from leasing companies) and foreign sources in recent years. This may to some extent be a reaction to the limitations on bank lending imposed by the central bank at the beginning of 2003.*

Claims on banks (including the central bank) ranged between 7.4% (Turkey) and 36.5% (Romania) of total assets, compared with a share of close to 30% in the euro area. Importantly, commercial banks' deposits with the central bank play a much larger role in the CC-4 than in the euro area, as deposits of commercial banks with the central bank account for between 6.5% (Turkey) and 34% (Romania) of banks' total assets in the CC-4 (i.e. for almost the entire amount of claims on other banks), compared with merely 1.4% in the euro area. This is not only attributable to the relatively high mandatory reserve requirement rates in the CC-4 (between 6% and 18%), but also to the structural liquidity surplus of commercial banks on the back of foreign capital inflows, combined with sterilized exchange rate interventions by the central bank, which results in a huge volume of liquidity-draining instruments in the CC-4. At the same time, the fact that the share of claims on other monetary financial institutions (MFI) is considerably lower in the CC-4 than in the euro area indicates a significantly smaller liquidity of the interbank market in these countries.

On the liabilities side, deposits by domestic nonbanks (overwhelmingly households and nonbank corporations) constitute the most important financing source for commercial banks in the CC-4, accounting for around 60% of total liabilities in Bulgaria and Croatia, and for 65% to 68% in Romania and Turkey (see table 3). These values compare to around 30% in the euro area and slightly more than 50% in the NMS-8. This high share of relatively cheap financing, combined with the generally higher interest rate margins in the CC-4, supports commercial banks' profitability in these countries.

The share of domestic deposits in total liabilities was on the rise until 2001 in Bulgaria and Croatia and until 2002 in Romania and Turkey. This expansion was to a large extent attributable to the introduction of euro cash at the beginning of 2002, which led to the depositing of euro legacy currencies with domestic banks, and, likely, to strengthened confidence in the domestic banking sector following the settlement of the banking crises. In Bulgaria, Croatia and Romania, the volume of domestic deposits has increased considerably in real terms also since the end of 2001, i.e. following the introduction of euro cash. At the same time, however, the share of domestic deposits in total assets has been crowded out by the sharp increase in foreign liabilities, which boosted domestic lending in these countries. By contrast, the volume of domestic deposits rose considerably less in real terms in Turkey than in the other three Southeastern European countries between the end of 2001 and the end of 2004. However, as the share of foreign liabilities in total liabilities remained nearly constant, the share of domestic deposits declined only slightly and remained well above pre-changeover levels.

Banks' net positions reveal major differences between the balance sheet structures in the CC-4 and in the euro area at the end of 2004. As the upper part of table 4 shows, in the CC-4, banks had negative net claims on households and nonbank corporations (i.e. an excess of deposits of over claims on these sectors). This contrasts with positive net claims of banks on these sectors in the euro

Table 3

Domestic Deposits with Commercial Banks

% of total liabilities, end-2004

	BG	HR	RO	TR	NMS-8 [1]	Euro area
Deposits of domestic MFIs	4.1	0.4	3.0	2.0	3.9	22.0
Deposits of domestic nonbanks	60.0	60.4	64.9	67.9	53.3	31.7
of which:						
Deposits of the general government	*3.9*	*4.2*	*2.6*	*4.8*	*3.3*	*1.3*
Deposits of households and nonbank corporations	*56.1*	*56.2*	*62.3*	*63.1*	*50.0*	*30.4*

Source: National central banks, ECB.

[1] *Arithmetic average.*

area, where debt securities issued as well as capital and reserves constituted the major source of funding for these net claims as well as for the net claims on the general government.[5] By contrast, in the CC-4 (similar to the NMS-8), negative net claims on households and nonbank corporations, negative net foreign assets (except in Turkey) and a comparatively high capital and reserves position provided the funding for the net claims on the general government (except for Romania) and, in particular, for the sizeable positive net claims on the central bank.

Importantly, the striking difference between partly sizeable negative net claims on households and nonbank corporations in the CC-4 and positive such net claims in the euro area cannot be interpreted as the result of banks' hesitation in providing financing to these sectors. Indeed, recalling that the share of claims on households and nonbank corporations in total assets was higher in the CC-4 (with the exception of Turkey) than in the euro area at the end of 2004, it is clear that the negative net position on households and nonbank corporations in Bulgaria, Croatia and Romania resulted primarily from the fact that compared with the euro area, domestic nonbank deposits continue to play a much larger role in banks' liabilities in these countries. The share of domestic deposits of households and nonbank corporations in total liabilities in the CC-4 is even significantly larger than the combined share of such deposits and of the position "debt securities issued" in the euro area. Nevertheless, including that part of the position "debt securities issued," which is held by domestic households and nonbank corporations, when calculating the "net claims on households and nonbank corporations" in the euro area, would result in a net position that is already closer to the corresponding net posi-

[5] *Moreover, in the euro area, the banking sector, i.e. "other monetary financial institutions (MFIs)," had positive net claims on MFIs, although it had a net liabilities position against the central bank (Eurosystem). This results from the fact that "claims" include loans extended to other MFIs as well as holdings of debt and equity securities issued by other MFIs, while only deposits from other MFIs (and not bank securities held by other MFIs) are subtracted to calculate the net position. Thus, the positive net claims on MFIs (6.9% of total assets) consist of the holdings of debt and equity securities issued by other MFIs (7.9% of total assets) minus net liabilities against the Eurosystem (1% of total liabilities).*

tion in the CC-4, in particular in Bulgaria and Croatia, where it is close to balance. In the CC-4, banks have so far issued only a very small volume of domestic debt securities, mainly due to the fact that their domestic corporate bond markets have in general been less developed.[6]

As regards the changes in the balance sheet structure from the end of 2001 to the end of 2004 (see the lower part of table 4), the net position of CC-4 banks against households and nonbank corporations had become significantly less negative since the end of 2001, despite the increase in the volume of deposits in real terms during this period. In parallel, commercial banks' net foreign asset position deteriorated significantly. While banks in all four countries had positive net foreign assets in 2001 (most notably Bulgaria, at 30% of total assets), Bulgarian, Croatian and Romanian banks' net external asset position had turned negative by 2004. The largest deterioration in banks' net foreign position occurred in Bulgaria, which also saw the most pronounced reduction in the negative net claims on households and enterprises. The sharp increase in foreign liabilities, which led to a deterioration in net foreign assets (in % of total assets), caused net claims on households and nonbank corporations to become significantly less negative thanks to two effects: First, it helped finance the considerable increase in the share of claims on domestic nonbanks (in Bulgaria, Romania, Turkey) to levels above those in the euro area (except in Turkey), and second, it crowded out the share of domestic deposits (Bulgaria, Romania, Croatia). If the rapid increase in foreign liabilities that Bulgaria, Croatia and Romania witnessed in recent years were to continue unabatedly over the medium term, this could hardly be considered as sustainable and conducive to financial stability.

On a more positive note, the fact that the capital and reserves position of banks in the CC-4 is significantly larger as a percentage of total liabilities than in the euro area and – with the exception of Bulgaria – also higher than in the NMS-8 deserves particular mention. These large capital positions have been brought about by the privatization of banks and the involvement of foreign investors and are partly ascribable to the lack of banks' funding via the issuance of debt securities. The strong capital base is also reflected in relatively high capital adequacy ratios in the CC-4, compared with the NMS-8 and the euro area.

[6] *However, the issuance of debt securities by banks has strengthened modestly more recently (in connection with the issuance of mortgage bonds), and this trend can be expected to continue in the future on the back of the housing loan business. It is quite plausible to expect part of current domestic deposits of households and nonbank corporations to shift into such securities over the medium term.*

Table 4

Major (Net) Positions of the Commercial Banks' Aggregate Balance Sheet

% of total assets/liabilities	BG	HR	RO	TR	NMS-8[1]	Euro area
Shares in % at end-2004						
Net claims on domestic MFIs	7.8	14.8	33.5	5.4	11.3	6.9
Net claims on the general government	4.8	6.0	−0.1	35.3	11.4	8.6
Net claims on households and nonbank corporations	−1.9	−0.9	−16.6	−31.7	−2.8	10.2
Net external assets	−1.5	−7.8	−10.2	0.4	−8.1	0.6
Net other assets[2]	1.9	1.1	5.1	8.2	..	−4.2
Debt securities issued	0.7	0.5	0.0	0.0	2.9	16.4
Capital and reserves	10.5	12.7	11.7	17.5	10.6	5.6
Changes in the shares in percentage points from end-2001 to end-2004						
Net claims on domestic MFIs	2.9	4.3	10.0	3.2	..	−0.4
Net claims on the general government	−2.4	−4.1	−7.2	−0.9	..	−0.4
Net claims on households and nonbank corporations	27.7	16.0	16.5	6.9	..	0.3
Net external assets	−32.4	−15.5	−18.7	−1.7	..	2.1
Net other assets[2]	2.5	−5.5	−3.3	−3.0	..	−1.0
Debt securities issued	0.6	0.3	0.0	0.0	..	0.6
Capital and reserves	−2.3	−5.1	−2.7	4.4	..	−0.1

Source: National central banks, ECB.

[1] *Arithmetic average.*

[2] *Net other assets include money market funds (on the asset and the liability side), fixed assets, other assets and remaining liabilities.*

Second Feature: Nonbanks' Foreign Currency Exposure Increases Banks' Indirect Foreign Exchange Risk and Thus Credit Risk

Foreign currencies play a significant role in the banking sectors of the CC-4. On the deposit side, this is partly ascribable to households' lack of confidence in the domestic currency (and the domestic banking sector) at the beginning of the transformation process. Later on, when households moved the foreign currency cash they had kept "under the mattress" to domestic bank accounts, households preferred foreign currency deposits.

On the lending side, the large share of foreign currencies can be considered to be a natural hedge of banks' foreign currency liabilities (foreign currency deposits, foreign loans, foreign currency-denominated equity capital paid in by foreign investors). Thus, it may mirror domestic banks' lack of confidence in the domestic currency or banks' efforts to limit their open foreign currency positions. At the same time, following the stabilization of the domestic currency, borrowers have likely been attracted to foreign currency loans by lower interest rates, apparently expecting that the interest rate differential would not be offset by a depreciation of the currency. Moreover, for some borrowers foreign currency-funding provides a natural hedge to their operative earnings denominated in foreign currency.

Foreign currency-denominated deposits accounted for between 41% and 74% of total bank deposits of households and nonbank corporations in these countries at the end of 2004 (see table 5a). At the same time, foreign currency-denominated loans accounted for between 10% and 61% of total bank loans to households and nonbank corporations in these countries (see table 5b). This share was highest in Romania and lowest in

Croatia. However, these figures may underestimate the entire role of foreign currencies in total deposits of and loans to households and nonbank corporations, given that there are also deposits and loans indexed to foreign currencies. Indexed instruments play a substantial role in particular in Croatia, where they accounted for almost 10% of total deposits of households and nonbank corporations and for 66% of total loans to this sector at the end of 2004.

At the beginning of this decade, the share of foreign currency-denominated deposits was boosted in Bulgaria, Romania and Turkey as residents deposited their holdings of euro legacy currencies prior to the cash changeover into euro at the beginning of 2002. The volume of both total and foreign currency-denominated deposits of households and nonbank corporations increased also in Croatia as a result of the depositing of holdings of euro-constituent currencies in these years. However, the share of foreign currency-denominated deposits did not increase further, as it had accounted for 87% of total deposits already beforehand and some part of the foreign currency holdings was converted into domestic currency. After the introduction of euro cash, the share of foreign currency deposits began to erode in all CC-4, and this process has continued since. It dropped to levels below those observed prior to the boost in all CC-4 except for Turkey. This decline may have been supported by heightened confidence in the respective domestic currencies.

On the lending side, the share of foreign currency loans increased in 2002 in all CC-4, probably mainly as

Table 5a

Domestic Foreign Currency-Denominated Deposits

shares in % of total deposits of the respective sectors, 2004

	BG	HR	RO	TR
Share of foreign currency deposits of households and nonbank corporations [1]	47.1	74.2	41.2	50.0
of which:				
Share of foreign currency deposits of households [2]	*54.6*	*84.5*	*40.2*	*50.6*
Share of foreign currency deposits of nonbank corporations [1]	*34.8*	*46.9*	*63.5*	*47.4*

Source: National central banks.

[1] *Croatia: Before 2004 including deposits of nonresidents and deposits of the general government.*
[2] *Croatia: Before 2004 without nonprofit institutions.*

Table 5b

Domestic Foreign Currency-Denominated Loans

shares in % of total loans to the respective sectors, 2004

	BG	HR	RO[1]	TR
Share of foreign currency loans to households and nonbank corporations	48.2	9.6	60.8	22.4
of which:				
Share of foreign currency loans to households	*11.0*	*0.5*	*45.9*	*..*
Share of foreign currency loans to nonbank corporations	*65.3*	*20.2*	*66.6*	*..*

Source: National central banks.

[1] *Claims.*

Note: Data do not include loans indexed to foreign currencies, which are significant in Croatia.

a result of additional foreign currency funding through domestic deposits. Thereafter, the share of foreign currency loans in total loans increased significantly further during an ongoing domestic lending boom in Bulgaria, while it markedly fell in Turkey, where decreasing interest rate differentials vis-à-vis the euro and the U.S. dollar apparently played a determining role. The share of foreign currency loans also declined modestly in Croatia.

Banks' foreign currency lending to households and enterprises implies an indirect foreign exchange risk to banks in the CC-4, which constitutes a form of credit risk. Since in particular households and smaller enterprises may not be sufficiently hedged against adverse exchange rate fluctuations (either through natural hedges or by using financial market instruments), a large depreciation of the domestic currency could erode borrowers' ability to service their foreign currency loans and hence lead to loan losses. The situation may be accentuated by the fact that the nonbank corporate sector's foreign indebtedness (as a result of cross-border borrowing) has increased significantly over the past few years in Bulgaria, Croatia and Romania, increasing the exposure to exchange rate risk.

The shares of foreign currency-denominated or -indexed claims on and deposits of domestic nonbanks in total assets (liabilities) of commercial banks' balance sheets are indeed sizeable. At the same time, published data on banks' net overall (on- and off-balance sheet) foreign currency positions (including foreign currency-indexed positions and external positions) show small net positions for all four CC-4, including Romania and Turkey.[7] At the end of 2004, Croatian banks had a long open position of around 1% of total assets. As a result, they would have benefited from a depreciation of the domestic currency, which would have provided some compensation for the credit risk stemming from the potential deterioration of their credit portfolio as a result of the currency depreciation. Romanian and Turkish banks had nearly balanced positions (+0.1% and –0.1% of total assets, respectively), while Bulgarian banks had a small negative position of around 0.3% of total assets (excluding exposure to the euro, in accordance with central bank regulations). These net overall positions are in line with or even smaller than those observed for most NMS.

Third Feature: Improved Profitability and Still Sufficiently High Capital Adequacy Ratios Despite Credit Expansion to Riskier Asset Classes

The profitability of banks in the CC-4[8] has improved considerably over the past few years, boosted by bank restructuring measures and privatization. Return on equity (ROE) amounted to around 16% to 19% in nominal terms in all four countries in 2004. This compares to an unweighted

[7] *Unfortunately, however, in some countries it is virtually impossible to fully trace back the published data on banks' net overall foreign currency positions to detailed data on gross (domestic and foreign) foreign currency-denominated and -indexed positions as these are often published only partially.*

[8] *In order to achieve a high degree of comparability, the profitability indicators have been calculated by the authors using the same standard methodology across countries.*

Table 6

Main Income Statement Items

% of average assets, 2004

	BG	HR	RO	TR	NMS-8	Euro area
Operating income	7.3	4.3	10.0	9.1	4.7	2.3
of which: Net interest income	*4.9*	*3.0*	*4.9*	*6.2*	*2.9*	*1.2*
Net noninterest income	*2.3*	*1.3*	*5.1*	*2.9*	*1.8*	*1.1*
Operating costs	4.2	2.3	6.2	5.3	2.8	1.5
of which: Personnel costs	*1.6*	*1.2*	*2.6*	*1.7*	..	*0.9*
Net costs of loan loss provisioning	0.7	0.3	0.7	0.5	..	0.3
Return (after tax) on assets (ROA)	2.0	1.4	2.4	2.2	1.3	0.4
Return (after tax) on equity (ROE)	16.8	16.0	18.6	16.7	19.4	10.5
Cost-to-income ratio	58.3	54.3	61.6	57.7	60.4	63.7

Source: National central banks, BRSA, ECB.

average ROE of 19.4% in the NMS-8 and of 10.5% in the euro area. However, the picture is more heterogeneous if one takes into account inflation developments. On the basis of return on equity deflated by CPI, Croatian banks performed best in 2004 (13.6%), while Romanian banks (6.0%) stood at the other end of the spectrum. The corresponding values for the NMS-8 and the euro area were 14.7% and 8.3%, respectively.

Despite a general decline in interest rate margins over the past couple of years, net interest income as a percentage of average assets has declined only modestly (Croatia), remained stable (Bulgaria) or even increased (Romania).[9] In 2004, net interest income ranged roughly between 3.0% and 6.2% of average assets in the CC-4 and was thus higher than in the new Member States and exceeded the euro area figure by far. To some extent this reflects higher risks inherent in the lending business in the CC-4, which is also mirrored in higher net costs of loan provisioning, but it predominantly translates into better profitability ratios.

