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Focus on Austria

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Editor in chief:

Wolfdietrich Grau

Secretariat of the Board of Executive Directors / Public Relations

In collaboration with:

Gabriela de Raaij, Manfred Fluch, Annemarie Gaal, Walpurga Köhler-Töglhofer, Manfred Plank, Burkhard Raunig, Gerhard Rünstler, Christine Stecyna, Walter Waschiczek

Edited by:

Beatrix Kossinowsky, Christiana Weinzetel

Economic Analysis Division

Translated by:

Thomas Bartsch, Johannes Chudoba, Ingrid Haussteiner, Irene Sperl-Mühldorf, Ingeborg Schuch

Foreign Research Division

Layout, design, set, print and production:

Printing Office

Inquiries:

Oesterreichische Nationalbank

Secretariat of the Board of Executive Directors / Public Relations

Otto-Wagner-Platz 3, A-1090 Vienna, Austria

Postal address: P. O. Box 61, A-1011 Vienna, Austria

Telephone: (1) 404 20, ext. 6666

Fax: (1) 404 20 6696

Orders:

Oesterreichische Nationalbank

Mail Distribution, Files and Documentation

Schwarzspanierstraße 5, A-1090 Vienna, Austria

Postal address: P. O. Box 61, A-1011 Vienna, Austria

Telephone: (1) 404 20, ext. 2345

Fax: (1) 404 20 2399

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Contents

The opinions expressed in the section *"Studies"* are those of the individual authors and may differ from the views of the Oesterreichische Nationalbank.

Supplements

REPORTS

Austrian Bank Holidays in 1999

Only January 1 and December 25 are full bank holidays in all EU countries. Certain banking activities such as payment systems and foreign exchange will continue to function on the other holidays.

January 1	New Year's Day
January 6	Epiphany
April 5	Easter Monday
May 13	Ascension
May 24	Whitmonday
June 3	Corpus Christi Day
October 26	National Holiday
December 8	Immaculate Conception
December 24	Christmas Eve

Banks in Vienna and the other main cities are also closed Saturdays. Holidays on Saturdays or Sundays are not listed above. Furthermore, the two Austrian central bank branches in Eisenstadt and St. Pölten will be closed for their regional national holidays on November 11 and November 15, 1999, respectively.

Calendar of Monetary Highlights

December 1998

3 The Governing Board of the Oesterreichische Nationalbank decides to cut the tender rate from 3.20 to 3.00% in conjunction with the other central banks of the European System of Central Banks (ESCB). The Oesterreichische Nationalbank offers a fixed tender rate of 3% for the period from December 4 to December 18, 1998. This move marks a further step in the process culminating on January 1, 1999, when the ESCB will take over responsibility for monetary policy in the euro area.

4 The amendment of the Savings Banks Act is promulgated. The amendment makes it possible to transform into private foundations the asset management shell of savings banks whose operational units have been restructured to form corporations.

10 The Oesterreichische Nationalbank lowers its interest rate for open market transactions (GOMEX) by 20 basis points to 3.20% as of December 11, 1998.

31 The Council of the European Union adopts the irrevocably fixed conversion rates between the euro and the currencies of the participating Member States. The conversion rate between the euro and the schilling is set at EUR 1 = ATS 13,7603.

The OeNB's Tasks and Duties in the ESCB

For the OeNB, as for the central banks of all participating Member States, Austria's participation in Stage Three of EMU entails becoming an integral part of the ESCB, which consists of the ECB and the national central banks. By giving up their sovereignty over monetary policy and creating a new institution, the ECB, which was inaugurated on June 30, 1998, and forms the core of the ESCB, the Member States redefined the roles their central banks are to play as of January 1999. These new roles imply changes both to the legal system and the institutional framework as well as an altered set of tasks and duties. Taking an active part in the process of joint decision-making in monetary policy and in the decentralized implementation of measures in the euro area will figure prominently among the tasks and duties of the national central banks.

Changes to the Institutional Framework

1 On the ESCB level

Pursuant to the ESCB/ECB Statute, the founding of the ECB also marked the establishment of the European System of Central Banks, consisting of the Member States' central banks ("national central banks") and the ECB. The ESCB will be solely responsible for the euro area's single monetary policy as of January 1, 1999, and will pursue its supreme goal of price stability on the basis of full independence from political instructions. The ESCB will be managed by the ECB's decision-making bodies: the Governing Council, the Executive Board and the General Council.

As the supreme decision-making body, the *Governing Council* will formulate the monetary policy for the Member States participating in the Monetary Union, authorize the issue of banknotes and determine the volume of coins to be minted, and decide on foreign exchange operations and the management of official foreign reserves. With the support of the national central banks, the Governing Council will also be responsible for the collection of the necessary statistical information. The Governing Council will consist of the six members of the Executive Board, including the President and Vice-President of the ECB, and the Governors of the participating Member States' national central banks. Monetary policy issues are decided by a simple majority vote in which each member of the Governing Council has one vote.

The *Executive Board* comprises the President, the Vice-President and four other members; it conducts monetary policy in accordance with the Governing Council's guidelines and decisions, which also implies giving the national central banks the necessary instructions.

The *national central banks* form an integral part of the ESCB and act in accordance with the guidelines and instructions of the ECB. Besides contributing to joint decision-making processes, the national central banks will be responsible for the implementation of ECB decisions. The Executive Board has recourse to the national central banks to conduct the ECB's monetary policy to the extent deemed possible and appropriate.

The *General Council* has no influence on the euro area's monetary policy, but serves as a coordinating body in which information can be exchanged between the euro area and non-participating EU central banks. The General

Council comprises the President and Vice-President of the ECB and the Governors of all EU central banks.

1.1. Distribution of Tasks and Duties in the ESCB

Tasks and duties in the ESCB are divided between

– the ECB, where the Governing Council adopts decisions and guidelines *centrally* to safeguard the consistency of monetary policy in the euro area and
– the national central banks, which conduct the ESCB's operations on a *decentralized* level, coordinated by the ECB Executive Board.

1.2 The ESCB's Main Functions

The basic tasks to be carried out through the ESCB according to Article 105 paragraph 2 of the EC Treaty are:

– to define and implement the monetary policy of the euro area;
– to conduct foreign exchange operations consistent with the euro area's exchange rate policy;
– to hold and manage the official foreign reserves of the Member States;
– to promote the smooth operation of payment systems between the Member States.

In the field of financial market and banking supervision the ESCB contributes to the smooth conduct of policies pursued by the competent authorities. The national central banks can also assume additional tasks if they are compatible with the single monetary policy.

2 On the Level of National Central Banks

Up until December 31, 1998, decisions on monetary policy and their implementation remain the responsibility of the national central banks.

The fundamental redefinition of the role and structure of European central banks induced by Monetary Union also brought about changes in the OeNB.

2.1 Legal and Organizational Restructuring of the OeNB

The Amendment to the Nationalbank Act of April 24, 1998, promulgated in the Federal Law Gazette I No. 60/1998, includes the provisions for institutional and organizational changes necessary to achieve legal convergence as laid down by the EC Treaty and the ESCB Statute. The institutional aspects of the OeNB decision-making bodies' independence were modified, the distribution of responsibilities between the General Council and the Governing Board was adapted and the positions of Governor and Vice-Governor were created. Article 2 of the Nationalbank Act, which defines the OeNB's tasks and objectives, was rephrased to comply with the objectives defined in the Maastricht Treaty; this amendment will take effect on January 1, 1999. To safeguard a smooth and complete integration into the structures of the ESCB, the provisions on tasks and instruments were also adapted.

– With the introduction of the euro, all the *General Council's* monetary policy powers will be transferred to the ECB. The General Council's

responsibilities will very much resemble those of a corporation's supervisory board, it shall however provide advice to the Governing Board on operational matters and monetary policy. In matters not linked to the ESCB, the General Council continues to be responsible for approving or taking decisions.

– As in the past, the *Governing Board* is in charge of the OeNB's internal affairs, and now, in addition, it manages external business. In pursuing objectives and performing tasks within the ESCB the Governing Board is bound by the guidelines and instructions laid down by the ECB. The Governing Board comprises the Governor, the Vice Governor and two other members; Board members are nominated by the Austrian Federal President after a proposal by the Federal Government. The period of office, which can be renewed once, has been set at five years.
– The national central banks' *Governors* have a crucial role to play in the ESCB as – together with the members of the ECB Executive Board - they decide the euro area's monetary policy in the ECB Governing Council. To reinforce the OeNB Governor's independence the 1998 Amendment to the Oesterreichische Nationalbank Act provides that in performing these functions the Governor is in no way bound either by the decisions of the Governing Board or those of the General Council nor is he subject to any other instructions.
– As of January 1, 1999, the *capital of the Oesterreichische Nationalbank* will be raised from ATS 150 million to EUR 12 million (some ATS 167 million).

2.2 Changes in the OeNB's Tasks and Duties

In future the ECB Governing Council will define the euro area's monetary policy. The decisions will then be implemented, where possible and appropriate, by the national central banks, as their closer links with and greater knowledge of domestic markets make them the natural counterparty for banks in the regional financial markets.

2.2.1 Changes of the Monetary Policy Instruments

– Open Market Policy

  The ESCB uses its most important monetary policy instrument, open market transactions, to steer interest rates and liquidity on the market and indicate its monetary policy course. Weekly liquidity-providing repo transactions with a maturity of two weeks serve as the primary refinancing instrument. These transactions will be conducted by the national central banks in the form of standard tenders (fixed rate or variable rate tender). The OeNB and the other national central banks will be responsible for collecting the tender offers and transmitting them to the ECB as well as informing the credit institutions of the results and settling the transactions. Monthly longer-term refinancing operations with a three-month maturity, structural open market operations and the operational side of issuing ECB debt certificates will also be carried out by the national central banks. The Governing Council can authorize fine-tuning operations, outright transactions of securities, foreign exchange

swaps and the collection of fixed-term deposits to be conducted by the ECB itself in exceptional cases. The national central banks act as the commercial banks' exclusive counterparties for the two standing facilities: the marginal lending facility[1]) and the deposit facility.[2])
Of the standing facilities used in Austria in the past, the GOMEX and the discounting of bills of exchange[3]) will be discontinued as of December 31, 1998. Daylight overdraft and overnight credit will be available in an adapted form. Selective forms of refinancing (export bills of exchange, ERP bills of exchange) will gradually be transferred to the Oesterreichische Kontrollbank. Repurchase transactions with the Oesterreichische Kontrollbank and the Federal Export Fund were discontinued as of October 1998 and December 1998, respectively.

– Minimum Reserves
Credit institutions in the euro area are required to hold minimum reserves at the national central bank in the Member State where they are located. The credit institutions subject to this minimum reserve requirement will be eligible for central bank refinancing.
The ECB Governing Council has approved a regulation governing the details of the reserve base, the reserve ratios, allowances and the remuneration of reserve holdings.[4])

2.2.2 Managing the Official Foreign Reserves

The ECB is equipped with official foreign reserves for possible interventions in the foreign exchange market and to underpin confidence in the euro. Initially these reserves will amount to approximately EUR 40 billion. The OeNB's share is some ATS 16 billion.[5]) The national central banks will manage the ECB's foreign exchange reserves in a fiduciary capacity, according to the ECB's foreign exchange investment guidelines. The lion's share of Austria's official foreign reserves will remain with the OeNB, which will manage them in accordance with the ECB guidelines.