Banks' net noninterest income has declined as a percentage of average assets over the past few years, in particular in Romania, Bulgaria and Turkey. Romanian banks generally had a higher ratio of net noninterest income, which seems to stem from higher earnings from securities and foreign exchange transactions. Despite this decline, in 2004 net noninterest income in the CC-4, with the exception of Croatia, was still higher than in the NMS-8, and in all CC-4 it was (mostly considerably) higher than in the euro area.

Operating income as a percentage of average assets in the CC-4, with the exception of Croatia, was significantly higher than in the new Member States, and in all CC-4 it was clearly higher than in the euro area in 2004. However, operating income as a percentage of assets has declined over the past few years in all CC-4, and this trend may continue in the future.

[9] *The data series is too short for Turkey (available since 2001) to draw far-reaching conclusions. Turkish banks achieved a net interest income of 11% of average assets in 2001, and the value fluctuated between 4.5% and 6.4% in 2002 to 2004.*

Reflecting the impact of restructuring and consolidation measures, banks in the CC-4 have succeeded in increasing their cost efficiency over the past few years. Nevertheless, operating costs as a percentage of average assets continue to be higher in the CC-4, with the exception of Croatia, than in the NMS-8, and all CC-4 countries have higher cost-to-asset ratios than banks in the euro area. Although cost-to-income ratios in the CC-4, with the exception of Romania, were lower than in the NMS-8 and in all CC-4 were lower than in the euro area in 2004, this indicator seems to be subject to more volatility over time.

The cleaning-up of banks' balance sheets during the restructuring process led to high provisioning costs around the period of financial distress in the CC-4. Since then, however, annual provisioning costs as a percentage of total assets have gradually decreased, in parallel with the improvement in the quality of banks' loan portfolios. Nevertheless, the net costs of provisioning in 2004 were modestly above the levels seen in the euro area, especially in Bulgaria and Romania. Banks in these two countries experienced an increase in their provisioning costs in 2003 and 2004. In both countries this may be connected to the rapid expansion of domestic lending activity and precautionary action. In addition, the introduction of tighter asset classification rules also had a tangible impact, necessitating additional provisioning.

Major prudential indicators of banks in the CC-4, such as (1) asset quality as measured by nonperforming loan (NPL) ratios, (2) capital adequacy ratios and (3) liquidity indicators like claims-to-deposits ratios or the maturity structure on the asset and the liability side, show a mixed but overall relatively satisfactory picture.

The quality of banks' portfolios, measured by NPL ratios, in the CC-4 has improved over the past few years.[10] This process has been supported not only by the removal of NPLs from the balance sheets during the bank restructuring process but also by improved management skills, credit processes and risk management capacities. At the end of 2004, the share of nonperforming assets in the CC-4 varied between 3.6% in Bulgaria and 8.1% in Romania. The comparative figure for the euro area was 3.1% in 2004 and for the ten new Member States of the EU (NMS-10) 10.7% in 2003.[11] At the same time, the structure of NPLs has also improved. While the two worst categories, doubtful and loss assets, had a share of around 73% of total NPLs in Bulgaria, Croatia and Romania in 2000 (and in previous years an even higher share in Bulgaria and Romania), the share decreased to 57% in Bulgaria, to 65% in Croatia and to 35% in Romania by the end of 2004. With regard to provisioning, in 2004 banks in the CC-4, with the exception of Romania, were significantly better provisioned than banks in the NMS-10

[10] *In general, cross-country and cross-period comparisons should be used very cautiously, given differences in the coverage of the indicator (in terms of instruments and clients) and in classification rules among different countries and changes in national legislation over time (mostly leading to tighter and more comprehensive classification rules; see e.g. Romania in early 2003).*

[11] *Indicators of NPLs and provisions for the NMS are taken from the ECB's "EU Banking Sector Stability Report" (November 2004), which refers to a weighted average NMS-10 aggregate.*

Table 7

Nonperforming Assets and the Stock of Provisions, end-2004

	BG	HR	RO	TR	NMS-10[1]	Euro area
Nonperforming assets in %[2]	3.6	4.5	8.1	6.2	10.7	3.1
of which: Share of doubtful and loss assets in total NPL	*56.9*	*65.1*	*35.3*	..	..	..
Provisions in %[2]	3.4	3.5	1.3	5.5	4.5	2.2
Provisions in % of NPL	95.5	78.6	15.9	88.1	42.1	71.8
Uncovered NPL in %[2]	0.2	1.0	6.8	0.7	6.2	0.9

Source: National central banks, BRSA, ECB.

[1] *2003.*

[2] *As a percentage of assets under classification.*

and even moderately better provisioned than banks in the euro area. However, this comparison does not take into account possible differences in the structure of NPLs and differences in provisioning requirements across countries (the provisions-to-NPL ratio tends to be higher, the worse the asset quality is, given higher provisioning requirements for lower asset classes).

Banks in the CC-4 seem to have a sufficient capital buffer compared with the risks they have undertaken. In Bulgaria, Croatia and Romania, capital adequacy ratios ranged between 14% and 19% at the end of 2004, while Turkish banks had a capital adequacy ratio of 26%, that is in all cases the ratios were well above national requirements of 8% to 12%. High capital adequacy ratios in part reflect a buffer for future business expansion and an increase in the volume of risky assets. They also offer some cushion for a potential deterioration of banks' asset quality or other shocks on bank capital in the future. Nevertheless, the ratios are trending downwards in the longer run, especially in Bulgaria, Croatia and Romania. This has been attributable to a greater expansion of risk-weighted assets than of the capital base. This process needs close monitoring, especially during periods of rapid credit expansion, when banks face heightened credit and indirect foreign exchange risks. At the same time, declining capital adequacy ratios – as long as they do not fall below critical levels – can also be interpreted as an indication of a more efficient use of capital by CC-4 banks.

Data about the maturity structure on banks' asset and liability sides are unfortunately rather scarce for the CC-4. Deposits of households and enterprises in the CC-4 continue to be dominated by short-term deposits. For example, deposits with a maturity of up to three months (including sight deposits) account for around 80% of total deposits of households and nonbank corporations in Bulgaria and Turkey. At the same time, loans to households and corporations tend to have a longer maturity: loans with a maturity of up to one year accounted for around 40% of total loans in Bulgaria, Croatia and Romania in 2004. This mismatch between the maturity structure of deposits and loans may represent some risk to banking sector liquidity. At the same time, however, given the fact that the share of longer-term loans and deposits with variable interest rates is considerable in the CC-4 (and probably significantly higher than in the euro area), the in-

Table 8

Capital Adequacy Ratio and the Maturity Structure of Deposits and Loans, end-2004

	BG	HR	RO	TR	NMS-8	Euro area
Capital adequacy ratio	16,6	14,1	18,8	26,2	12,8	11,8
Deposits with a maturity of up to 3 months[1]	78,6	..	..	83,2	..	..
Loans with a maturity of up to 1 year[1]	38,8	37,7	44,1	..	..	21,4

Source: National central banks, BRSA, ECB.

[1] *Households and enterprises.*

terest rate risk of banks in these countries seems to be still limited. The shifting of interest rate risk to households and enterprises, however, may become a source of credit risk in the future, if rising interest rates were to adversely impact on borrowers' debt servicing capacity.

Summary and Conclusions

Following financial distress in the late 1990s and early 2000s, the banking sectors in the CC-4 have gone through a significant restructuring process over the past few years. As a result of this process, banks in Bulgaria, Croatia and Romania have been almost fully privatized, with the largest part having been sold to foreign strategic investors. Lending to the private sector has developed rapidly during the past few years. As a result, claims on households and nonbank corporations have now a larger share in total banking sector assets in Bulgaria, Croatia and Romania than in the euro area. Banks in the CC-4 predominantly rely on domestic deposits and equity for financing, to a much greater degree than banks in the euro area. However, over the past few years banks financed strong domestic credit expansion to a substantial extent by incurring foreign liabilities. Foreign currencies play a significant role in the financial system of the CC-4, both on the asset and the liability side. Bank profitability in the CC-4 is on average higher than in the new EU Member States or in the euro area. Higher profitability stems from significantly higher operating income, although this advantage is partially offset by higher operating costs. Over the past few years, improved cost efficiency has helped to counteract the gradual decline in operating income and to maintain high profitability ratios. Despite improvements in recent years, the asset quality of banks in the CC-4, measured by the share of nonperforming assets, is poorer than in the euro area. Nevertheless, banks seem to be sufficiently provisioned. Moreover, the capital adequacy ratios are still comparatively high despite the recent domestic credit expansion to riskier debtors.

Notwithstanding this broadly satisfactory picture, banking supervisory authorities face considerable challenges in the CC-4. Rapid credit expansion to the private sector needs close monitoring as it may have adverse effects on financial and macroeconomic stability. To increase their market shares, banks may be tempted to shift lending increasingly to more risky clients and financial products, which would – in parallel – require an adaptation of their risk management capacities. In this respect, special attention should be paid to foreign currency lending. While commercial banks are generally well-protected against direct foreign currency

risk (according to summarizing information on the open foreign exchange position published by the respective central banks), they face considerable credit risk stemming from indirect foreign exchange risk, as many of their customers, especially households and small and medium-sized enterprises, are likely insufficiently hedged against adverse exchange rate movements. Also, the integration of the CC-4 into the global financial system bears financial stability implications, as – inter alia – financial openness makes it easier for distress in one country to infect other countries. The international aspect of the banking business also highlights the necessity of close cooperation between national supervisory authorities. Central banks in the CC-4 are well aware of these risks. In Bulgaria, Croatia and Romania, they have already moved to rein in credit expansion to preserve macroeconomic stability and to prevent hard-won financial stability from being endangered. Financial regulation, supervisory structures and supervisory practices have also been upgraded over the past few years and are regularly monitored by the IMF. Involvement into the EU financial supervisory framework in the run-up to and upon EU accession should lend further support to financial stability surveillance and thus financial stability.

Cut-off date: 13 February 2006.

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Systemic Risk Monitor: A Model for Systemic Risk Analysis and Stress Testing of Banking Systems

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In 2002 the Oesterreichische Nationalbank (OeNB) launched in parallel several projects to develop modern tools for systemic financial stability analysis, off-site banking supervision and supervisory data analysis. In these projects the OeNB's expertise in financial analysis and research was combined with expertise from the Austrian Financial Market Authority (FMA) and from academia. Systemic Risk Monitor (SRM) is part of this effort. SRM is a model to analyze banking supervision data and data from the Major Loans Register collected at the OeNB in an integrated quantitative risk management framework to assess systemic risk in the Austrian banking system at a quarterly frequency. SRM is also used to perform regular stress testing exercises. This paper gives an overview of the general ideas used by SRM and shows some of its applications to a recent Austrian dataset.

1 Introduction

The primary mandate of central banks is to achieve and maintain price stability. Safeguarding and maintaining financial stability has always been regarded as a necessary prerequisite for this task. Institutionally, this combination of tasks was until very recently achieved by putting the central bank in charge of the oversight of individual financial institutions. Following the lead of the U.K., many countries, including Austria, have transferred responsibility for the oversight of individual financial institutions to newly established financial supervisory authorities, while the central banks kept the mandate to safeguard and maintain systemic financial stability. These institutional developments have forced central banks to arrive at answers to the new question what it means to maintain systemic financial stability without having ultimate responsibility for the oversight of individual financial institutions.

In 2002 the Oesterreichische Nationalbank (OeNB) launched in parallel several projects that aim to develop modern tools for systemic financial stability analysis and off-site banking supervision. In these projects the OeNB's expertise in financial analysis and research was combined with expertise from the University of Vienna, the University of Applied Sciences Vorarlberg, the Vienna University of Technology and the Austrian Financial Market Authority (FMA; see OeNB and FMA, 2005).

Systemic Risk Monitor (SRM) is part of this effort. SRM is a model to analyze banking supervision data and data from the Major Loans Register collected at the OeNB in an integrated quantitative risk management framework. The purpose of SRM is to assess systemic risk in the Austrian banking system at a quarterly frequency. SRM is also used to perform regular stress testing exercises.

1.1 An overview of the model

The basic idea of the SRM model is to combine standard techniques from modern quantitative market and credit risk management with a network model of the banking system. In contrast to standard risk management models, SRM makes the step from the individual institution perspective to the system level. This step is the major challenge to be met by any systemic risk model. Only at the system level the two major reasons for simultaneous problems become

visible: correlated exposures and financial interlinkages. The risk of simultaneous difficulties of institutions and the financial losses incurred in such events is the key focus of systemic financial stability analysis.

The model intentionally does not rely on a sophisticated theory of economic behavior. The consequences from a given liability and asset structure being exposed to realistic shock scenarios are uncovered in terms of problems of institutions. The model is designed to exploit existing data sources. Although these sources are not ideal, our approach shows that with the available data we can start to consider financial stability at the system level and provide quantitative judgements of systemic financial stability and systemic risk.

1.2 Related research

SRM can draw on a rich modern literature dealing with risk management and risk monitoring problems for banks or insurance companies (see McNeil et al., 2005, for an overview). The change of perspective from the individual institution level to the system level is the main methodological innovation of SRM. It is this system perspective, where SRM had to explore new territory. SRM mainly builds on research by Elsinger et al. (2006b) and Boss (2002). This paper gives an overview of the general ideas used by SRM and shows some of its applications to a recent Austrian dataset. Readers interested in technical details are referred to the model documentation, which can be received from the authors upon request (see Boss et al., 2006).

2 The SRM Model

The basic structure of the SRM model can be best described at an intuitive level by a simple picture showing the individual model components as well as their interrelation. Chart 1 displays the modular construction of SRM.

As a starting point it is perhaps best to begin with the middle layer of Chart 1, showing three boxes: *Market risk losses, Noninterbank credit risk losses and Interbank network model*.

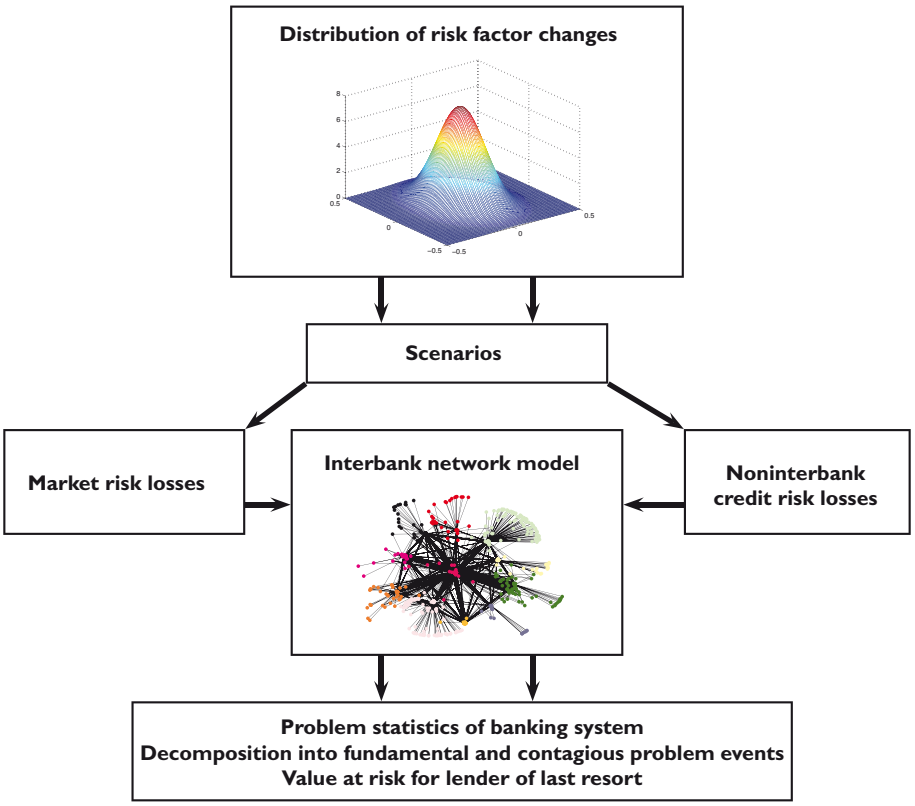
SRM describes the Austrian banking system at the end of each quarter as a system of portfolios. Each portfolio in the system belongs to one bank and typically consists of collections of securities such as stocks and bonds across domestic and foreign markets (the *Market risk losses* box), a collection of corporate loans and loans to households (the *Noninterbank credit risk losses* box) as well as interbank positions (the *Interbank network model* box).

The value of each portfolio is observed from the data at the end of each quarter. The future portfolio values one quarter later (approximately 60 trading days) are random variables. Thus the difference between the portfolio values at the observation date and the portfolio values a quarter from the observation date, i.e. the gains and losses in the banking system, is subject to uncertainty. It is the distribution of these gains and losses we are interested in.

We adopt the usual risk management practice of thinking of future portfolio values as a function of time as well as of risk factors. Risk factors are market prices that determine portfolio values, such as stock market indices, interest rates and foreign exchange rates, as well as macroeconomic variables that have an impact on the quality of loan portfolios. To analyze the distribution of portfolio gains and losses in the banking system, we have to specify the distribu-

Chart 1

Basic Structure of SRM[1]



[1] *Chart 1 shows the basic structure of the SRM model. Banks' noninterbank portfolios are exposed to shocks from a risk factor change distribution of market and credit risk factors. The value of interbank positions is determined endogenously by the network model and a clearing mechanism that makes all financial claims consistent ex post after shocks have been realized. The clearing of the interbank market determines the solvency of other banks and defines endogenous probabilities of problem events as well as the respective recovery rates. The output consists of statistics on problem events, a decomposition into fundamental and contagious problem events and an estimate of the amounts of liquidity a lender of last resort has to stand ready to inject into the system.*

tion of *risk factor changes*. All individual modeling steps as well as the practical challenges that arise in SRM have to do with the details of how we describe the functional relation between risk factor changes and portfolio losses.