2.2.3 Printing and Issuing Bank Notes

In the past, the OeNB held the exclusive right to issue bank notes in Austria. As of January 1, 1999, the OeNB will be authorized, subject to the permission of the ECB, to issue euro bank notes and to print the initial supply of euros for Austria. Thus, providing Austria's economy and population with bank notes and coins remains one of the central tasks of the OeNB and its branch offices.

2.2.4 TARGET, RTGS and ARTIS

Settling money market operations in the euro area requires a reliable payments system capable of providing rapid settlement throughout the monetary area. The TARGET system comprises a network interlinking the central banks and an attached RTGS in each country. This system can not only be used for money market operations but commercial banks can also employ it to settle their payments. The Austrian component, ARTIS, is a state-of-the-art settlement tool and its integration into TARGET as of January 1, 1999, has been secured.

2.2.5 Banking Supervision in the ESCB

Banking supervision remains in the hands of national authorities in Stage Three of EMU and consequently, the OeNB's responsibilities in this field are untouched by the establishment of the ESCB. Article 5 paragraph 5 of the EC Treaty, however, states that the ESCB contributes to the smooth conduct of policies pursued by the competent authorities in the supervision of credit institutions and safeguarding the financial system's stability; the main objective is to promote an efficient alignment of efforts between the ESCB and the national supervisory bodies. By intensifying the mutual exchange of information, the ESCB will also help forge closer links with EU supervisory authorities.

With the restructuring of financial markets in Europe, enhanced market transparency and growing international competition, as well as progressing disintermediation and increasing financial vulnerability in ever more closely knit global financial markets, banking and financial market supervision faces a host of new challenges.

2.2.6 Focus on Macroeconomic Analysis and Statistics

As the Governors will in future be participating monetary policy decisions for a currency area that exceeds established national dimensions, the departments dealing with statistics and analysis are called upon to assume additional tasks and responsibilities. The OeNB's economic analysis activities will focus on monetary policy in the euro area as a whole. The single monetary policy's effects on the Austrian economy will become one of the key issues for analysis and the OeNB will continue to formulate recommendations for Austria's economic policy. Our Eastern European neighbors' economic development will also remain a focal point of research at the Bank. OeNB surveys on banks, the financial market and the balance of payments form the statistical backbone of the economic analyses. Monetary and balance of payments statistics will be compiled in a standardized format throughout the euro area.

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1 The marginal lending facility is largely similar to the OeNB's current lombard loans.

2 The deposit facility can be compared with the REGOM-Call currently used in Austria; however, OeNB cash bonds ("Kassenscheine") no longer serve as collateral.

3 In future, the national central banks can list bills of exchange, like debt obligations and debt instruments issued by credit institutions, among the tier-two assets which are of particular importance for their national financial markets and banking systems.

4 Holdings of required reserves are remunerated at the two-week standard-tender rate. In contrast to some other participating Member States, Austria already had a minimum reserve requirement, without remuneration and with varying reserve ratios for different types of assets.

5 Each NCB's contribution is calculated on the basis of its share in the ECB's current capital of approximately EUR 4 billion. The difference between the projected level of foreign reserves of EUR 50 billion and the initial level of EUR 40 billion stems from the missing shares to be contributed by the Member States not yet participating in EMU. The OeNB holds 2.3594% of the ECB's capital; correspondingly, its share in the official foreign reserves transferred to the ECB comes to approximately ATS 16 billion. These foreign reserves are exchanged for remunerated debt claims against the ECB. Furthermore, the OeNB will receive its due share of the income generated by the ECB's official foreign reserves.

Annex

The OeNB in the ESCB

Changes to the Institutional Framework and the Distribution of Functional Duties

Area	Changes and New Duties
Legal framework	– 1998 Amendment to the Nationalbank Act, Federal Law Gazette I No. 60/1998
Effects on the institutional framework	– The OeNB General Council hands over monetary policy powers to the ECB. – The OeNB Governing Board is subject to the guidelines and directives of the ECB governing bodies. – The OeNB Governing Board comprises the Governor, the Vice Governor und two other. members, who are all nominated for a period of five years. – The OeNB's capital is raised from ATS 150 million to EUR 12 million.
The OeNB Governor's role in the ESCB	– As a Member of the ECB Governing Council the OeNB Governor is in no way subject to any instructions – Together with the other NCBs' Governors and the ECB Executive Board he determines monetary policy; a simple majority principle (one member - one vote) applies in the ECB Governing Council.
Monetary Policy *1. Overall changes*	– Monetary policy is decided on a centralized level, by the ECB Governing Council and the ECB Executive Board. – The decisions are then implemented on a decentralized level by the national central banks.
2. Instruments	– Open market transactions (fixed rate and variable rate tenders) will become the ESCB's most important instrument. – The marginal lending facility and the deposit facility will serve as the two standing facilities. – A minimum reserve requirement will be introduced for all credit institutions based in the euro area. – A number of refinancing instruments (GOMEX, discounting bills of exchange, selective refinancing, lombard, refinancing lines) are discontinued as of the end of 1998.
Official foreign reserves	– The OeNB holds 2.3594% of the ECB's capital. – On the basis of this share the OeNB transfers some ATS 16 billion of foreign reserves to the ECB and receives debt claims against the ECB in return. – The national central banks manage the ECB's foreign reserves in a fiduciary capacity, according to the ECB's investment guidelines. – OeNB will receive its due share of the income generated by the ECB's official foreign reserves. – The OeNB manages the official foreign reserves which remain with the OeNB in accordance with the ECB guidelines.
Main Business Areas *1. Banknotes*	– The ECB Governing Council has the exclusive right to authorize the issue of banknotes. – Subject to the permission of the ECB, the OeNB is authorized to issue banknotes denominated in euro. – The initial supply of euro banknotes for Austria is printed by the OeNB.
2. Payment systems	– Money market operations are conducted via the TARGET payment system. – The Austrian RTGS is linked to the TARGET system. – ARTIS serves as the settlement system for the Austrian financial market.
3. Banking supervision	– Banking supervision remains the competence of the national authorities. – The ECB is involved, e. g. through its right to be heard and a mutual exchange of information with national authorities.
Other Areas *1. Economic analysis*	– The OeNB's monetary and economic policy analyses cover the whole euro area. – Special attention is paid to the single monetary policy's effects on Austria. – A main emphasis is placed on the analysis of economic developments in Central and Eastern European economies in transition.
2. Compiling statistics	– Statistics on supervision – Statistics on monetary indicators – Balance of payments statistics