The top box of Chart 1 symbolizes a multivariate risk factor change distribution. In SRM such a distribution is estimated every quarter based on past observations of market price changes and changes of macroeconomic variables that have an impact on problem event probabilities.

The modeling strategy treats the marginal risk factor distributions and the dependency structure separately. While marginal distributions are chosen according to statistical tests that select for each risk factor a model which gives the best out-of-sample density forecast of changes in each risk factor over a three-month horizon, dependency is modeled by fitting a grouped t-copula to the data. Together, the marginal distributions and the copula characterize the multivariate risk factor change distribution.

For the simulation of scenarios, vectors of risk factor changes are drawn at random from this distribution. Each drawing of risk factor changes from the multivariate distri-

bution characterizes a scenario, symbolized by the box *Scenarios*. Scenarios are then translated into profits and losses at the system level in two steps. In a first step each scenario is analyzed with respect to its impact on the value of market and noninterbank credit positions.

In a second step, these positions are combined with the network model. The network model basically checks whether given the gains and losses from the portfolio positions and given the capital of the banks, they are able to fulfill the financial obligations resulting from their interbank relations. Thus the network model combines all financial positions and bank capital in an overall system of bank net values. The network model does this by applying a clearing procedure that provides the final system of bank net values for each scenario. Simulating many scenarios, we get a distribution of problem events and gains and losses that allows us to make probability assignments for problem events over a three-month horizon.

The market risk losses and the losses from noninterbank credit risk are generated by two submodels that translate scenarios of risk factor changes into the respective scenario losses: a market and a credit risk model.

For marketable securities the situation is fairly simple. Supervisory data allow us a fairly coarse reconstruction of positions of securities at market values that are held on the bank balance sheet. The picture is coarse because individual stocks are lumped into Austrian and foreign, and interest rate- and currency-sensitive instruments are mapped into broad maturity and currency buckets. Consider, for instance, a simple stock portfolio consisting of Austrian and foreign stocks. Risk factor changes are then the logarithmic changes in the Austrian and a foreign stock price index. To calculate gains or losses from the stock portfolios, we can use a linearized approximation of the loss function. This amounts to simply multiplying the position values with the risk factor changes to get the portfolio gains and losses. For interest rate- and currency-sensitive positions, we can equally arrive at gains and losses by using linearized losses and the relevant risk factor changes, which are changes in different exchange rates or interest rate changes for different maturities and different currencies.

For loans to nonbanks the situation is more complicated because the dependence between loan losses and risk factors is more indirect. We do not have a simple analogue to market returns. Defaults of loans in certain industry sectors – the units into which we break down loans in SRM – depend mainly on risk factors describing the aggregate state of the economy. Due to the discrete nature of the default events (either an obligor defaults or not), linearized losses are of little importance for the analysis of credit risk. Therefore SRM uses a credit risk model to calculate losses from loan portfolios. Our credit risk model is based on Credit Risk+ (see Credit Suisse, 1997) and has been adapted to explicitly take into account the dependency of default rates on the state of the macroeconomy. The basic idea is that the default probability of a loan in a particular industry sector, for instance construction, depends on a set of macroeconomic variables according to a function the parameters of which are statistically estimated from historical data. Given a realiza-

tion of macroeconomic variables and the implied probability of default for different industry sectors, loan defaults are assumed to be conditionally independent. Under this assumption a loan loss distribution can be derived for each bank for each value of macroeconomic risk factor changes. Loan losses are then calculated by independent draws from these loan loss distributions.

From this discussion we see a fundamental modeling choice taken in SRM: Following the literature on risk management of individual institutions, the analysis is undertaken for a given set of portfolios observed at the observation time. The value of the portfolio is assumed to be completely determined by the risk factors and no behavioral considerations are taken into account. The longer the time horizon under consideration, the more problematic is such an assumption. In particular, in our framework, where we aim at an integrated analysis of portfolio positions which can be easily changed with other positions that are much more difficult to change, even at a 60-trading day horizon, this assumption is debatable for some of the portfolio positions. We ask the following question: given the portfolio positions we observe today in the system and given the future realizations of risk factors, how would these changes influence portfolio values ceteris paribus? This allows a statement about the risk inherent in the current banking system.

2.1 Using SRM for Financial Stability Analysis

We use four main risk concepts to look at the simulation output:

1) analysis of fundamental and contagious problem events;
2) analysis of probability distribution of problem events according to rating classes;
3) analysis of aggregate loss distributions;
4) quantification of resources that might have to be mobilized by a lender of last resort.

Since the risk of bank problems is a major concern for a central bank, we put a particular focus on probabilities of problem events. The network model allows us to distinguish problem events that result directly from changes in risk factors from events that result indirectly from contagion through interbank relations. We call problem events fundamental if they result directly from risk factor movements and we call them contagious if they are a consequence of interbank relations. Apart from analyzing the number of fundamental and contagious problem events, we look at the probability distribution of problem events according to the OeNB's rating classes. We look at the aggregate loss distribution both for all risk categories taken together and for certain subcomponents such as market risk, credit risk and contagion risk. Finally we make an attempt to quantify the resources a lender of last resort might have to mobilize to prevent problems in the banking system.

2.2 Using SRM for Stress Testing

One advantage of a quantitative model is that it allows the consideration of hypothetical situations. In the context of systemic risk assessment, one kind of thought experiment is of particular importance. Usually it is of interest to know how the risk measures for the banking system will behave when there are extreme risk factor changes. Such thought experiments are known as stress tests. Sys-

temic risk monitor provides a coherent framework to consistently conduct such stress testing exercises.

In a stress test, one or more risk factors of interest are constrained to take extreme values, like a certain drop in GDP or a hike in interest rates. Since we have a complete model of the multivariate risk factor distribution we can then perform a model simulation under the constraint that certain risk factors are at their stressed values. The risk measures of the model can then be studied relative to the baseline simulation based on the unconditional risk factor change distribution calibrated to historical data. The main advantage of this approach is its consistency with the dependency structure of the risk factors and therefore its consistency with the quantitative framework. Such an approach is advocated by Elsinger, Lehar and Summer (2006a) or by Bonti, Kalkbrener, Lotz and Stahl (2005).

3 Data

The main sources of data used by SRM are bank balance sheet and supervisory data from the monthly reports to the OeNB (known by their German acronym MAUS) and the OeNB's Major Loans Register (Großkreditevidenz, GKE). In addition we use default frequency data in certain industry groups from the Austrian business information provider and debt collector Kreditschutzverband (KSV), financial market price data from Bloomberg and Datastream and macroeconomic time series from the OeNB, the OECD and the IMF International Financial Statistics.

Banks in Austria file monthly reports on their business activities to the central bank. In addition to balance sheet data, the so-called MAUS reports contain a fairly extensive assortment of other data that are required for supervisory purposes. They include figures on capital adequacy, interest rate sensitivity of loans and deposits with respect to various maturity buckets and currencies, and foreign exchange exposures with respect to different currencies.

To estimate shocks on bank capital stemming from market risk, we include positions in foreign currency, equity, and interest rate-sensitive instruments from MAUS. For each bank, we collect foreign exchange exposures in USD, JPY, GBP and CHF only, as no bank in our sample reports had open positions of more than 1% of total assets in any other currency at the observation date. We collect exposures to foreign and domestic stocks, which are equal to the market value of the net position held in these categories. For the exposure to interest rate risk, we use the interest rate risk statistics, which provide exposures of all interest-sensitive on- and off balance sheet assets and liabilities with respect to 13 maturity buckets for EUR, USD, JPY, GBP and CHF as well as a residual representing all other currencies. On the basis of this information we calculate the net positions in the available currencies – neglecting the residual – with respect to four different maturity buckets: up to 6 months, 6 months to 3 years, 3 to 7 years, more than 7 years. For the valuation of net positions in these maturity buckets, we use the 3-month, 1-year, 5-year and 10-year interest rates in the respective currencies.

To analyze credit risk we use, in addition to the data provided by MAUS, the Major Loans Register, which provides us with detailed information on banks' loan portfolios to nonbanks. This database contains

all loans exceeding a volume of EUR 350,000 on an obligor-by-obligor basis.

We assign the domestic loans to nonbanks to 13 industry sectors (basic industries, production, energy, construction, trading, tourism, transport, financial services, public services, other services, health, households, and a residual sector) based on the NACE classification of the debtors. Furthermore we add regional sectors (Western Europe, Central and Eastern Europe, North America, Latin America and the Caribbean, Middle East, Asia and Far East, Pacific, Africa, and a residual sector) for both foreign banks and nonbanks, which leaves us with a total of 18 nondomestic sectors. Since only loans above a threshold volume are reported to the GKE we assign domestic loans below this threshold to the domestic residual sector. This is done on the basis of a report that is part of MAUS and provides the number of loans to domestic nonbanks with respect to different volume buckets. No comparable statistics are available for nondomestic loans. However, one can assume that the largest part of cross-border lending exceeds the threshold of EUR 350,000 and hence we do not lose much information on smaller cross-border exposures.

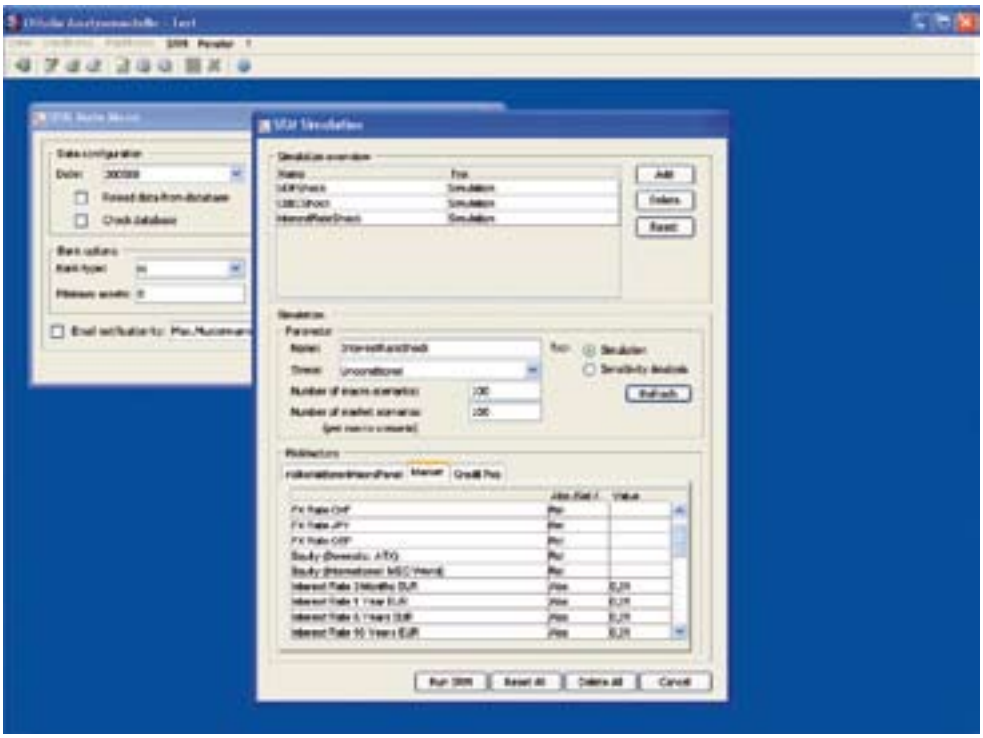
The riskiness of an individual loan to domestic customers is assumed to be characterized by two components: the rating which is assigned by the bank to the respective customer and the default frequency of the industry sector the customer belongs to. The bank's rating is reported to the GKE and is mapped at the OeNB onto a master scale, which allows assigning a probability of default to each loan. The default frequency data are from the Austrian business information provider and debt collector Kreditschutzverband (KSV). The KSV database provides us with time series of insolvencies and the total number of firms in most NACE branches at a quarterly frequency starting in 1969. This allows us to calculate a time series of historically observed default frequencies for our 13 industry sectors by dividing the number of insolvencies by the number of total firms for each industry sector and quarter. The time series of default frequencies is explained by macroeconomic risk factor changes, for which we use an econometric model. This estimated equation enables us to translate macroeconomic risk factor changes into probabilities of default for each industry branch. These default probabilities serve as input to the credit risk model. To construct insolvency statistics for the private and the residual sectors, where no reliable information on the number of insolvencies and sample sizes is available, we take averages from the data that are available. Default probabilities for the nondomestic sectors are calculated as averages of the default probabilities according to the ratings that are assigned by all banks to all customers within a given foreign sector.

4 Applications

The OeNB uses the SRM model mainly for two applications: systemic risk assessment and stress testing. Systemic risk assessment involves a simulation at the end of each quarter as soon as all new data are available. The output of this simulation is a risk report with a detailed account of our four risk measures. In the stress tests one or more risk factors of interest are deliberately set to an extreme value and the simulation is performed conditional on the assumption that

Chart 2

Screenshot of the SRM Interface



Source: OeNB.

these risk factors are at their hypothetical extreme realizations. The output of this simulation can then be compared with the baseline simulation.

To make SRM operational, it is implemented such that it can be accessed via an interface called from the analyst's desk. The interface is a Java client application which gives users the possibility to run certain predefined simulations (including a variety of regular stress tests) as well as to parameterize individual simulations. The level of parameterization covers the point in time for which the simulation is run, data included in the model, various alternative model components as well as their parameters. Additionally, stress tests can be defined for market and credit risk factors. The parameters chosen are stored at database level and written to configuration files, which are read by the application at runtime. The models themselves are implemented in Matlab script language, version 14.3, a programming language for technical computing, which provides object-oriented means to include various model components and store complex data sets. Although SRM functionality can be accessed through Matlab's standard user interface, in its end-user implementation the source code of SRM is compiled as C Code and called via the SRM interface. In either case output is written to Microsoft Excel files for further analysis, which are sent as an e-mail attachment to the analyst's desk by SRM after a simulation request has been finished. A screenshot of the interface is shown in Chart 2.

4.1 Regular Supervisory Data Analysis and Stress Tests

Systemic Risk Monitor will be used to perform regular analyses of supervisory data with respect to systemic risk problems. It will also be used as a stress testing tool. We will now illustrate output generated by SRM by looking at some examples based on a recent simulation for the last quarter of 2005. We present our results always for a regular simulation of the current economic situation together with two stress tests: Stress test number one simulates an unexpected drop in GDP. Stress test number two assumes a parallel upward shift in the euro yield curve.

4.2 Fundamental and Contagious Problem Events

The network model generates a multivariate distribution of bank's problem events across scenarios. We interpret the relative frequency of problem events as a probability.

Our method allows a decomposition of problem events into events resulting directly from shocks to the risk factors and those that are consequences of a domino effect. Bank problems may be driven by losses from market and credit risks (fundamental problem events). Bank problems may, however, also be initiated by contagion: as a consequence of other bank problems in the system (contagious problem events).

We can quantify these different cases and are able to give a decomposition into fundamental and contagious problem events. Table 1 summarizes the according probabilities both in the current situation as well as under both stress scenarios. These probabilities are grouped by the number of fundamental problem events. The column "fundamental" shows the percentage of scenarios where we encounter such events. The number of scenarios where in addition contagion occurs is reported in the "contagious" column.

Table 1 shows that in the base case simulation of the current situation we have no scenario with more than 5 fundamental problem events. None of the scenarios including up to 5 fundamental problem events shows contagion. This result is consistent with

Table 1

Probabilities of Fundamental and Contagious Problem Events[1]

%

	Current situation		GDP stress		Interest rate stress	
	Fundamental	Contagious	Fundamental	Contagious	Fundamental	Contagious
0	74.49	0.00	68.53	0.00	60.27	0.00
1 to 5	25.51	0.00	31.27	0.00	39.73	0.00
6 to 10	0.00	0.00	0.13	0.00	0.00	0.00
11 to 20	0.00	0.00	0.05	0.00	0.00	0.00
21 to 50	0.00	0.00	0.02	0.02	0.00	0.00
More than 51	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.00	0.00	100.00	0.02	100.00	0.00

Source: OeNB.

[1] *A fundamental problem event is due to the losses arising from exposures to market risk and nonbank credit risk, while a contagion is triggered by problems of another bank that cannot fulfill its promises in the interbank market. The probability of occurrence of fundamental problem events alone and concurrently with contagious problem events is observed. The time horizon is one quarter. The column Current situation shows the result for a simulation without stress. The Column GDP stress shows the case of a stress test with an unexpected drop in GDP. The column Interest rate stress shows the stress test with a parallel upward shift in the euro yield curve. Data are from December 2005.*

the findings in Elsinger, Lehar and Summer (2006a), who show that contagion is a rare event given a risk factor change distribution calibrated to historical data. In situations of stress, the picture changes: When we have a drop in GDP, up to 50 fundamental problem events can occur, and there can also be some contagion once we have 21 to 50 fundamental problem events. The stress test for an interest rate hike looks less spectacular. The simulations show no contagion effects but the number of scenarios where at least one and up to at most five problem events are expected to occur increases. The analyst using SRM has the opportunity to look deeper into the microstructure of these results and find out details about the institutions that are most severely hit under the stress scenario.