Economic Outlook for Austria from 1998 to the Year 2000

Macroeconomic forecasting represents a main instrument of economic analysis, which, as one of the principal tasks of national central banks in the ESCB, is used to assess monetary policy framework conditions. To meet the increased demand for analyses, the OeNB will produce expanded model-based macroeconomic forecasts every six months. Moreover, an emphasis will be placed on further improving leading indicators on inflation developments and on making extended use of seasonally adjusted data.

This forecast is based on a macromodel of the Austrian economy, which considers both demand- and supply-side factors and is largely based on quarterly data. This makes it possible to record the dynamic interaction of main indicators more accurately and to take into account current developments more readily.

The following forecast was completed November 5, 1998.

General Assessment

The financial crises in Asia and Russia and the incipient cyclical slowdown in the U.S.A. are beginning to show first effects on the development of European industries and exports. Consequently, Austria's export market growth is likely to be hit as of the second half of 1998. Towards mid-1999 export markets may, however, recover somewhat. At the same time, hefty rises of real disposable incomes and favorable supply-side investment conditions will prop up domestic demand throughout the survey period.

The model-based forecast sets GDP growth at 3.2, 2.6 and 2.9% for the years 1998 through 2000. After a slight decline, economic growth is expected to pick up in the year 2000 on account of improved international framework conditions. The Austrian economy will, however, increasingly move towards the final stages of the economic cycle, which will be reflected in weaker investment and productivity dynamics as well as accelerating wages.

Nevertheless, real unit labor costs will continue to fall throughout the forecast horizon. Combined with delayed effects of declining commodity and energy prices, this will keep inflationary pressures at bay throughout the

Economic Environment

	1997	1998	1999	2000
	%			
GDP-growth				
U.S.A.	+ 4.0	+ 3.3	+ 2.1	+ 2.2
Euro area	+ 2.5	+ 2.9	+ 2.5	+ 2.8
Austria's export markets	+10.2	+ 6.9	+ 5.3	+ 6.5
Interest rates				
Three month rate	+ 3.5	+ 3.6	+ 3.6	+ 3.6
Ten year rate	+ 5.7	+ 4.8	+ 4.4	+ 4.4
	1990=100			
Oil prices	76	54	59	62
	ATS			
Exchange rate USD/ATS	12.2	12.3	11.4	11.4
	% of GDP			
Government deficit	– 1.9	– 2.0	– 1.9	– 1.7

Source: IMF and EU Commission forecasts (October 1998); OeNB.

Austria's Economic Outlook 1998 to 2000

	1997	1998	1999	2000
	percentage changes from previous year			
Real Final Uses				
Gross domestic product	+ 2.5	+ 3.2	+ 2.6	+ 2.9
Private consumption	+ 0.7	+ 2.0	+ 2.2	+ 2.1
Government consumption	+ 0.9	+ 1.6	+ 1.3	+ 1.1
Gross fixed capital formation	+ 3.6	+ 5.7	+ 3.9	+ 4.9
Exports	+ 6.8	+ 9.7	+ 5.6	+ 7.0
Imports	+ 6.4	+ 9.0	+ 5.7	+ 6.7
Labor market				
Nominal unit labor costs	− 0.6	− 0.1	+ 0.6	+ 0.9
Gross compensation per employee	+ 1.7	+ 2.3	+ 2.6	+ 3.0
Labor productivity	+ 2.3	+ 2.4	+ 1.9	+ 2.1
Real wages	+ 0.3	+ 1.3	+ 1.3	+ 1.8
Employment rate	+ 0.3	+ 0.9	+ 0.8	+ 0.9
Unemployment rate[1])	7.1	7.2	7.1	6.9
Prices				
GDP price deflator	+ 1.3	+ 0.9	+ 1.2	+ 1.2
Consumption deflator	+ 2.0	+ 0.8	+ 1.0	+ 1.2
HICP	+ 1.2	+ 0.8	+ 0.9	..
Import prices	+ 1.1	+ 0.7	+ 0.2	+ 1.1
Terms of trade	− 0.6	+ 0.6	+ 0.5	+ 0.2
Real disposable income	− 0.1	+ 3.3	+ 2.7	+ 3.1
Household savings ratio[2])	7.9	9.0	9.5	10.3
	ATS billion			
Current account	−56.1	−48.3	−43.9	−38.4
	in % of GDP			
	− 2.2	− 1.8	− 1.6	− 1.4

Source: OeNB.
[1]) National definition.
[2]) As a percentage of disposable income.

forecast period. Consumption deflator growth will remain limited, climbing from 0.8% in 1998 to 1.2% in the year 2000. The unemployment rate will drop from 7.2% in 1998 to 6.9% in the year 2000.