4.3 Probability Distribution of Problem Events According to the OeNB Master Scale

To get a more precise idea about the distribution of risk within the banking system, we map the probabilities of problem events into the OeNB master scale. This distribution of ratings, which is implied by our simulation, is shown in table 2.

Table 2 shows that in the base case simulation, about 95% of banks are expected to be in a triple or double A rating at the end of the first quarter of 2006. Under the assumptions of our two stress scenarios, the number of top-rated institutions decreases slightly. The biggest increase under stress can be observed in the lower rating classes.

4.4 Aggregate Loss Distributions

Turning from problem events to the distribution of losses over the next quarter, we can draw pictures of the losses due to credit risk, market risk and contagion risk as well as due to the combination of all of these risks. Contrary to familiar pictures from the practice of risk management, these distributions are derived from an integrated analysis of all portfolio positions and their change in value due to the entire distribution of risk factor changes. Thus rather than analyzing credit and market risk in isolation, these graphs give us the results of an integrated analysis.

Chart 3 shows four loss distributions. From the figures we can see – as in standard quantitative risk management – whether or not the system has enough capital to absorb extreme losses. Therefore loss distribution figures give a first overview of the shock absorption capacity of the system.

Table 2

Probability Distribution of Problem Events According to the OeNB Master Scale[1]

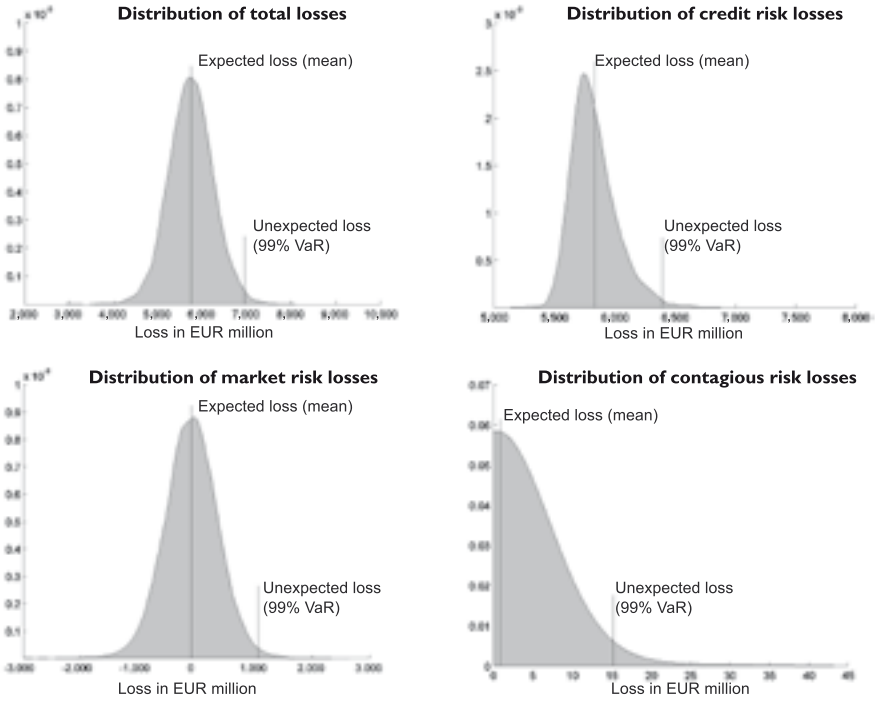
	Current situation			GDP stress		Interest rate stress	
OeNB Master Scale	S&P	abs.	rel.	abs.	rel.	abs.	rel.
1 to 2	AAA to AA	800	94.67%	779	92.19%	791	93.61%
3 to 4	A to BBB	23	2.73%	35	4.14%	22	2.61%
5 to 7	BB to CCC	22	5.22%	31	7.46%	31	6.05%

Source: OeNB.

[1] *Share of banks in OeNB rating classes. Data are from December 2005.*

Chart 3

Loss Distributions: Total, Market, Credit and Contagion Risk[1]



Source: OeNB.

[1] *Densities of loss distribution for the entire banking system. The densities are shown for the entire portfolio and separately for market and credit risk as well as for the losses due to contagion. Data are from December 2005.*

4.5 Changes in System-Wide VaR under Stress

We analyze the distribution of losses relative to regulatory capital, that is, we look at the distribution of losses as a percentage of regulatory capital and determine certain quantiles of this distribution. In our case we analyze the mean and the 99% quantile (or the 99% value at risk). We look at these measures for the different subcategories, total losses, market losses, credit losses and contagion losses. The results for the base case as well as for the stress scenarios are reported in table 3.

Table 3 shows that the Austrian banking system is very well capitalized. Even under the stress scenarios capital is sufficient to absorb potential losses that result from risk factor movements.

4.6 Value at Risk for the Lender of Last Resort

A relevant aspect of our model for the regulator is that it can be used to estimate the cost of crisis intervention. We estimate the funds that would have to be available to avoid contagion or even fundamental problem events for different confidence levels. A lender of last resort's cost of preventing problems in the banking system is calculated as the amount required to prevent problem events. A lender of last resort's cost of preventing contagion is calculated as the amount required to prevent all but fundamental problem events. Hence, interbank liabilities are not fully insured but just sufficiently to prevent contagion.

Since problem events occur rarely in the base scenario the amounts that must be available to prevent these

Table 3

Mean and 99% Quantile of Loss Distribution Relative to Regulatory Capital[1]

%

	Total[2]		Market		Credit[2]		Contagion	
Rel. VaR	Mean	99%	Mean	99%	Mean	99%	Mean	99%
Current situation	1.56	4.04	−0.18	2.11	1.74	2.82	0.00	0.03
GDP stress	1.68	7.42	−0.15	5.68	1.82	2.99	0.01	0.05
Interest rate stress	3.87	6.23	2.11	4.34	1.75	2.87	0.01	0.04

Source: OeNB.

[1] *Mean and 99% quantile of the distribution of losses relative to regulatory capital for total losses, losses from market risk, losses from credit risk and losses from contagion risk. This relative VaR is shown for the baseline simulation, for the case of a GDP stress test and for the case of the euro yield curve stress test. Data are from December 2005.*

[2] *In order to reflect the risk-bearing capacity with respect to different risk categories, the volume of specific and general provisions for credit risk losses as of end-2005 was substracted from the mean and the 99% quantile of the distribution of credit losses and total losses, respectively, before the respective numbers were divided by regulatory capital.*

Table 4

Costs of Avoiding Problem Events[1]

	Current situation		GDP stress		Interest rate stress	
Quantiles	95%	99%	95%	99%	95%	99%
Resources	29.16	31.58	29.16	44.71	1.24	21.4

Source: OeNB.

[1] *In the first bottom row we give estimates for the 95% and 99% percentiles of the avoidance cost distribution across scenarios. Amounts are in EUR million. Data are from December 2005.*

events are low. The analysis shows that for the quarter ending in December 2005 a lender of last resort can expect that even if crisis scenarios simulated by the model do actually occur, the amounts to be mobilized for crisis intervention will be small.

5 Conclusions

Systemic Risk Monitor implements a new framework for banking system risk assessment. The innovation is that SRM analyzes risk at the level of the entire banking system rather than at the level of an individual institution.

Conceptually, it is possible to take this perspective by carrying out a systematic analysis of the impact of a set of market and macroeconomic risk factors on banks in combination with a network model of mutual credit relations.

Whereas the modelling of noninterbank market and credit losses is rooted in standard quantitative risk management techniques, the combination with an interbank network model to arrive at total gains and losses in the banking system in SRM is new. Both the generalizations of standard individual risk management techniques and the simultaneous consideration of portfolio values across the system for given risk factor changes as well as the resolution of bilateral claims via a network clearing model focus on the main issues for an institution in charge of monitoring systemic financial stability: the probability of joint problems of institutions and their financial consequences. The system perspective uncovers exposures to aggregate risk that remain invisible for banking supervision that relies on the assess-

ment of single institutions only. We distinguish problems caused directly by a macroeconomic shock from those triggered by problems of other banks in the interbank market.

We hope that SRM will prove useful as a tool of macro-prudential risk analysis and that the framework will be of interest to other institutions with a mandate to safeguard and maintain systemic financial stability.

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Operational Risk and Contagion in the Austrian Large-Value Payment System ARTIS

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The objective of this paper is to quantify the contagion effect of an operational incident occurring at one ARTIS participant's site on the payment activity of the other ARTIS participants. We used model simulations to focus on operational problems occurring at one of the participants, not an operational failure of the ARTIS platform itself. The scenarios are designed according to an ex-ante estimation of potential risk concentrations based on actual data for the sample period (Schmitz et al., 2006). The main conclusion from the simulations was that the contagion effect in ARTIS is low on condition that the existing business continuity arrangements prove effective. However, this is a very restrictive assumption. Without the use of business continuity arrangements or if they turn out to be not fully effective, the contagion effect on the smooth functioning of the payment system was substantial in all three scenarios. In contrast to the most common approach described in the literature, we used actual (instead of simulated) liquidity data to study the contagion effect at the individual bank level as well as at the aggregate level of unsettled payments. A non-negligible number of banks failed to settle payments in all three scenarios. The paper also provides results on two features of large-value payment systems that have hitherto gone unstudied in the literature: the stop-sending rule and debit authorization.

JEL classification: E 50, G 10

1 Introduction

The objective of this paper is to quantify, by use of simulations, the degree to which an operational incident occurring at one of the ARTIS[2] participants affects the ability of the other participants to settle transactions. The Committee on Payment and Settlement Systems defines operational risk as "the risk that operational factors such as technical malfunctions or operational mistakes will cause or exacerbate credit or liquidity risk" (CPSS, 2001, p. 5). Our analysis focuses on operational problems occurring at one of the participants, not on an operational failure of the ARTIS platform itself. The simulations use real data for the sample period November 2004 (a typical month of ARTIS operation). The basic functionalities of ARTIS are mapped onto the simulation tool as closely as possible. The scenarios are designed according to an ex-ante estimation of potential risk concentration based on actual data for the sample period. Nevertheless, one must bear in mind that the reported results are the outcome of simulation experiments based on stylized operational failures rather than historical events. Actual operational incidents at ARTIS participants causing disruptions over several hours have occurred too rarely and they had too little impact on payment activity to provide a reliable data basis for the empirical assessment of operational risk.

[1] *The authors would like to thank the two referees as well as Morten Bech, Kurt Johnson, Jeffrey Arnold and Aaron Katz for very helpful comments on an earlier draft as well as Alfred Muigg, Siegfried Wagner, Silvia Schulz, Gerhard Lechner, Michael Strommer, Rudolf Habacht and Thomas Hampejs for providing data and valuable information. Our thanks also go to the Bank of Finland for making available the BoF-PSS2 and Matti Hellqvist for his support in adapting the simulator to our needs. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Oesterreichische Nationalbank (OeNB) and the Eurosystem.*

[2] *ARTIS (which stands for Austrian Real Time Interbank Settlement system) is the Austrian component of the Trans-European Automated Real-time Gross settlement Express Transfer system TARGET.*

This study was motivated by the OeNB's mandate to oversee ARTIS and its Austrian participants pursuant to Article 44a of the Federal Act on the Oesterreichische Nationalbank of 1984 (Nationalbankgesetz), which empowers the OeNB to perform payment systems oversight, and Article 82a of this Act, which defines the sanctions the OeNB can impose in the area of payment systems oversight.

The paper is structured as follows: section 2 very briefly outlines the main descriptive statistics of ARTIS. In section 3, we introduce the scenarios, present the results obtained and compare them across scenarios. Section 4 discusses the implications of the results and section 5 summarizes them.

2 Descriptive Statistics of ARTIS – Participation and Transactions

In November 2004 ARTIS comprised a total of 575 accounts, which were held by credit institutions, the Austrian federal government, non-financial corporations and by the OeNB itself.[3] A large number of these accounts were offset accounts (e.g. accounts of GSA, the OeNB's subsidiary in charge of cash services in Austria) and transfer accounts (e.g. those which link ARTIS to the other national TARGET components[4]). The other 234 were transaction accounts held by Austrian and international banks; they are the main focus of this analysis. Nevertheless, the simulations – and the aggregate data calculated on their basis – must include all accounts in order to ensure that the system is closed.

In November 2004 the average daily value of payments submitted in ARTIS totaled EUR 32.61 billion; with a standard deviation of EUR 7.7 billion, this value was, however, quite volatile. The total value of transactions settled in the period under review came to EUR 717.39 billion, which equals about three times nominal GDP in 2004. Most daily values were within the range of the mean plus/minus one standard deviation with three notable exceptions: On November 1 (public holiday in Austria) as well as on November 11 and 25 (U.S. bank holidays), the daily transaction values were significantly below the mean.

3 Simulations

What does the simulation data reveal about the contagion risk within the system with respect to an operational failure at one of the participants? We can distinguish two channels via which operational incidents at one of the participants can have contagious effects on other participants: the payment concentration channel and

[3] *For more detailed descriptive statistics of ARTIS, please refer to Schmitz et al. (2006).*

[4] *Transfer accounts are ARTIS accounts of other ESCB central banks held at the OeNB. It is via them that all transactions with the respective country and Austria are routed. If e.g. an operational problem occurred at the Deutsche Bundesbank, it would not be able to forward the payments of German banks accumulating on the Austrian transfer account at RTGSplus to ARTIS. Some of the transfer accounts are very active owing to the large volume of foreign trade as well as the large volume of capital market and money market transactions with the respective countries. Transfer accounts do neither hold beginning-of-day balances nor collateral, as they are operated by ESCB central banks. At the end of the trading day all bilateral net positions are consolidated into single net positions for each central bank vis-à-vis the ECB (netting by novation).*

the liquidity concentration channel.[5] While the former focuses on the number of payments a participant is involved in as sender or receiver, the latter concentrates on the participant's share of liquidity (beginning-of-day balances plus collateral[6]) in total liquidity at the beginning of the day.

To quantify these two risks and their adverse effects, we conducted a large number of simulations based on three different scenarios for all transaction days in November 2004, using the Bank of Finland's simulation tool BoF-PSS2. This payment system simulator recalculates the transactions of each day by adding incoming payments to and subtracting outgoing payments from the participants' respective accounts. As transactions in the input data set come with time-stamps, the simulator recalculates the balances of all participants' accounts throughout the day depending on the institutional features of the system (e.g. settlement algorithm, queue release mechanism). We included many of these features directly via the parameterization of the BoF-PSS2. However, some of the system's institutional features could not be accounted for in the simulator and had to be mapped into the input data set. In addition, it is not possible to take into account behavioral reactions of system participants. Consequently, they had to be determined exogenously and mapped into the input data set. Nevertheless, this tool is widely used to determine operational risk – Bedford et al. (2004), for example, show that the contagion effect of operational shocks in the U.K.'s system CHAPS Sterling is quite low. While most studies in this field are based on simulated aggregate liquidity levels, our study uses actual liquidity data, analyzing the impact of operational risk on the system as a whole as well as on individual banks.

3.1 Scenarios

The scenario design was based on an analysis of actual payment flows in ARTIS. The objective of the simulations is to estimate the contagion effect of an operational incident at one (or several) of the system's participants on the liquidity of the other participants and the functioning of the system as a whole. We designed the scenarios in the following four steps.

First, we defined the impact of an operational failure: It is the incapacitation of the affected participant to process outgoing payments, i.e. the inability to submit transactions.[7]

Second, we selected the node(s) of the network of payment flows to be affected by the operational failure. We chose the most active nodes in the network in terms of liquidity (liquidity concentration channel), number and value of payments submitted and received (payment concentration channel) and Herfindahl index of

[5] *An operational incident at a participant who processes transactions with many other participants is expected to have a larger contagious impact, as it is likely to lead to a larger withdrawal of liquidity from the system. For the same reason, an operational incident at a participant who holds a large share of aggregate liquidity is likely to have a large contagious impact. See Bedford et al. (2004).*

[6] *Strictly speaking, there is a difference between collateral and liquidity; the former must be liquidized by applying for intraday credit. However, the pecuniary and non-pecuniary costs to do so are negligible. Therefore, we regard collateral (rather than actual intraday credit) as the relevant constraint for participants to settle payments.*

[7] *In this context, we assumed that the resulting illiquidity of the affected participant is not interpreted as potential insolvency by the other participants of the payment system and the financial system at large.*

concentration of payment flows (based on the number and value of payments received and submitted).[8]

Third, we specified the duration of the operational failure, that is, for how many hours the affected participant was incapacitated by the incident. We conducted the simulations on the assumption of a one-day failure[9] to submit payments. Scenario design was guided by the principle that the shocks to the system should be exceptional but still plausible. ARTIS also provides for business continuity arrangements: in the case of operational failures, ARTIS participants can submit payments by phone, fax, physical messenger services or eKonto,[10] on condition that their internal systems remain fully functional.[11] As these methods to submit payments are more costly, they are only employed for critical and/or large-value payments. In order to assess the impact of such backup facilities, we reran the simulations under the assumption that backup facilities were employed before the end of the business day, i.e. after ten hours of operational failure. The reruns are based on the (very restrictive) assumption that even very large numbers of payments can be processed with these methods in a timely manner, i.e. before the end of the business day, and that the affected bank's internal systems are fully functional.[12]

Forth, since the simulator cannot account for the reactions of other system participants or the system operator to the operational incident, two types of behavioral reactions must be included exogenously. (1) Other participants may want to stop submitting payments to the affected participant. When an operational problem occurs at a central bank's transfer account, a stop-sending rule applies in TARGET. This means that no further payments are transferred to the affected transfer account. However, when an operational problem occurs at a bank, no stop-sending rule is applied in ARTIS; the other participants usually continue to submit payments to the affected participants, even if the latter cannot submit payments themselves for many hours. This is a restrictive assumption, but it is well supported by anecdotal evidence supplied by ARTIS operators. According to them, banks explicitly prefer to submit payments to "stricken" banks, because they want to fulfill their obligations with respect to these banks in a timely manner irrespective of the latters' operational problems. We are not aware of any evidence suggesting that banks impose bilateral sending limits. Our scenarios were designed in line with this assumption; the simulations are thus limited to operational incidents with a duration of up to one day – in the case of a longer operational failure, the other participants are more likely to discontinue submitting payments to the participants with operational problems. (2) Participants

[8] *For the underlying data on the network structure in ARTIS, see Schmitz et al. (2006).*

[9] *See also Bedford et al. (2004).*

[10] *This is an alternative access mode to the ARTIS operating desk that is available to some but not all participants, in which payments are submitted manually and are further processed manually by the ARTIS operating desk.*

[11] *Otherwise, the affected participants would have no access to the information on their respective payment obligations.*

[12] *A delayed closing is (in principle) possible with the ECB's approval.*

can react to possible operational incidents by increasing available collateral. Anecdotal evidence suggests that participants already hold large shares of their assets that qualify as collateral on accounts at the OeNB. After all, depositing eligible assets with the OeNB is no more costly for system participants than depositing them with the Austrian central securities depository; doing so can be even cheaper than depositing international assets with the respective foreign central securities depository. By contrast, providing additional eligible collateral is likely to involve portfolio readjustments, thus possibly incurring greater costs. Therefore, we assumed that system participants would not increase collateral for a one-day operational incident, which again limits the simulations to operational failures with a duration of up to one day.