Current International Economic Environment

According to preliminary quarterly calculations of the Austrian Institute of Economic Studies, Austria's GDP grew by 4.0% in the first half of 1998. The underlying demand components developed at a divergent pace: All the data indicate a strengthening shift from export demand to domestic demand in the course of the year.

The aggregate figures for the first eight months of 1998 show goods exports at 9.5%[1]) above the previous year's level, but a look at the trends in the course of this period reveals that growth has slackened considerably since the beginning of the year. In the first quarter exports exceeded the corresponding 1997 levels by 15.4%, whereas in the second quarter this rate of expansion slowed to 8.3%; the third quarter showed a further slowdown. The waning of export dynamics will only partly affect the overall balance of 1998, it will however impact indicators in 1999 via the negative base effect.

To some extent, this loss of momentum counterbalances the 1997 developments. One of the primary factors of the rapid expansion in 1997 was the delayed effect of the dollar's appreciation in 1996. As this effect wore off, export growth dampened throughout 1998.

Furthermore, the weakening of Austria's exports is paralleled by similar trends in other European countries. The world economy has suffered marked growth setbacks; the Asian crisis and the resulting turbulence in global financial markets will continue to pose a certain risk. The effects on the euro area will largely be indirect, via the developments in the U.S.A.

The first ripples of the crisis are coming to be felt in the United States. In the third quarter the U.S.A. reported a growth rate which at 3.25% exceeded forecasts; however, growth was mainly bolstered by consumption, and the major decline of exports since January 1998 as well as a shrinking household savings ratio have been leading to increasing imbalances, which make a downturn ever more likely.

The forecasts on international economic indicators are summarized in Table 1. The projections are based on the assumption of weak export growth in the second half of 1998 and a slight recovery commencing in the second half of 1999. Interest rates and exchange rates have been extrapolated from values as of October 10, 1998, on a technical basis. Crude oil is assumed to rebound slightly, i. e. by the year 2000 prices are expected to regain half the ground lost in the 30% dive in the first half of 1998.

Domestic demand in Austria, by contrast, was buoyant in the first half of the year. Notably, real retail turnover climbed 3.4% in the first eight months of 1998. According to the OeNB's Consumer Confidence Barometer, households plan to maintain the current high level of consumption, despite somewhat subdued expectations as to the general economic development. For a more detailed account of recent international and domestic economic developments refer to the article "Economic Background" in this issue.

Demand-Side Factors

International economic trends will result in declining export growth up until mid-1999. In particular, the base effect of subdued export dynamics in the second half of 1998 will lead to a growth rate of total exports of 5.6% in 1999. The second half of 1999 could mark the beginning of a slight recovery. On the basis of projections on the cyclical developments of the global economy, exports are forecast to grow by 7.0% in the year 2000.

Throughout the forecast horizon, domestic demand will serve as the main pillar of the economy, as private households' disposable incomes rise and the cost conditions for investment are favorable. Over the past two years, budget austerity very much restricted the rise of real disposable income. Despite households cutting their savings ratio to 7.9%, private consumption was very moderate. In line with government plans, the forecasts infer a slightly decreasing deficit ratio between 1998 and the year 2000. As a consequence, private consumption will return to long-term growth. Income growth will be supported by accelerated wage growth. The model forecast places private consumption growth at an average of 2.1% over the coming years. At the same time, households will be in a position to raise their savings ratio to 10.3%, which more or less corresponds to the 1995 level.

Supply-Side Factors

The favorable cost environment for enterprises warrants a fair amount of optimism. In addition to the effects of the accelerator mechanism, favorable costs should bolster plant and equipment expenditure and employment. This should partially offset the dampening effects of the export slowdown.

On the one hand, investment and employment demand in the past two years were relatively moderate compared to the pace of economic growth; as a result, capital and labor productivity, as well as capacity utilization, climbed. Consequently, a certain investment lag has to be caught up on.

On the other hand, wage expansion has been handled with care. The moderate rate of wage growth in recent years can be seen as a reaction to the consequences of the 1993 recession and the effects of the dollar's depreciation in 1995. Austrian wage policies showed a very flexible response to the employment risks this engendered. However, after 1996, pessimistic projections on productivity may also have played a role. The moderate pace of wage growth combined with sizable productivity gains to push real unit labor costs down by an average of 1.8% each year since 1994.

In conjunction with low interest rates and reviving consumer demand, these trends may be able to partially offset the effects of slackened export growth on investment and employment. The model forecasts place gross fixed capital formation at 5.7% in 1998, 3.9% in 1999 and 4.9% in the year 2000.[2])

Labor Market

In the first ten months of 1998, employment growth accelerated sharply to 1.0% compared with the previous year's period, while healthy productivity trends prevailed. Simultaneously, labor supply has expanded considerably. Besides cyclical effects, to which Austrian labor supply is known to be particularly sensitive, legal changes with a positive impact on the creation of part-time employment are likely to have contributed to this phenomenon. The forecasts assume that the resulting structural expansion of employment demand and supply will continue throughout the forecast horizon.

The hefty productivity gains achieved since 1996 leave some room for wage hikes. Along with a certain easing of pressures in the labor market, a tendency to counterbalance the modest rises of the past two years is likely to push up wages. The model forecast predicts that total gross wage growth will speed up from 1.7% in 1997 to 3.0% in the year 2000. Productivity hikes are, however, robust enough to safeguard a continuing drop of real unit labor costs in the forecast period.

With employment rising by 0.9% on average, the unemployment rate (national definition) will fall from 7.2% in 1998 to 6.9% in the year 2000.