Finally, we defined three scenarios with the highest expected impact and the highest expected contagion effects in accordance with the parameters defined in step 2: In scenario 1 the most active transfer account cannot submit payments to the system, while in scenario 2 the most active bank is affected by the same problem, and in scenario 3 the three most active banks simultaneously cannot submit payments to the system owing to operational problems (e.g. owing to a breakdown of the communications infrastructure). In all three scenarios we assumed that the operational incident would last for one day or ten hours, respectively, in accordance with step 3 of the scenario design procedure. Furthermore, we assumed that the other participants would continue to submit payments to the affected participants with the exception of scenario 1, in which payments to the affected participant could still be submitted but not sent (stop-sending rule in accordance with the basic functionalities of ARTIS/TARGET). The simulations are based on actual collateral data for November 2004, which are interpreted as binding liquidity constraints for the banks.

3.2 Scenario 1 – Failure at the Top Transfer Account

In scenario 1, the national TARGET operator in charge of the most active transfer account is affected by an operational incident at 07:15 a.m. It cannot submit or settle payments until the end of the business day at 06:00 p.m. In response to the operational incident, a stop-sending status is declared at 08:00 a.m. in line with ARTIS/TARGET business continuity arrangements.[13]

3.2.1 Impact on Aggregate Liquidity and on the Smooth Functioning of the Payment System

In scenario 1, aggregate liquidity is equal to actual aggregate liquidity at the beginning of the day, as the transfer account holds neither beginning-of-day balance nor collateral. Consequently, the operational problems at this account do not cause a liquidity drain (i.e. they do not reduce aggregate liquidity owing to the fact that the affected participant's liquidity re-

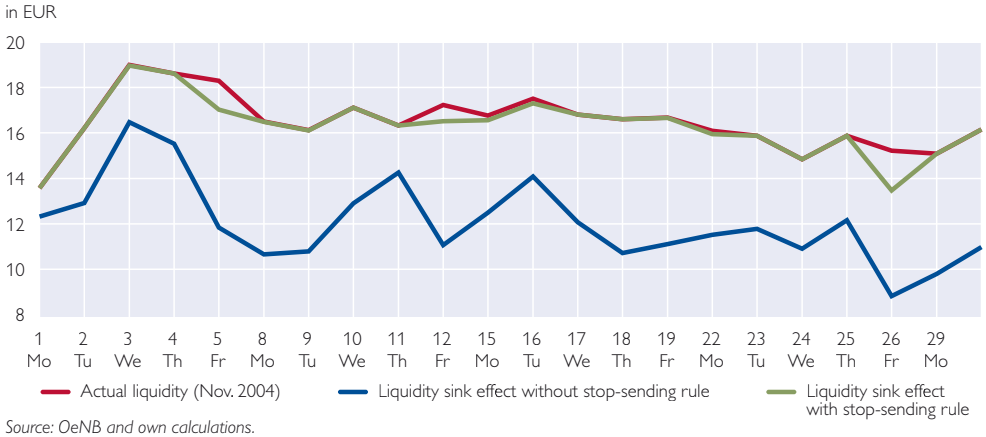
[13] *After about 30 minutes, the national TARGET operators exchange information on the operational incident at the affected central bank in a conference call and decide whether to apply the stop-sending status. It is therefore sensible to assume that it takes about 45 minutes in total until the stop-sending rule is actually applied.*

serves are not available for circulation in the system). Instead, the account's central position in the network structure of payment flows in ARTIS can lead to a "liquidity sink" effect (also referred to as liquidity trap). It denotes a reduction of aggregate liquidity available for circulation in the system that occurs when liquidity is transferred to the stricken account and discontinues circulating as a result of the account's operational problems. The higher the value transferred to the stricken account, the higher the liquidity sink effect is. The stop-sending rule was designed to mitigate this effect. As a result, available aggregate daily liquidity decreased by no more than 1.19% on average owing to transactions that were settled after the operational failure had occurred but before the stop-sending rule was applied (see chart 1). The changes in aggregate liquidity in scenario 1 were, however, quite volatile, with a standard deviation of about 240% of the mean. The source of volatility was the liquidity sink effect, which differed substantially from day to day. As the analysis suggested that the stop-sending rule would limit the contagion effect within the system to operational risk outside the ARTIS platform, we reran the simulations for all 22 days in the sample without the stop-sending rule. The results are presented below in section 3.2.4.

The value of payments submitted to the system in scenario 1 totaled EUR 22.4 billion on average, with a standard deviation of EUR 5.8 billion. This represented a 31.5% decrease relative to the unstressed system, which is attributable to two factors: (1) the stricken account's node risk (defined as an individual bank's share in the total value of submitted and received transactions, in this scenario 18.8%), and (2) the stop-sending rule (which accounted for a decrease by 12.7%). The average daily value of settled transactions totaled EUR 21.6 billion (with a standard deviation of EUR 5.5 billion), which corresponds to a reduction by 33.8% relative to the unstressed scenario. The number of payments submitted shrank by 16.3% to a daily average of 12,832 during the sample period. This reduction is once more substantially higher than the node risk of the transfer account in terms of the number of payments (9.7% of the total number of payments submitted or

Chart 1

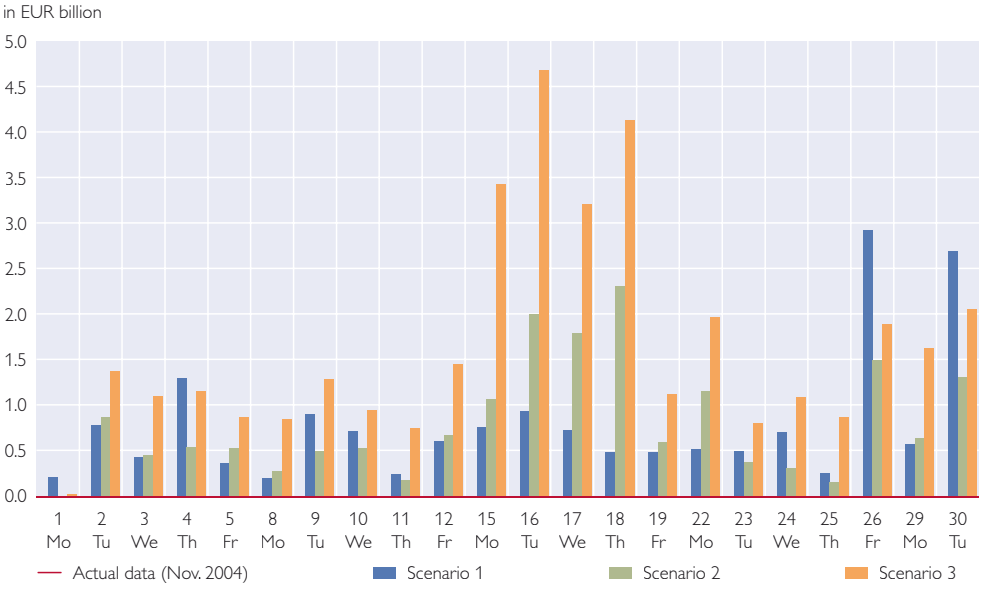
Actual and Stressed Liquidity With and Without the Stop-Sending Rule (Scenario 1)



Source: OeNB and own calculations.

Chart 2

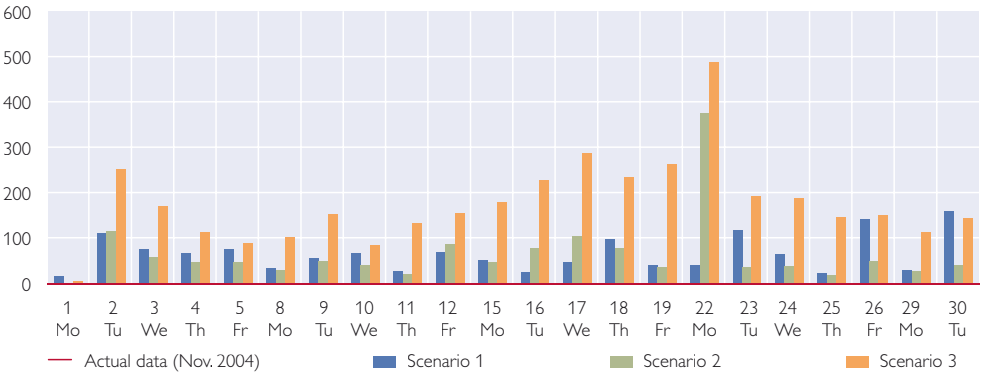
Value of Unsettled Payments



Source: OeNB and own calculations.

Chart 3

Number of Unsettled Payments



Source: OeNB and own calculations.

received). The difference is again attributable to the impact of the stop-sending rule.

In scenario 1, the contagion effect on the other participants of the payment system was significant in terms of the aggregate value of unsettled transactions. This value came to EUR 780 million on average per day or 3.5% of the average value submitted in the unstressed system, in which all payments were settled (see chart 2). The value of unsettled transactions refers only to the payments submitted by the other participants (including those to the stricken transfer account), but not to payments of the stricken transfer account itself. It was rather volatile with a standard deviation of EUR 710 million in a range from EUR 200 million to EUR 2.9 billion. On average, the number of payments submitted but not settled amounted to 64 per day in a range

Table 1

Number of Banks with Unsettled Payments

	Actual	Scenario 1	Scenario 2	Scenario 3
Daily average	0	12.1	8.7	22.8
Minimum	0	8	0	1
Maximum	0	18	12	30
Standard Deviation	0	2.4	2.8	5.9
Total	0	36	38	56

Source: OeNB and own calculations.

from 14 to 159 (see chart 3). The large variations in the value of unsettled transactions demonstrate that the impact of one and the same operational incident on the system can be different on different days.

How much additional liquidity is required to settle all transactions on each day? Even though the value of unsettled transactions provides a first indication, it overstates the need for liquidity assistance, as it fails to take into account the fact that liquidity circulates once it was injected into the system. The indicator for continuous liquidity usage estimates the ratio of submitted payments that was covered by reserves. In scenario 1, this indicator had an average value of 0.37 (compared with 0.30 in the unstressed system). This means that, across all days and participants, on average 37% of the total value submitted was covered by individual participants' liquidity reserves and 63% by payments received. The volume of liquidity assistance that is actually required in the sample period, i.e. taking into account the circulation of liquidity, can be estimated by multiplying daily continuous liquidity usage with the daily value of unsettled transactions. On an average day, EUR 290 million had to be injected into the system to reach the lower bound of additional aggregate liquidity, thus enabling all accounts to settle open transactions.[14] This value corresponds to 1.76% of liquidity available during the sample period. The necessary minimum liquidity assistance ranged from EUR 70 million (or 0.4% of actual aggregate liquidity available on that day) to EUR 1.1 billion (or 7.5% of actual aggregate liquidity available on that day) across the sample period. The average value of daily unsettled payments (EUR 780 million or 4.7% of average aggregate liquidity in the unstressed system) provides an indication of an upper bound – the maximum amount required – of additional liquidity necessary to prevent a contagion effect.

3.2.2 Impact on Individual Banks

In scenario 1, the contagion effect – measured by the number of individual banks that could not settle all transactions – was substantial. Their number averaged 12.1 per day in a range from 8 to 18 out of a total of 234 banks among the 575 accounts (see table 1). The total number of banks that failed to settle submitted transactions on at least one day totaled

[14] *For the lower bound to suffice for the settlement of all transactions, additional liquidity must be provided to those participants in the system who experience problems, i.e. who actually need it. Furthermore, the circulation of additional liquidity must equal the circulation of aggregate liquidity.*

Table 2

Impact of the Stop-Sending Rule – Selected Indicators in Scenario 1 (average daily values across November 2004)

Indicator	Scenario 1 with stop-sending rule (1)	Scenario 1 without stop-sending rule (2)	Difference (1)−(2)
Aggregate liquidity (in EUR billion)	16.3	12.1	4.2 (26%)[1]
Liquidity reduction (in % of aggregate liquidity)	1.2	26.9	−25.7[1]
Value of submitted transactions (in EUR billion)[2]	22.4	26.7	−4.2 (−18.9%)
Value of unsettled transactions (in EUR billion)[3]	0.8	1.3	−0.6 (−71.8%)

Source: OeNB and own calculations.

[1] *Differences in percent of value with stop-sending rule.*

[2] *Value of submitted transactions refers to the value of payments submitted by unaffected participants, i.e. excluding the value of payments that were not submitted by the stricken bank owing to operational problems. If the stop-sending rule applies (column 1), the payments redirected in the queue are not included in the value of payments submitted: the respective liquidity is still available to the banks, who can cancel submissions as long as they are queued.*

[3] *Value of unsettled transactions refers to the payments submitted by those participants who are not affected by operational problems.*

36. Two of them could not settle all transactions on all 22 days, while 10 of them were affected on 11 or more days and 7 accounts failed on one day only. The impact of scenario 1 on the individual banks differed widely among banks.

3.2.3 Impact of Business Continuity Arrangements

In order to assess the impact of backup facilities, we reran the simulations under the assumption that the operational failure lasted until 04:00 p.m. rather than the entire day. We assumed that the available backup facilities were employed in a timely manner so that all payments could be processed before the end of the business day at 06:00 p.m.[15] Furthermore, we assumed that the participant's internal systems were fully operational, so that they knew which payments needed to be processed. Under these assumptions, all submitted payments were actually settled and no adverse effects on the payments of the stricken account or any other participant were recorded.

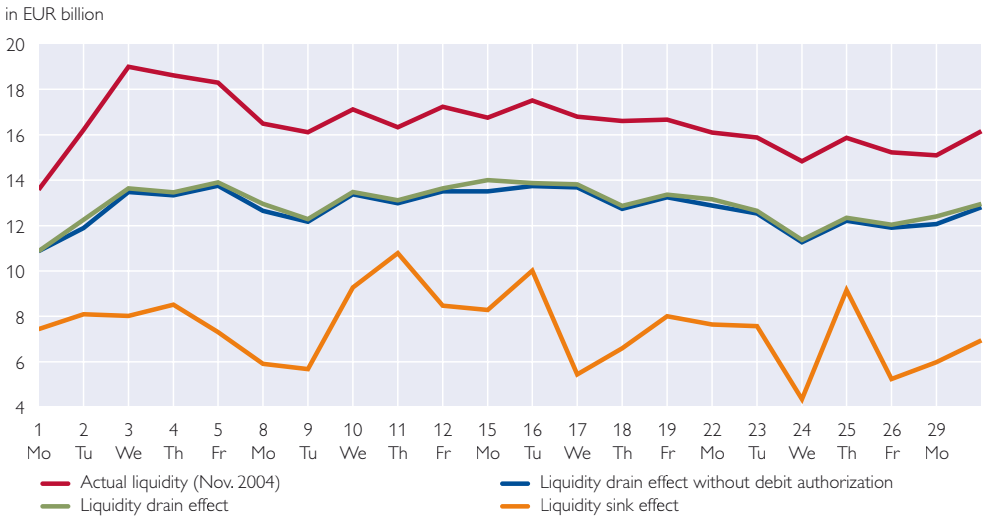
3.2.4 Impact of the Stop-Sending Rule

The stop-sending rule substantially reduced the adverse impact of the operational shock and increased the resilience of the system. In order to assess the relative impact (and thus the efficacy) of the stop-sending rule, we reran scenario 1 without the stop-sending rule, while keeping all other features identical. Without the stop-sending rule, the liquidity sink effect increased from 1.2% to 26.9% of aggregate liquidity in the unstressed system, and the mean value of submitted transactions increased by EUR 4.2 billion or 19.3% on average (see table 2). This implies that the value of payments to the affected transfer account after 08:00 a.m. came to EUR 4.2 billion on average. Without the stop-sending rule, the total value of unsettled transactions increased from EUR 780 million to EUR 1.3 billion on average, while the number of unsettled payments went up from 64.1 to 120.8 on average.

[15] *A delayed closing is (in principle) possible with the ECB's approval.*

Chart 4

Actual and Stressed Liquidity With and Without Debit Authorization (Scenario 2)



Source: OeNB and own calculations.

3.3 Scenario 2 – Failure at the Top Bank

In this scenario, the most active bank cannot submit or settle payments from 06:00 a.m. until 06:00 p.m. owing to an operational incident. The scenario design includes the feature of debit authorization by the stricken bank for a number of other participants in ARTIS.[16] Consequently, many payments by the stricken bank could be submitted (via the participants to whom debit authorization was granted) and settled despite the operational problems. Thus, debit authorization can reduce the liquidity drain effect. In order to assess the impact of debit authorization on the contagion effect within the system, we reran the simulations in a replicated scenario without debit authorization. The results are presented in section 3.3.4.

3.3.1 Impact on Aggregate Liquidity and on the Smooth Functioning of the Payment System

Owing to the operational incident at the most active bank, aggregate liquidity available for circulation in the system (i.e. excluding the liquidity accumulating at the stricken bank) decreased by an average of 54.6% (21.6% were attributable to the liquidity drain effect and 33.2% to the liquidity sink effect) to a daily average of EUR 7.5 billion (see chart 4). Compared with the actual value in November 2004, the average daily value of payments submitted shrank by EUR 5.2 billion to EUR 27.4 billion (with a standard deviation of EUR 6.4 billion). This decrease by 16% corresponds to the stricken bank's usual share in submitted payments (which could not be submitted as a result of the operational incident)

[16] *According to § 9 of the Terms and Conditions governing the OeNB's ARTIS system, participant A can grant debit authorization to participant B. Debit authorization is defined as the right granted to participant B to initiate (certain pre-agreed) payments from the account of participant A. Debit authorizations are granted to a small number of participants for prearranged purposes (very frequently recurring standard operations) and cannot be interpreted as crisis mitigation instruments available on short notice in the case of an operational incident.*

minus the value of payments submitted by debit authorization (which could still be processed). The average value of settled payments was EUR 26.6 billion with a standard deviation of EUR 6.1 billion.

The operational incident had a substantial negative contagion effect on aggregate payment activity, as the daily average value of unsettled transactions amounted to EUR 800 million or 2.9% of the value submitted (see chart 2).[17] The impact of the operational incident, however, varied markedly from day to day – the value of unsettled transactions ranged from EUR 0 to EUR 2.3 billion. The number of unsettled payments rose to 63.3 on average per day, accounting for 0.4% of submitted payments on average (see chart 3). The contagion effect was substantial, as a large share of payments could not be settled by the unaffected participants. According to our estimates, some EUR 320 million (or 1.9% of average aggregate liquidity in the unstressed system) would be required to reach the lower bound of average liquidity and settle all submitted payments, taking into account the circulation of liquidity. The upper bound would be EUR 800 million or 4.9% of average aggregate liquidity in the sample period.

The mean of the continuous liquidity usage came to 40%, which means that 40% of the submitted payments in scenario 2 were settled using liquidity reserves. Compared with the unstressed scenario, this implied an increase by about 10 percentage points. Still, the circulation of liquidity did not come to a complete halt despite a substantial contagion effect.

3.3.2 Impact of Scenario 2 on Individual Banks

The impact on the ability of the other banks to settle submitted payments was substantial in scenario 2, and it varied considerably from day to day. A total of 38 banks (or 16.2% of all banks) were affected by contagion throughout the month (see table 1). On average, 8.7 banks in a range from 0 to 12 banks (or 3.7% of all banks) were unable to settle all submitted payments on each day. While 4 banks could not settle all transactions on 21 days, 7 were affected on 11 or more days, and 14 banks were affected on one day only. This means that the impact of scenario 2 on the different banks was also far from uniform.

3.3.3 Impact of Backup Options

We reran the simulations under the assumption that the business continuity arrangements were invoked at 04:00 p.m. and all payments of the stricken bank were settled before the end of the business day. Under these assumptions, all payments were settled and no contagion effect materialized. However, the resilience of the system rests on the following two conditions: the participant's internal systems must be fully operational, so that he knows which payments need to be processed, and between 534 and 1,655 payments (submitted via phone, fax, messenger service or eKonto) must be processed manually before 06:00 p.m.[18]

[17] *The value of unsettled transactions refers only to payments submitted by the unaffected participants (including payments to the stricken bank); it does not include payments of the stricken bank itself (as these cannot be submitted).*

[18] *As noted above, a delayed closing is possible with the ECB's approval.*

3.3.4 Impact of Debit Authorization

We reran scenario 2 without debit authorization. It turned out that debit authorization slightly attenuated the contagion effect of the operational shock within the system. Debit authorization allowed some payments of the stricken bank to be settled despite the operational failure (provided that its account is sufficiently liquid, which it usually is, as the bank is unable to submit payments). Consequently, the average liquidity drain was lower than in a system without debit authorization. In scenario 2, this feature reduced the liquidity drain from 22.5% to 21.4% of aggregate liquidity, thus accounting for a reduction by EUR 170 million or 1.1 percentage points of aggregate liquidity in the unstressed system. Without debit authorization, the liquidity drain equals the stricken bank's share in aggregate liquidity (22.5%). In scenario 2 with debit authorization, the value of unsettled transactions decreased by EUR 150 million (or 15.6% of the value without debit authorization) from an average of EUR 950 million to EUR 800 million. The number of unsettled payments shrank by 74.1 payments per day on average (or 53.9% of this number without debit authorization) from 137.3 to 63.3. The average number of banks which could not settle all transactions on each day of the sample period decreased from 10.3 in a range from 0 to 14 to 8.7 in a range from 0 to 12 (–15.2%). While the total number of banks affected by contagion was merely reduced from 42 to 38 (–9.5%), debit authorization had a strong impact on the individual participants. Those who had the right to access the stricken bank's account were effectively shielded from any direct effects of the operational incident.

3.4 Scenario 3 – Simultaneous Failure At the Three Most Active Bank Accounts

This scenario assumes that the three most active banks cannot submit payments from 06:00 a.m. until 06:00 p.m. owing to an operational incident. All three stricken banks granted debit authorization to a number of other ARTIS participants. To gauge the impact of this feature on the smooth functioning of the system, we reran the simulations based on a replicated scenario without debit authorization. The results are presented in section 3.4.4.

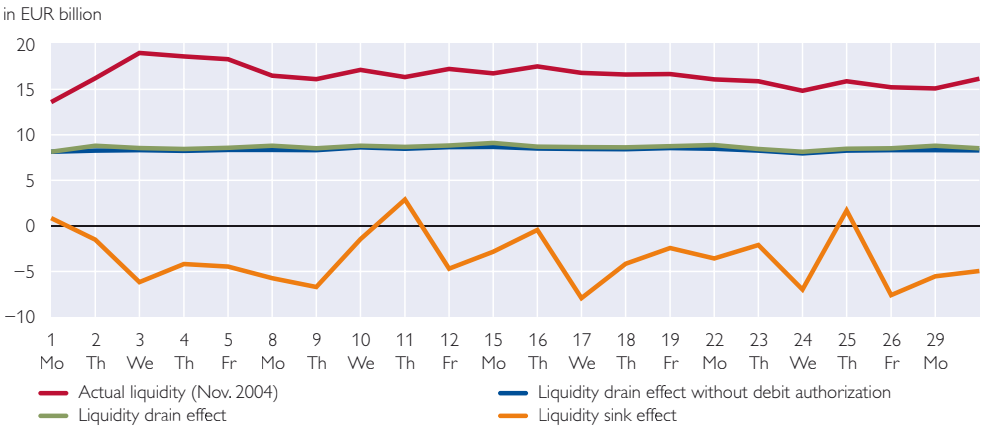
3.4.1 Impact on Aggregate Liquidity and on the Smooth Functioning of the Payment System

In theory, aggregate liquidity available for circulation in the system (i.e. excluding the liquidity accumulating at the stricken banks) decreased by 121.5% compared with the unstressed level, with the liquidity drain accounting for 47.4% and the liquidity sink accounting for 74.1% (see chart 5). If all payments to the three stricken banks had been settled, liquidity would have turned negative. In reality, however, aggregate liquidity available for circulation in the system is bounded below by zero. In scenario 3, the liquidity sink effect basically withdrew all remaining liquidity from circulation, and the adverse impact of the contagion effect on the smooth functioning of the payment system was very strong indeed.

The average value of submitted payments decreased to EUR 20.7 billion (–36.4% relative to the unstressed system). This reduction equaled the three stricken banks' share in the total value of transactions submitted in the unstressed system minus the share of payments submit-

Chart 5

Actual and Stressed Liquidity With and Without Debit Authorization (Scenario 3)



Source: OeNB and own calculations.

ted under debit authorization. On average, the value of settled payments shrank to EUR 19.1 billion (–41.6% compared with the unstressed value). The daily value of unsettled transactions came to EUR 1.7 billion on average in a range from EUR 150 million to EUR 4.7 billion (see chart 2). On average, 175 payments (in a range from 3 to 488) could not be settled (see chart 3). The volume and value of unsettled payments refer only to payments submitted by the other participants (i.e. excluding the stricken banks' payments, which could not be submitted, but possibly including payments made by the other participants to them). According to our estimation, the lower bound of additional liquidity necessary to settle all submitted payments came to around EUR 1.1 billion (in a range from EUR 0.1 billion to EUR 3.2 billion) on an average day, taking into account the circulation of liquidity. This corresponds to 6.8% of aggregate liquidity in the unstressed system. These results also indicate that the impact of the scenario varied substantially across days. The upper bound of additional liquidity came to EUR 1.7 billion (10% of aggregate liquidity in the unstressed system).

The system's participants had to rely much more on their liquidity reserves than on incoming payments to settle outgoing payments. The indicator of continuous liquidity usage increased from 29.9% in the unstressed scenario to 67.8%. This means that the participants covered roughly two-thirds of the value of submitted and settled payments with liquidity reserves and only one-third with incoming payments.

3.4.2 Impact on Individual Banks

On average, 22.8 (in a range between 1 and 30) of the 234 banks failed to settle all payments submitted on each day (see table 1). While 56 banks were unable to settle all payments on at least one day, one bank was affected on all 22 days of the sample period and 24 banks failed to settle all transactions on 11 or more days. 10 banks were affected on a single day only. Thus, the impact of scenario 3 on the individual banks differed across banks.

3.4.3 Impact of Backup Options

In order to assess the impact of alternative submission channels, we reran scenario 3 under the assumption that all payments of the three stricken banks were submitted via alternative channels. Furthermore, we assumed that the stricken banks' internal systems were fully operational, so that they knew about their payment obligations. In this case, all payments were settled and no negative effects on payment activity were observed. On condition that all payments could be processed in time, the system proved to be resilient even to a very strong negative shock. For the business continuity arrangements in place, this implied that between 1,440 and 4,022 payments would have to be processed manually before the end of the business day at 06:00 p.m.[19]

3.4.4 Impact of Debit Authorization

We reran scenario 3 without debit authorization to identify its impact on the financial soundness of the system. Debit authorization reduced the liquidity drain effect by a daily average of EUR 250 million or 1.5% of aggregate liquidity. The value of unsettled payments decreased by an average of EUR 190 million or 10.3% of the value of unsettled payments compared with the scenario without debit authorization, thus declining from about EUR 1.9 billion to EUR 1.7 billion. The number of unsettled payments on average went down from 267 to 175, while the average number of banks affected by contagion was reduced from 24.6 to 22.8. The number of banks with unsettled payments on at least one day in the sample period decreased from 60 to 56. Debit authorization thus slightly decreased the impact of the operational failure on the system in scenario 3. A more substantial impact was recorded for the liquidity position of those participants who had the right to access the accounts of the stricken banks. They were effectively shielded from any direct impact of the operational incident (provided that the stricken banks' accounts were sufficiently liquid).

3.5 Comparison Across Scenarios

In the scenarios including business continuity arrangements, no adverse impact was recorded on the smooth functioning of the payment system. Given the very restrictive assumptions underlying the efficacy of the business continuity arrangements, we compared the impact of the operational incidents in the three scenarios without business continuity arrangements. The strongest impact on aggregate liquidity, on the value of unsettled payments and on the number of banks with unsettled payments as well as on the frequency of settlement failure was recorded for scenario 3 (see table 3). However, one must bear in mind that it was designed as a worst-case scenario. The value and number of unsettled payments and the total number of banks with unsettled payments were very similar in scenarios 1 and 2. This similarity is quite surprising, taking into account the large differences in liquidity reduction (1.2% of aggregate liquidity in scenario 1 compared with 54.8% in scenario 2). In addition, the stop-sending rule was only applied in scenario 1.

[19] *As noted above, a delayed closing is possible with the ECB's approval.*

Table 3

Comparing Selected Indicators
(daily values/ averages across November 2004)

Indicator	Actual	Scenario 1	Scenario 2	Scenario 3
Aggregate liquidity (in EUR billion)	16.5	16.3	7.3	−3.8
Liquidity reduction (in % of aggregate liquidity)	0	1.2	54.8	121.5
of which: Liquidity drain (in percentage points)	*0*	*0*	*21.6*	*47.4*
Liquidity sink (in percentage points)	*0*	*1.2*[1]	*33.2*	*74.1*
Value submitted (in EUR billion)	32.6	22.4	27.4	20.7
Without business continuity arrangements				
Value of unsettled payments (in EUR billion)	0	0.8	0.8	1.7
Value of unsettled payments (in % of value submitted)	0	3.3	2.7	7.7
Number of unsettled payments	0	64.1	63.3	175
With business continuity arrangements[2]				
Value of unsettled payments (in EUR billion)	0	0	0	0
Value of unsettled payments (in % of value submitted)	0	0	0	0
Number of unsettled payments	0	0	0	0

Source: OeNB and own calculations.

[1] *With stop-sending rule – without it, the respective value would be 26.9%.*

[2] *The assumption that the stricken bank submits all payments via backup facilities and that ARTIS operators manually process them all in time is rather restrictive.*

4 Implications

Any measures taken on the basis of these results in the field of payment system design and payment system oversight need to conform to the guiding principles of practicability and efficiency for payment systems as stipulated in Core Principle VIII.[20] The marginal cost of implementing additional security features and business continuity arrangements must not outweigh the marginal (pecuniary and non-pecuniary) return from increased reliability.

The simulations account for the available business continuity arrangements by reopening the submission channel for the stricken bank(s) at 04:00 p.m. Many transactions were queued until that time and settled between 04:00 p.m. and 06:00 p.m. However, this means that for business continuity measures to be effective – i.e. for service levels to be met even under stress – some 1,500 to 3,400 payments (depending on the scenario) or even around 4,000 payments (on peak days in the worst-case scenario) would have to be processed manually. This assumption is very restrictive and unlikely to hold in practice. The time available to complete this task depends on when exactly the stricken bank switches to alternative submission procedures, while the time required to do so depends on the processing capacities available at the central platform. Assuming that about 30 payments per hour can be processed manually by one staff member, substantial additional human capital and equipment would be required to reach the required payment throughput before the end of the business day

[20] *"Core Principle VIII – The system should provide a means of making payments which is practical for its users and efficient for the economy." (CPSS, 2001).*

(06:00 p.m.), while maintaining a high level of processing quality.[21]

In order to reduce contagion within the system when it is under stress, the existing contingency procedures could be complemented by a stop-sending function comparable with the one employed in scenario 1. All other participants would then be informed of the fact that a particular account cannot submit payments. Furthermore, they would be given the option to redirect their payments to the stricken bank to a queue. In principle, these queued payments remain available to the sending bank in ARTIS. Once the stricken bank has resolved the operational problems, all payments in the queue are released and settled. A stop-sending function would substantially reduce the liquidity sink effect, and it would be a simple and practical solution as required in Core Principle VII (CPSS 2001, p. 40). Nevertheless, in order to assess the exact impact of a stop-sending function, further simulations based on scenarios 2 and 3 have to be conducted.

From the perspective of payment systems oversight, the findings of this study again emphasize the importance of (regular) testing as a valuable tool for assessing the effectiveness of existing business continuity arrangements, in particular with regard to their workability in practice. In this regard, this study confirms the usefulness of the currently conducted review of the business continuity oversight framework established by CPSS Core Principle VII. With this review, the Eurosystem aims at achieving a sufficiently high level of operational resilience across systemically important payment systems. The implementation of effective testing and regular reviewing processes for business continuity measures, among other aspects, is of particular interest; it will be addressed in the context of TARGET 2 oversight.

5 Summary

The objective of this study was to quantify the contagion effect of an operational incident outside the ARTIS platform on the ability of other, unaffected participants to settle payments. The methods applied were model simulations of operational shocks for the sample period November 2004.

In the unstressed scenario, the smooth functioning of the system was guaranteed by the availability of sufficient aggregate liquidity. All submitted transactions were settled and no account experienced liquidity shortages that would have caused transactions to remain unsettled by the end of the business day (06:00 p.m.) on any day in the sample period.