Inflation

Inflationary pressures can be expected to remain slight over the whole of the forecast horizon. Firstly, favorable supply components, above all the sound development of unit labor costs, are likely to keep the clamps on inflation. Second, the decline of commodity prices in early 1998 can be expected to

take the sting out of import price rises. It appears that the price-cuts were not fully passed on to consumers in the first half of 1998; consequently the forecast assumes that their longer-term effects will continue into 1999. As import price growth, at just 0.7% in 1998 and 0.2% in 1999, lies below the respective export price rises, the terms of trade will improve significantly. The low level of import prices will keep the cyclical surge of inflation at bay. Finally, the price effects in the wake of Austria's accession to the Common Market do not seem to have been fully absorbed. Harsher competition in formerly protected sectors of the economy are likely to keep dampening inflation.

As a consequence, inflation as measured by the private consumption deflator will be limited to 0.8% in 1998, 1.0% in 1999 and 1.2% in the year 2000. HICP growth decelerated throughout 1998, and amounted to just 0.6% year-on-year in September 1998. Average annual inflation is estimated at 0.8% in 1998 and 0.9% in 1999.

Current Account

In the first eight months of 1998, Austria's current account gap shrank slightly, by ATS 3.7 billion, compared with the corresponding 1997 period. Decelerated exports and continuing robust domestic demand result in a negative growth effect of net exports in the order of 0.1%. The effects on the current account will, however, be more than made up for by the decline of commodity prices and the resulting improvement of the terms of trade. In the year 2000, net exports will once again begin to contribute to growth. Overall, the current account deficit will be cut from ATS 48.3 billion (1.8% of GDP) in 1998 to ATS 38.4 billion (1.4% of GDP) in the year 2000.

Risks

International forecasters stress that their forecast risks are currently relatively high. Furthermore, the risks emanating from the international economic environment are generally thought to be rather asymmetric. Less favorable economic conditions on the European level would hamper Austria's exports more seriously than presumed in this forecast. In due course, business confidence and, consequently, domestic investment demand in Austria could suffer. Conversely, the forecast assumes that the savings ratio in Austria will progress steeply. Thus, with a more modest savings ratio, robust consumption growth could be sustainable even if income developments do not quite meet expectations. A shift to more rapid inflation appears to be unlikely. Nevertheless, the current high levels of capacity utilization may be a source of upward pressures.

1 Preliminary data for the third quarter were not available as of the forecast's closing date. The data which have become available indicate a further slowdown: The aggregate figures for July and August exceed the previous year's figures by just 2.7%.

2 The forecast model's investment equation is based on a long-term equilibrium relation between the capital stock and capital and labor costs. Aggregate demand is employed as an additional explanatory short-term variable.

Annex

Table 1

Demand Components

in real terms, at 1983 prices

	1997	1998	1999	2000	1997	1998	1999	2000
	ATS billion				*change from previous year in %*			
Private consumption	969,954	989,456	1,011,545	1,033,022	+0.7	+2.0	+2.2	+2.1
General government consumption	282,485	287,031	290,750	293,868	+0.9	+1.6	+1.3	+1.1
Gross fixed capital formation	444,994	470,278	488,815	512,564	+3.6	+5.7	+3.9	+4.9
Errors and omissions	16,217	14,482	16,710	17,240	×	×	×	×
Domestic demand	1,713,650	1,761,247	1,807,821	1,856,694	+2.4	+2.8	+2.6	+2.7
Exports (total)	941,582	1,033,158	1,091,061	1,167,443	+6.8	+9.7	+5.6	+7.0
Imports (total)	948,878	1,034,193	1,093,325	1,166,799	+6.4	+9.0	+5.7	+6.7
Gross domestic product	1,706,354	1,760,213	1,805,557	1,857,338	+2.5	+3.2	+2.6	+2.9

Source: OeNB.

Table 2

Demand Components (At Current Prices)

	1997	1998	1999	2000	1997	1998	1999	2000
	ATS billion				*change from previous year in %*			
Private consumption	1,412,536	1,452,884	1,499,429	1,549,005	+2.7	+ 2.9	+3.2	+3.3
General government consumption	487,248	503,327	518,427	533,461	+1.9	+ 3.3	+3.0	+2.9
Gross fixed capital formation	607,768	651,752	685,439	728,516	+5.4	+ 7.2	+5.2	+6.3
Errors and omissions	25,590	15,404	14,621	12,570	×	×	×	×
Domestic demand	2,533,142	2,623,368	2,717,916	2,823,552	+4.0	+ 3.6	+3.6	+3.9
Exports (total)	1,061,327	1,179,782	1,255,599	1,360,018	+7.3	+11.2	+6.4	+8.3
Imports (total)	1,077,512	1,182,500	1,253,299	1,351,645	+7.6	+ 9.7	+6.0	+7.8
Gross domestic product	2,516,957	2,620,649	2,720,216	2,831,925	+3.9	+ 4.1	+3.8	+4.1

Source: OeNB.

Table 3

Demand Components (Price Indices)

	1997	1998	1999	2000	1997	1998	1999	2000
	1983=100				*change from previous year in %*			
Private consumption	145.6	146.8	148.2	149.9	+2.0	+0.8	+1.0	+1.2
General government consumption	172.5	175.4	178.3	181.5	+1.0	+1.7	+1.7	+1.8
Gross fixed capital formation	136.6	138.6	140.2	142.1	+1.7	+1.5	+1.2	+1.4
Domestic demand	147.8	148.9	150.3	152.1	+1.6	+0.8	+0.9	+1.2
Exports (total)	112.7	114.2	115.1	116.5	+0.5	+1.3	+0.8	+1.2
Imports (total)	113.6	114.3	114.6	115.8	+1.1	+0.7	+0.2	+1.1
Gross domestic product	147.5	148.9	150.7	152.5	+1.3	+0.9	+1.2	+1.2

Source: OeNB.