We conducted simulations based on three different scenarios. Their design took into account the two main sources of contagion risk in payment systems: the payment concentration channel and the liquidity concentration channel. The simulated shocks were exceptional but plausible operational incidents. On condition that the existing business continuity arrangements prove effective, the simulations showed the high opera-

[21] *The Basel Committee on Banking Supervision emphasizes the need to ensure that business continuity plans are effective and to identify necessary modifications through periodic testing (Basel Committee on Banking Supervision, 2005, Principle 6).*

tional reliability of ARTIS. Under the very restrictive assumptions that (1) the stricken bank(s) had access to the information concerning their payment obligations and (2) all payments submitted by the stricken bank(s) could be settled in time via phone, fax, messenger service or eKonto, no adverse effects were recorded for their own or any other participant's payments. The system functioned smoothly even under severe stress.

However, without the use of business continuity arrangements or in case they turned out to be not fully effective, the contagion effect on the smooth functioning of the payment system was substantial in all three scenarios. A non-negligible number of banks failed to settle payments. The simulations revealed large differences in the impact one and the same operational incident had (1) on the system as a whole and (2) on the individual banks as well as (3) in the extent to which it affected them on various days. Therefore, more research is called for to better understand the determinants of the impact of shocks on the system, on its participants, and across days.

Our investigation of the impact of two noteworthy features of ARTIS on the contagion effect – the stop-sending rule and debit authorization – produced the following results: The stop-sending rule substantially reduced the contagion effect of the operational shock and increased the resilience of the system. Currently, the stop-sending rule applies only to operational problems at one of the TARGET central banks. Our findings indicate that a similar rule for operational incidents at commercial banks would strongly increase the resilience of the system. Further research is, however, needed to put this hypothesis to the test. While debit authorization also attenuated the system's reaction to operational shocks, it did so to a much lesser (but still non-negligible) extent. More importantly, it proved effective in shielding those participants who had access to the stricken bank's account via debit authorization from direct adverse effects of the operational incident.

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Annex of Tables

Annex of Tables

International Environment	Table
Exchange Rates	*A1*
Key Interest Rates	*A2*
Short-Term Interest Rates	*A3*
Long-Term Interest Rates	*A4*
Corporate Bond Spreads	*A5*
Stock Indices	*A6*
Gross Domestic Product	*A7*
Current Account	*A8*
Inflation	*A9*
The Real Economy in Austria	
Financial Investment of Households	*A10*
Household Income, Savings and Credit Demand	*A11*
Financing of Nonfinancial Corporations	*A12*
Insolvency Indicators	*A13*
Selected Financial Ratios of the Manufacturing Sector	*A14*
Financial Intermediaries in Austria	
Total Assets and Off-Balance-Sheet Operations	*A15*
Profitability	*A16*
Annual Profit / Loss	*A17*
Claims on Domestic Nonbanks	*A18*
Foreign Currency-Denominated Claims on Domestic Non-MFIs	*A19*
Specific Loan Loss Provisions for Claims on Nonbanks	*A20*
Market Risk	*A21*
Liquidity Risk	*A22*
Solvency	*A23*
Assets Held by Austrian Insurance Companies	*A24*
Assets in Austrian Mutual Funds	*A25*
Assets Held by Austrian Pension Funds	*A26*
Assets Held by Austrian Severance Funds	*A27*

Cutoff date for data: May 24, 2006

Conventions used in the tables:
x = No data can be indicated for technical reasons
.. = Data not available at the reporting date

Revisions of data published in earlier volumes are not indicated.
Discrepancies may arise from rounding.

International Environment

Table A1

Exchange Rates

Period average (per EUR 1)

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
U.S. dollar	0.9452	1.1313	1.2437	1.2443	0.9921	1.1577	1.2599	1.2041
Japanese yen	118.07	130.96	134.40	136.86	119.85	130.85	135.75	137.51
Pound sterling	0.6287	0.6919	0.6786	0.6839	0.6359	0.6983	0.6836	0.6817
Swiss franc	1.4670	1.5210	1.5439	1.5484	1.4650	1.5495	1.5349	1.5503
Czech koruna	30.80	31.85	31.90	29.78	30.55	32.14	31.36	29.49
Hungarian forint	242.92	253.51	251.68	248.06	242.35	259.75	247.37	248.71
Polish zloty	3.8560	4.3998	4.5268	4.0215	4.0403	4.5244	4.3272	3.9648
Slovak koruna	42.67	41.49	40.02	38.59	42.75	41.47	39.74	38.57
Slovenian tolar	225.97	233.85	239.06	239.56	228.38	235.52	239.88	239.49

Source: Thomson Financial.

Table A2

Key Interest Rates

End of period, %

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Euro area	3.25	2.75	2.00	2.00	2.00	2.00	2.00	2.25
U.S.A.	1.25	1.25	1.25	0.75	1.25	2.00	3.25	4.25
Japan	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
United Kingdom	4.00	4.00	3.75	3.75	4.50	4.75	4.75	4.50
Switzerland [1]	0.75–1.75	0.25–1.25	0.00–0.75	0.00–0.75	0.00–1.00	0.25–1.25	0.25–1.25	0.50–1.50
Czech Republic	3.75	2.75	2.25	2.00	2.25	2.50	1.75	2.00
Hungary	9.00	8.50	9.50	12.50	11.50	9.50	7.00	6.00
Poland	8.50	6.75	5.25	5.25	5.25	6.50	5.00	4.50
Slovak Republic	8.25	6.50	6.50	6.00	4.50	4.00	3.00	3.00
Slovenia [2]	8.75	8.25	6.50	6.00	4.00	4.00	4.00	4.00

Source: Eurostat, Thomson Financial, national sources.

[1] *SNB target range for three-month LIBOR.*

[2] *Until January 2003: official interest rate; since February 2003: interest rate for 60-day tolar bills issued by Banka Slovenije.*

Table A3

Short-Term Interest Rates

Three-month rates, period average, %

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro area	3.32	2.33	2.11	2.19	3.23	2.14	2.14	2.24
U.S.A.	1.80	1.22	1.62	3.57	1.68	1.15	2.03	4.06
Japan	0.09	0.09	0.09	0.09	0.08	0.09	0.09	0.09
United Kingdom	4.01	3.69	4.59	4.70	3.95	3.70	4.85	4.56
Switzerland	1.17	0.33	0.47	0.80	0.80	0.26	0.65	0.84
Czech Republic	3.55	2.28	2.36	2.01	2.94	2.10	2.60	1.95
Hungary	9.21	8.49	11.29	7.02	9.62	10.38	10.62	6.18
Poland	8.99	5.68	6.20	5.29	7.76	5.40	6.75	4.61
Slovak Republic	7.77	6.18	4.68	2.93	7.59	6.17	4.05	3.02
Slovenia	8.03	6.78	4.66	4.03	7.92	6.36	4.05	4.02

Source: Thomson Financial.

Table A4

Long-Term Interest Rates

Ten-year rates, period average, %

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro area	4.91	4.14	4.12	3.42	4.56	4.27	4.01	3.32
U.S.A.	4.60	4.00	4.26	4.28	4.12	4.25	4.23	4.34
Japan	1.27	0.99	1.50	1.39	1.13	1.29	1.55	1.44
United Kingdom	4.91	4.58	4.93	4.46	4.62	4.81	4.88	4.32
Switzerland	3.20	2.66	2.74	2.10	2.88	2.83	2.66	2.01
Czech Republic	4.88	4.12	4.75	3.51	4.42	4.43	4.76	3.47
Hungary	7.09	6.82	8.19	6.60	7.17	7.36	8.09	6.30
Poland	7.36	5.78	6.90	5.22	6.60	6.16	6.84	4.94
Slovak Republic	6.94	4.99	5.03	3.52	6.36	5.10	4.95	3.36
Slovenia	×	6.40	4.68	3.81	8.26	6.15	4.46	3.71

Source: Eurostat, national sources.

Table A5

Corporate Bond Spreads

Period average, percentage points

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro corporate bond spreads against euro benchmark	1.39	0.68	0.26	0.47	1.06	0.42	0.26	0.46
U.S. dollar corporate bond spreads against U.S. dollar benchmark	6.29	4.82	4.36	3.88	6.24	4.66	4.26	3.78

Source: Thomson Financial.

Table A6

Stock Indices[1]

Period average

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro area: EURO STOXX	259.97	213.29	251.14	293.81	220.36	227.31	251.59	309.27
U.S.A.: S&P 500	995.34	964.85	1,131.10	1,207.40	892.05	1,028.66	1,134.02	1,227.62
Japan: Nikkei 225	10,119.31	9,312.88	11,180.88	12,421.34	9,277.11	10,243.21	11,089.72	13,398.93
Austria: ATX	1,183.87	1,305.11	1,979.58	2,996.30	1,116.44	1,398.78	2,123.47	3,325.52
Czech Republic: PX50	437.62	558.24	828.23	1,255.53	441.02	610.19	885.05	1,360.54
Hungary: BUX	7,760.46	8,400.74	11,752.23	19,018.09	7,414.88	9,015.06	12,832.75	21,129.55
Poland: WIG	14,431.27	17,103.10	24,108.88	29,567.50	13,614.11	19,661.49	24,841.20	32,291.81
Slovak Republic: SAX16	116.60	164.08	213.42	437.07	118.41	171.34	243.28	452.05
Slovenia: SBI20	2,846.78	3,377.57	4,561.36	4,674.89	3,174.44	3,531.18	4,778.30	4,531.78

Source: Thomson Financial.

[1] *EURO STOXX: December 31, 1986 = 100, S&P 500: December 30, 1964 = 100, Nikkei 225: March 31, 1950 = 100, ATX: January 2, 1991 = 1000, PX50: April 6, 1994 = 100, BUX: January 2, 1991 = 100, WIG: April 16, 1991 = 100, SAX: September 14, 1993 = 100, SBI20: January 1994 = 100.*

Table A7

Gross Domestic Product

Annual change in %, period average

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro area	0.9	0.7	2.0	1.6	1.2	0.8	1.8	1.7
U.S.A.	1.6	2.7	4.2	3.5	2.1	3.6	3.8	3.4
Japan	0.1	1.8	2.3	2.7	1.6	2.0	1.4	3.6
Austria	1.0	1.4	2.4	1.9	1.3	1.5	3.2	1.8
Czech Republic	1.5	3.2	4.7	6.0	1.2	3.6	5.0	6.3
Hungary	3.8	3.4	4.6	4.1	4.1	3.7	4.4	4.4
Poland	1.4	3.9	5.3	3.2	2.0	4.5	4.3	4.0
Slovak Republic	4.6	4.5	5.5	6.0	5.0	4.8	5.5	6.9
Slovenia	3.5	2.7	4.2	3.9	3.8	2.7	4.3	3.6

Source: Eurostat, national sources.

Table A8

Current Account

% of GDP, cumulative

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro area	0.8	0.4	0.5	−0.4	1.2	0.7	0.7	−0.5
U.S.A.	−4.5	−4.7	−5.7	−6.5	−4.7	−4.6	−6.0	−6.5
Japan	2.8	3.2	3.7	3.5	2.4	2.8	2.8	..
Austria	0.4	−0.5	0.3	0.8	1.9	0.7	0.5	0.4
Czech Republic	−5.7	−6.3	−6.1	−2.1	−7.3	−8.9	−7.7	−3.4
Hungary	−7.1	−8.7	−8.6	−7.3	−7.6	−8.0	−7.9	−7.0
Poland	−2.6	−2.1	−4.1	−1.6	−1.7	−1.3	−2.9	−1.9
Slovak Republic	−8.0	−0.8	−3.5	−8.8	−8.2	−0.4	−4.3	−10.3
Slovenia	1.4	−0.4	−2.1	−1.1	1.8	0.0	−2.2	−1.5

Source: Eurostat, European Commission, Thomson Financial, national sources.

Note: Due to seasonal fluctuations, the comparability of half-year figures with yearly figures is limited. The half-year figures for the U.S.A. are based on seasonally adjusted nominal GDP data.

Table A9

Inflation

Annual change in %, period average

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
Euro area	2.2	2.1	2.1	2.2	2.2	2.1	2.3	2.3
U.S.A.	1.6	2.3	2.7	3.3	1.9	2.1	3.2	3.8
Japan	−0.9	−0.3	0.0	−0.3	−0.7	−0.3	0.2	−0.4
Austria	1.7	1.3	2.0	2.1	1.7	1.1	2.2	2.0
Czech Republic	1.4	-0.1	2.6	1.6	0.2	0.3	2.9	1.9
Hungary	5.2	4.7	6.8	3.5	4.7	5.0	6.5	3.4
Poland	1.9	0.7	3.6	2.2	1.2	1.1	4.6	1.5
Slovak Republic	3.5	8.4	7.5	2.8	3.0	9.2	6.8	2.9
Slovenia	7.5	5.7	3.7	2.5	7.2	5.3	3.6	2.4

Source: Eurostat.

The Real Economy in Austria

Table A10

Financial Investment of Households

Transactions, EUR million

	2002	2003	2004	2005[3]	2002	2003	2004	2005[1]
	Year				2nd half			
Currency and deposits[2]	7,624	8,229	6,049	5,471	4,591	3,825	3,479	2,263
Securities (other than shares)[3]	1,607	1,449	2,490	1,549	236	1,442	510	686
Shares (other than mutual fund shares)	683	831	962	1,778	404	195	425	241
Mutual fund shares	483	1,119	2,883	3,632	602	248	997	2,112
Insurance technical reserves	3,349	2,935	4,609	5,870	1,457	707	1,988	2,456
Total financial investment	13,746	14,563	16,992	18,301	7,290	6,417	7,399	7,758

Source: OeNB.

[1] *Preliminary data.*
[2] *Including loans and other assets.*
[3] *Including financial derivatives.*

Table A11

Household Income, Savings and Credit Demand

Year-end, EUR billion

	2002	2003	2004	2005
	Year			
Net disposable income	134.5	139.7	144.2	..
Savings	10.3	12.0	13.1	..
Saving ratio, in %[1]	7.7	8.6	9.0	..
MFI loans to households	86.33	89.40	98.33	111.26

Source: Statistics Austria (national accounts broken down by sectors), OeNB (financial accounts).

[1] *Saving ratio = savings / (disposable income + increase in accrued occupational pension benefits).*

Table A12

Financing of Nonfinancial Corporations

Transactions, EUR million

	2002	2003	2004	2005[1]	2002	2003	2004	2005[1]
	Year				2nd half			
Securities (other than shares)	−410	4,299	2,909	4,258	−411	4,039	2,001	3,193
Loans	6,360	6,039	4,588	6,802	3,519	3,629	4,044	3,994
Shares and other equity	7,850	3,608	4,173	6,618	1,239	−858	261	1,736
Other accounts payable	913	2,485	562	549	−851	809	585	−578
Total debt	14,713	16,431	12,232	18,227	3,496	7,620	6,890	8,345

Source: OeNB.

[1] *Preliminary data.*

Table A13

Insolvency Indicators

	2002	2003	2004	2005	2002	2003	2004	2005
	Year				2nd half			
	EUR million							
Default liabilities	3,422	2,440	2,540	2426	1,770	1,182	1,371	1,436
	Number							
Defaults	2,864	2,957	2,972	3203	1,441	1,542	1,503	1,659

Source: Kreditschutzverband von 1870.

Table A14

Selected Financial Ratios of the Manufacturing Sector

Median, %

	2002	2003	2004
Self-financing and investment ratios			
Cash flow, as a percentage of turnover	7.60	7.82	7.38
Cash flow, as a percentage of investment	194.62	183.87	..
Reinvestment ratio[1]	52.08	41.28	36.74
Financial structure ratios			
Equity ratio	12.58	14.56	18.55
Risk-weighted capital ratio	17.93	19.50	24.78
Bank liability ratio	44.16	42.94	37.01
Government debt ratio	9.27	9.24	9.20

Source: OeNB.

[1] *Investment x 100 / credit write-offs.*

Financial Intermediaries in Austria

Table A15

Total Assets and Off-Balance-Sheet Operations

End of period, EUR million

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Total assets	587,611	573,349	591,867	605,107	636,035	652,758	697,505	725,046
of which: total domestic assets	426,245	418,141	419,571	430,888	441,250	452,306	463,815	479,100
total foreign assets	161,366	155,208	172,296	174,219	194,785	200,452	233,690	245,946
Interest rate contracts	1,022,741	1,144,431	2,204,721	1,853,494	1,891,262	1,241,189	1,266,274	1,247,825
Foreign exchange derivatives	202,939	240,542	298,475	305,447	255,755	216,284	245,677	240,564
Other derivatives	7,553	3,814	4,305	15,173	17,375	8,490	15,916	17,731
Derivatives total	1,233,234	1,388,787	2,507,501	2,174,114	2,164,392	1,465,963	1,527,867	1,506,120

Source: OeNB.

Note: Data on off-balance-sheet operations refer to nominal values.

Table A16

Profitability

End of period, EUR million

	2002	2003	2004	2005	2002	2003	2004	2005
	1st half				Year			
Net interest income	3,518	3,497	3,530	3,547	7,080	7,058	7,131	7,094
Income from securities and participating interests	828	812	990	1,125	1,771	1,719	2,076	2,700
Net fee-based income	1,514	1,552	1,670	1,903	3,012	3,187	3,387	3,941
Net profit/loss on financial operations	197	384	309	333	570	618	607	642
Other operating income	629	591	590	621	1,284	1,292	1,255	1,333
Operating income	6,685	6,836	7,090	7,530	13,717	13,874	14,457	15,710
Staff costs	2,380	2,368	2,381	2,418	4,780	4,739	4,859	5,036
Other administrative expenses	1,524	1,508	1,511	1,628	3,139	3,108	3,107	3,332
Other operating expenses	781	768	780	776	1,582	1,620	1,748	1,694
Total operating expenses	4,685	4,644	4,672	4,822	9,501	9,468	9,715	10,063
Operating profit/loss	2,000	2,192	2,418	2,708	4,216	4,406	4,742	5,647

Source: OeNB.

Table A17

Annual Profit/Loss

year-end value, EUR million

	1998	1999	2000	2001	2002	2003	2004
	Year						
Net risk provisions from credit business	2,243	1,814	2,048	2,317	2,164	1,850	1,787
Net risk provisions from securities business	−531	−257	−442	−925	−10	−46	−554
Annual surplus	1,593	1,915	2,278	2,655	1,400	2,069	2,942

Source: OeNB.

Table A18

Claims on Domestic Nonbanks

End of period, EUR million

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Nonfinancial corporations	113,843	111,588	111,178	110,840	108,979	109,924	111,334	108,944
of which: foreign currency-denominated claims	20,364	19,532	18,177	17,791	17,343	16,094	16,109	14,604
Households	81,507	84,618	84,723	87,358	93,984	97,130	100,375	107,562
of which: foreign currency-denominated claims	20,594	22,066	21,810	23,691	27,077	28,461	30,401	33,316
General government	28,724	28,333	27,501	29,945	29,679	31,238	30,192	29,141
of which: foreign currency-denominated claims	1,682	1,395	1,567	1,231	1,588	1,688	2,074	2,160
Other financial intermediaries	12,309	12,771	12,908	13,392	13,505	14,510	15,131	19,365
of which: foreign currency-denominated claims	1,342	1,466	1,394	1,412	1,594	1,667	2,030	3,216
Total	236,383	237,310	236,309	241,534	246,147	252,801	257,032	265,011
of which: foreign currency-denominated claims	43,983	44,459	42,948	44,125	47,602	47,910	50,614	53,295

Source: OeNB.

Note: Due to changes in the reporting system as of the reporting month of June 2004, the time series for nonfinanial corporations and households had to be adjusted. Freelance professionals and self-employed persons are now classified under households. Any remaining breaks in the time series have been adjusted for the growth rates indicated in this report.

Table A19

Foreign Currency-Denominated Claims on Domestic Non-MFIs

End of period, % of total foreign currency-denominated euro area non-MFIs[1]

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Swiss franc	51.4	56.8	72.4	81.6	86.0	90.1	89.3	89.0
Japanese yen	42.2	37.7	21.6	12.2	7.1	5.6	5.2	3.9
U.S. dollar	6.0	5.0	5.2	5.0	5.6	3.6	4.8	6.3
Other foreign currencies	0.3	0.4	0.7	1.2	1.3	0.7	0.7	0.8

Source: OeNB.

[1] The indicated figures refer to claims of monetary financial institutions (MFIs, ESA definition) on domestic non-MFIs. Given the differences in the definition of credit institutions according to the Austrian Banking Act and of MFIs according to ESA and differences in the number of borrowers, comparability to "Claims on Domestic Nonbanks" is limited. Due to rounding, figures do not add up to 100.0% for every year.

Table A20

Specific Loan Loss Provisions for Claims on Nonbanks

End of period, % of claims

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Specific loan loss provisions	3.4	3.3	3.5	3.3	3.4	3.3	3.2	..

Source: OeNB.

Table A21

Market Risk[1]

End of period, EUR million and % resp.

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Interest rate risk								
Basel ratio for interest rate risk[2]	x	8.8%	7.8%	7.8%	7.5%	6.1%	6.4%	6.6%
Capital requirement for the position risk of interest rate instruments in the trading book	427.2	415.3	420.6	470.2	514.8	609.8	810.3	703.0
Exchange rate risk								
Capital requirement for open foreign exchange positions	70.3	80.4	81.8	54.9	66.1	52.9	97.3	93.3
Equity price risk								
Capital requirement for the position risk of equities in the trading book	33.6	20.5	25.4	28.4	52.4	43.4	71.1	95.9

Quelle: OeNB.

[1] *The calculation of capital requirements for market risk combines the standardized approach and internal value-at-risk (VaR) calculations. The latter use previous day's values without taking account of the multiplier. Capital requirements for interest rate instruments and equities are computed by adding up both general and specific position risks.*

[2] *Average of the Basel ratio for interest rate risk (loss of present value following a parallel yield curve shift of all currencies by 200 basis points in relation to regulatory capital) weighted by total assets of all Austrian credit institutions excluding banks that operate branches in Austria under freedom of establishment. For banks with a large securities trading book, interest rate instruments of the trading book are not included in the calculation.*

Table A22

Liquidity Risk

End of period, %

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Liquid resources of the first degree: 5% quantile of liquidity ratio[1]	11.5	6.1	7.1	4.5	4.3	4.3	4.3	4.5
Liquid resources of the second degree: 5% quantile of liquidity ratio	27.3	26.1	28.2	25.2	25.7	24.4	24.1	23.7

Source: OeNB.

[1] *The liquidity ratio relates liquid assets to the corresponding liabilities. Article 25 of the Austrian Banking Act defines a minimum ratio of 2.5 % for liquid resources of the first degree (cash ratio) and of 20% for liquid resources of the second degree (quick ratio). The 5% quantile indicates the liquidity level surpassed by 95% of banks on the respective reporting date and is thus an indicator of poor liquidity.*

Table A23

Solvency

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
	End of period, EUR million							
Total tier 1 capital (core capital)	28,368	26,861	28,181	29,705	31,564	32,102	33,822	34,681
Total tier 2 capital (supplementary capital)	14,159	13,485	14,171	14,941	16,059	16,742	17,656	18,537
Tier 3 capital[1]	2,197	2,324	771	803	764	674	730	782
	End of period, eligible capital as a percentage of risk-weighted assets							
Capital adequacy ratio[2]	14.2	13.3	13.9	14.5	14.8	14.7	14.6	14.5
Core Capital Ratio	9.9	9.1	9.5	9.9	10.1	10.0	10.1	9.8

Source: OeNB.

[1] *Due to an amendment to the applicable law, data are only available as of 2000.*
[2] *The capital adequacy ratio refers to the capital eligible as credit risk cover under the Austrian Banking Act (i.e. tier 1 capital plus tier 2 capital minus deduction items) as a percentage of the assessment base. As tier 3 capital is subordinated capital that may only be allocated against market risk, it was not included here so as to produce a conservative capital adequacy assessment.*

Table A24

Assets Held by Austrian Insurance Companies[1]

End of period, EUR million

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Cash, overnight and other deposits at domestic banks	1,442	1,628	3,617	2,106	1,744	2,516	2,472	2,567
Domestic debt securities	7,600	7,736	8,488	9,101	9,175	8,909	9,238	9,308
of which: domestic banks	5,031	5,350	6,264	6,824	6,938	7,068	7,519	7,647
Equity securities and other domestic securities	14,616	15,043	14,648	15,204	15,987	17,359	19,387	21,192
Loans	8,517	8,055	7,441	7,303	6,733	6,504	5,933	5,686
of which: domestic banks	126	78	137	146	148	161	206	366
Domestic equity interests	2,784	3,308	3,550	3,588	3,682	3,906	3,928	3,962
Real estate	3,804	3,553	3,526	3,573	3,438	3,361	3,340	3,288
Foreign assets	14,959	15,709	15,597	17,261	19,209	20,691	22,964	25,126
of which: debt securities	11,132	11,548	11,776	12,755	14,979	15,648	17,002	18,231
Custody account claims on deposits on reinsurers	, ,	2,042	, ,	2,149	, ,	2,260	, ,	, ,
Other assets	3,310	3,329	3,734	3,548	4,068	3,594	4,361	3,773
Total assets	58,620	60,403	62,320	63,833	65,927	69,100	73,433	76,760

Source: OeNB.

[1] *Semiannual data exclusive of reinsurance transactions, based on quarterly returns.*

Table A25

Assets in Austrian Mutual Funds

End of period, EUR million

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Domestic securities	36,472	35,953	34,653	34,309	35,405	37,341	43,052	47,032
of which: debt securities	23,003	22,547	20,743	19,436	19,058	19,025	20,545	20,350
equity securities	13,469	13,406	13,910	14,873	16,347	18,316	22,507	26,682
Foreign securities	60,701	60,712	66,706	69,435	75,707	80,505	91,473	100,367
of which: debt securities	40,498	43,199	48,531	48,952	53,022	56,821	64,635	68,054
equity securities	20,203	17,513	18,175	20,483	22,685	23,684	26,838	32,313
Other assets	5,017	6,047	5,774	7,274	7,530	7,441	7,984	9,286
Total assets	102,190	102,712	107,133	111,018	118,642	125,287	142,509	156,685
of which: foreign currency	24,157	22,455	22,376	22,178	24,328	24,591	28,085	32,694

Source: OeNB.

Table A26

Assets Held by Austrian Pension Funds

End of period, EUR million

	2002		2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Domestic securities	7,128	7,200	7,744	8,267	8,770	9,179	9,744	10,112
of which: federal treasury bills and notes	0	0	0	0	0	0	0	0
debt securities	67	57	56	45	121	108	96	98
mutual fund shares	7,032	7,125	7,641	8,159	8,607	9,019	9579	9949
other securities	30	18	47	63	42	52	69	65
Foreign securities	401	353	425	405	460	525	727	1006
of which: debt securities	44	44	47	44	15	27	69	74
mutual fund shares	315	279	350	330	417	469	645	906
other securities	43	30	29	31	28	29	13	26
Deposits	118	171	164	221	72	125	95	113
Loans	32	42	67	42	59	83	94	94
Other assets	121	110	161	143	147	170	196	224
Total assets	7,800	7,876	8,562	9,078	9,508	10,082	10,856	11,549
of which: foreign currency	188	195	233	212	236	249	272	312

Source: OeNB.

Table A27

Assets Held by Austrian Severance Funds

End of period, EUR million

	2003		2004		2005	
	June 30	Dec. 31	June 30	Dec. 31	June 30	Dec. 31
Total direct investment	6.29	38.53	64.94	92.25	129.39	158.66
of which: euro-denominated	6.26	38.16	63.99	89.23	122.45	153.83
foreign currency-denominated	0.00	0.00	0.00	×	×	×
accrued income claims from direct investment	0.03	0.37	0.95	×	2.03	3.16
Total indirect investment	12.07	59.46	123.53	269.59	382.34	537.83
of which: total of euro-denominated investment in mutual fund shares	11.79	59.19	122.85	266.59	370.40	490.40
total of foreign currency-denominated investment in mutual fund shares	×	×	×	3.25	11.94	47.43
Total assets assigned to investment groups	18.37	146.47	188.46	362.10	511.73	696.49
of which: foreign currency-denominated	×	×	×	4.93	16.85	49.10

Source: OeNB.

Note: Due to special balance sheet operations total assets assigned to investment groups deviate from the sum of total indirect investments.

NOTES

Abbreviations

ARTIS	Austrian Real Time Interbank Settlement (the Austrian RTGS system)
A-SIT	Secure Information Technology Center – Austria
ASVG	Allgemeines Sozialversicherungsgesetz – General Social Security Act
A-Trust	A-Trust Gesellschaft für Sicherheitssysteme im elektronischen Datenverkehr GmbH
ATX	Austrian Traded Index
BCBS	Basel Committee on Banking Supervision (BIS)
BIC	Bank Identifier Code
BIS	Bank for International Settlements
BOP	balance of payments
BSC	Banking Supervision Committee (ESCB)
CACs	collective action clauses
CEBS	Committee of European Banking Supervisors (EU)
CEE	Central and Eastern Europe
CEECs	Central and Eastern European countries
CESR	Committee of European Securities Regulators
CIS	Commonwealth of Independent States
CPI	consumer price index
EBA	Euro Banking Association
EBRD	European Bank for Reconstruction and Development
EC	European Community
ECB	European Central Bank
Ecofin	Council of Economic and Finance Ministers (EU)
EEA	European Economic Area
EFC	Economic and Financial Committee (EU)
EIB	European Investment Bank
EMS	European Monetary System
EMU	Economic and Monetary Union
EONIA	Euro OverNight Index Average
ERM II	Exchange Rate Mechanism II (EU)
ERP	European Recovery Program
ESA	European System of Accounts
ESAF	Enhanced Structural Adjustment Facility (IMF)
ESCB	European System of Central Banks
ESRI	Economic and Social Research Institute
EU	European Union
EURIBOR	Euro Interbank Offered Rate
Eurostat	Statistical Office of the European Communities
FATF	Financial Action Task Force on Money Laundering
Fed	Federal Reserve System
FMA	Financial Market Authority (for Austria)
FOMC	Federal Open Market Committee (U.S.A.)
FSAP	Financial Sector Assessment Program (IMF)
FWF	Fonds zur Förderung der wirtschaftlichen Forschung – Austrian Science Fund
GAB	General Arrangements to Borrow
GATS	General Agreement on Trade in Services
GDP	gross domestic product
GNP	gross national product
GSA	GELDSERVICE AUSTRIA Logistik für Wertgestionierung und Transportkoordination GmbH (Austrian cash services company)
HICP	Harmonized Index of Consumer Prices
HIPC	Heavily Indebted Poor Countries
IBAN	International Bank Account Number
IBRD	International Bank for Reconstruction and Development
ICT	information and communication technology
IDB	Inter-American Development Bank
IFES	Institut für empirische Sozialforschung GesmbH (Institute for Empirical Social Research, Vienna)
Ifo	ifo Institute for Economic Research, Munich
HIS	Institut für Höhere Studien und Wissenschaftliche Forschung – Institute for Advanced Studies, Vienna
IIF	Institute of International Finance
IIP	international investment position
IMF	International Monetary Fund
ISO	International Organization for Standardization
IWI	Industriewissenschaftliches Institut – Austrian Institute for Industrial Research
JVI	Joint Vienna Institute
LIBOR	London Interbank Offered Rate
M3	broad monetary aggregate M3
MFI	monetary financial institution
MRO	main refinancing operation
MoU	memorandum of understanding
NACE	Statistical Classification of Economic Activities in the European Community
NCB	national central bank
OeBS	Oesterreichische Banknoten- und Sicherheitsdruck GmbH – Austrian Banknote and Security Printing Works
OECD	Organisation for Economic Co-operation and Development
OeKB	Oesterreichische Kontrollbank (Austria's main financial and information service provider for the export industry and the capital market)
OeNB	Oesterreichische Nationalbank (Austria's central bank)
OPEC	Organization of the Petroleum Exporting Countries
ÖBFA	Austrian Federal Financing Agency
ÖNACE	Austrian Statistical Classification of Economic Activities
POS	point of sale
PRGF	Poverty Reduction and Growth Facility (IMF)
RTGS	Real-Time Gross Settlement
SDR	Special Drawing Right (IMF)
SDRM	Sovereign Debt Restructuring Mechanism (IMF)
SEPA	Single Euro Payments Area
SPF	Survey of Professional Forecasters
STEP2	Straight-Through Euro Processing system offered by the Euro Banking Association
STUZZA	Studiengesellschaft für Zusammenarbeit im Zahlungsverkehr G.m.b.H. – Austrian Research Association for Payment Cooperation
S.W.I.F.T.	Society for Worldwide Interbank Financial Telecommunication
TARGET	Trans-European Automated Real-time Gross settlement Express Transfer
Treaty	refers to the Treaty establishing the European Community
UNCTAD	United Nations Conference on Trade and Development
UNO	United Nations Organization
VaR	Value at Risk
WBI	Wiener Börse Index
WEF	World Economic Forum
WIFO	Österreichisches Institut für Wirtschaftsforschung – Austrian Institute of Economic Research
WIIW	Wiener Institut für internationale Wirtschaftsvergleiche – The Vienna Institute for International Economic Studies
WKO	Wirtschaftskammer Österreich – Austrian Federal Economic Chamber
WTO	World Trade Organization

Legend

x = For technical reasons no data can be indicated

.. = Data not available at the reporting date

– = The numerical value is zero or smaller than half of the unit indicated

Note: Apparent arithmetical discrepancies in the tables are due to rounding.

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annual

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Other Risks Associated with the Trading Book
www.oenb.at/en/img/band6ev40_tcm16-20476.pdf

Guidelines on Operational Risk Management (forthcoming)

These guidelines describe the features of operational risk, evaluate the significance of this risk category for banks and securities firms, and provide an overview of methods and measures adopted to control operational risks. The guidelines explore the major risk areas and risk control/limitation measures in line with the four causes of operational risk (people, systems, processes, external events) and also assess associated legal risks. Furthermore, the guidelines offer an overview of the methods used to calculate (quantitative and qualitative) capital requirements.

Other Publications

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The first part of the "Structured Products Handbook" deals with structured bonds whose payoff properties depend on interest rate movements, and the following two parts focus on products whose payoff characteristics are shaped by equity prices and foreign exchange rates.

New Quantitative Models of Banking Supervision
www.oenb.at/en/img/new_quantitative_models_of_banking_supervision_tcm16-24132.pdf

Guidelines on Bank-Wide Risk Management

The Guidelines on Bank-Wide Risk Management (Internal Capital Adequacy Assessment Process) give a detailed overview of assessment procedures in all major risk categories. They provide in-depth information on the different types of capital and their suitability for risk cover. Moreover, the guidelines present quantitative methods and procedures to determine the risk-bearing-capacity of a credit institution. A separate section highlights the significance of having a limit system in place that is adequate in a given risk scenario and underscores the need for efficient internal control mechanisms.
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