Table 4

Labor Market

	1997	1998	1999	2000	1997	1998	1999	2000
	number				*change from previous year in %*			
Labor supply	3,657,817	3,690,012	3,711,125	3,731,261	+0.3	+0.9	+0.6	+0.5
Employment	3,424,469	3,450,762	3,472,293	3,498,673	+0.3	+0.8	+0.6	+0.8
Dependently employed	3,055,569	3,083,522	3,107,982	3,137,267	+0.3	+0.9	+0.8	+0.9
Self-employed	368,900	367,240	364,311	361,405	+0.1	−0.4	−0.8	−0.8
Unemployed	233,348	239,250	238,833	232,588	+1.2	+2.5	−0.2	−2.6
	%							
Unemployment rate								
National definition	7.1	7.2	7.1	6.9	×	×	×	×
OECD definition	6.4	6.5	6.4	6.2	×	×	×	×
	ATS							
Gross wages per employee								
In money terms	415,419	424,996	435,875	449,002	+1.7	+2.3	+2.6	+3.0
In real terms (at 1990 prices)	281,690	285,468	289,317	294,483	+0.3	+1.3	+1.3	+1.8
	1993=100							
Real unit labor costs	94.6	93.6	93.1	92.8	−1.9	−1.0	−0.6	−0.3

Source: OeNB.

Table 5

Current Account

	1997	1998	1999	2000	1997	1998	1999	2000
	ATS billion				*% of GDP*			
Uses								
Net exports	− 16,185	− 2,718	2,300	8,373	−0.6	−0.1	+0.1	+0.3
Net factor income	− 3,369	− 3,369	− 3,369	− 3,369	−0.1	−0.1	−0.1	−0.1
Transfers from abroad	− 31,711	− 32,948	− 33,760	− 34,592	−1.3	−1.3	−1.2	−1.2
Balance	− 51,265	− 39,036	− 34,829	− 29,588	−2.0	−1.5	−1.3	−1.0
Net saving								
Households	120,727	143,837	156,581	177,397	+4.8	+5.5	+5.8	+6.3
General government	− 47,238	− 51,301	− 52,082	− 49,347	−1.9	−2.0	−1.9	−1.7
Other sectors	−124,754	−131,572	−139,328	−157,637	−5.0	−5.0	−5.1	−5.6
Current account balance (ESA 95)	− 56,067	− 48,336	− 43,880	− 38,389	−2.2	−1.8	−1.6	−1.4

Source: OeNB,

Table 6

National Income

	1997	1998	1999	2000	1997	1998	1999	2000
	ATS billion				*change from previous year in %*			
Gross domestic product	2,516,957	2,620,649	2,720,216	2,831,925	+3.9	+4.1	+3.8	+4.1
Capital consumption	344,182	359,586	378,653	398,730	+6.0	+4.5	+5.3	+5.3
Indirect taxes	317,977	337,100	353,597	372,495	+5.2	+6.0	+4.9	+5.3
Net factor income	− 3,369	− 3,369	− 3,369	− 3,369	×	×	×	×
National income (excluding net transfers to the EU)	1,858,167	1,927,332	1,991,336	2,064,069	+3.1	+3.7	+3.3	+3.7
Disposable income								
Households	1,533,263	1,596,721	1,656,010	1,726,402	+1.9	+4.1	+3.7	+4.3
General government	514,381	532,624	549,442	570,392	+6.9	+3.5	+3.2	+3.8
Other sectors	160,211	168,035	173,240	174,362	+8.7	+4.9	+3.1	+0.6
Disposable national income	2,207,855	2,297,380	2,378,692	2,471,156	+3.5	+4.1	+3.5	+3.9

Source: OeNB.

Table 7

Households

	1997	1998	1999	2000	1997	1998	1999	2000
	ATS billion				*change from previous year in %*			
Gross compensation of employees	1,269,328	1,310,484	1,354,716	1,408,672	+2.0	+ 3.2	+3.4	+ 4.0
General government transfers	528,915	547,000	575,575	607,074	+0.4	+ 3.4	+5.2	+ 5.5
Other household income	457,446	483,637	502,020	521,135	+8.3	+ 5.7	+3.8	+ 3.8
Direct taxes on households	722,426	744,401	776,300	810,479	+4.9	+ 3.0	+4.3	+ 4.4
Disposable household income	1,533,263	1,596,721	1,656,010	1,726,402	+1.9	+ 4.1	+3.7	+ 4.3
Households' consumption	1,412,536	1,452,884	1,499,429	1,549,005	+2.7	+ 2.9	+3.2	+ 3.3
Households' saving	120,727	143,837	156,581	177,397	−7.0	+19.1	+8.9	+13.3
Households' saving ratio	*7.9*	*9.0*	*9.5*	*10.3*	*x*	*x*	*x*	*x*
Disposable income (at 1983 prices)	1,052,872	1,087,432	1,117,194	1,151,352	−0.1	+ 3.3	+2.7	+ 3.1

Source: OeNB.

Livelier Domestic Demand Compensates Slackening Export Drive

Economic output expanded at a healthy pace in Austria in the first half of 1998. According to the quarterly national accounts compiled by the Austrian Institute of Economic Research, WIFO, GDP grew 4.4 and 4.0% year on year in the first and second quarters. Beyond the headline figure, economic indicators across the board suggest that exports are being steadily displaced as the engine of growth by domestic demand. Probably what with foreign exchange effects that benefited the Austrian economy earlier tapering off and the global economic slowdown filtering through, exports of goods slackened more and more as the year progressed. By contrast, domestic consumption increasingly gained steam during the first half as personal incomes rebounded.

The fact that the upturn is less and less export-led is among other things evident from production and job figures, and business surveys suggest that the trend is set to continue. The seasonally adjusted survey figures on the Austrian economy published by the European Commission indicate that, in sync with developments across the EU, business sentiment has been getting gloomier in Austria since March, with order levels and industrial output corroborating the bleaker outlook. Consumer confidence continues to be strong, however.

Merchandise Exports Down

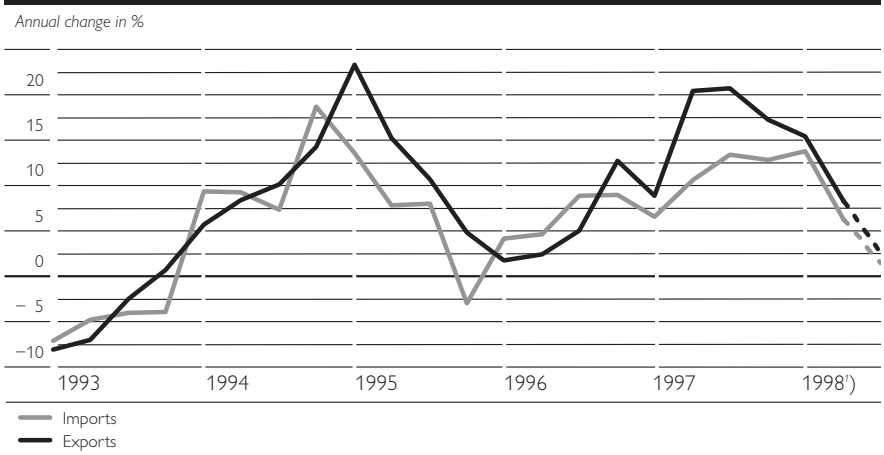
In 1997, deliveries of goods abroad jumped 16.8% and imports of goods surged 10.9% in nominal terms according to the Austrian Central Statistical Office's foreign trade returns. As a consequence, the trade deficit improved by ATS 32.5 billion, and net merchandise exports according to the national accounts contributed 0.9% to GDP growth. The gratifying development of exports can be ascribed to the growing interlinkage of world trade, the dynamic growth of Austrian export markets (+7.5%) and the marked improvement of Austrian unit labor cost over comparable costs in trade partner countries. Moreover, the real effective exchange rate of the Austrian schilling deteriorated 3.3% in 1997. In terms of industrial unit labor cost, Austria's price competitiveness in fact augmented 5.4%.

By contrast, the first half of 1998 saw a pronounced contraction of export growth. Cumulatively, exports from January to August still exceeded the analogous 1997 figure by a hefty 9.5%, but this figure masks a significant cascading downtrend in export performance: First-quarter results were up 15.4% from a year earlier, second-quarter results just 8.3%, and the July/August figure a mere 2.7%. Import growth rates likewise went down over this period, from 13.8% in the first, to 6.2% in the second quarter, and to a meager 1.5% in the months of July and August.

Actually, not only the cumulative result but also the quarterly figures probably paint too favorable a picture, because the latter are skewed by the base effect of a robust second-half 1997 expansion inflating first-half 1998 gains over the analogous 1997 figure. A sound judgment of the quarterly performance could only be made on the basis of seasonally adjusted figures, but such data are not available at present.

The flattening of the export growth rate in 1998 can be seen as a correction of 1997's buoyant expansion, which in turn can be traced to some extent to the lagged impact of the effective depreciation of the Deutsche mark and the Austrian schilling that took place in 1996. The subsiding depreciation effects, thus, went hand in hand with dwindling export growth rates. However, this can only be part of the explanation. Shrinking global economic growth must also have played a role. The main indirect drag on Austrian exports in this respect comes from lower demand for Austrian intermediate goods on the part of German and other European exporters.

Austrian Foreign Trade



¹) Latest figure: July and August 1998 total.
Source: ÖSTAT.

The deficit of the Austrian current account corresponded to 1.9% of GDP in 1997. Nine months into 1998, a slight deterioration on the year-earlier figures is apparent for the first time in the year, with the September figures tipping the scales toward a widening of the gap by ATS 4.3 billion to ATS 36.9 billion year on year. August 1998 had still seen a contraction by ATS 3.7 billion compared with a year ago. By major subaccounts, the deficit on merchandise payments deteriorated by ATS 5.8 billion to ATS 71.8 billion, whereas the services surplus grew ATS 7.8 billion to ATS 34.8 billion. The deterioration from August to September can be exclusively attributed to the development of factor incomes and current transfers, which can be ascribed to special factors likely to undergo a correction in the months ahead.

Increased Impetus from Consumer Demand

Throughout 1997, domestic demand was rather muted, with a growth rate of 1.5%. By contrast, in the first months of 1998 there was mounting evidence that economic growth was also filtering through to the domestic sectors of the economy.

In particular, real incomes can be expected to have rebounded considerably in 1998 and to do so also in 1999, following a phase of fiscal retrenchment in the two previous years. Even if part of the gains are put by,

which will push up the savings rate, domestic consumption is bound to increase and boost the domestically oriented sectors.

This trend is most conspicuous in retail trade turnover, which, eight months into 1998, picked up 3.4% in real terms after having dwindled throughout 1997. Sales of consumer durables, to which changes in personal incomes translate more strongly, advanced at a faster clip (+7.1%) than nondurable consumer goods (+1.6%). Evidently households are now making up for purchases of durable consumer goods put off during the past two lower-income years.

By comparison, the most recent results of the consumer confidence barometer do not convey any such strong signals. The data point to a slight improvement of the consumption climate, which is however on a steady rise. Despite expectations of a global economic deterioration, the further development of personal incomes is viewed favorably.

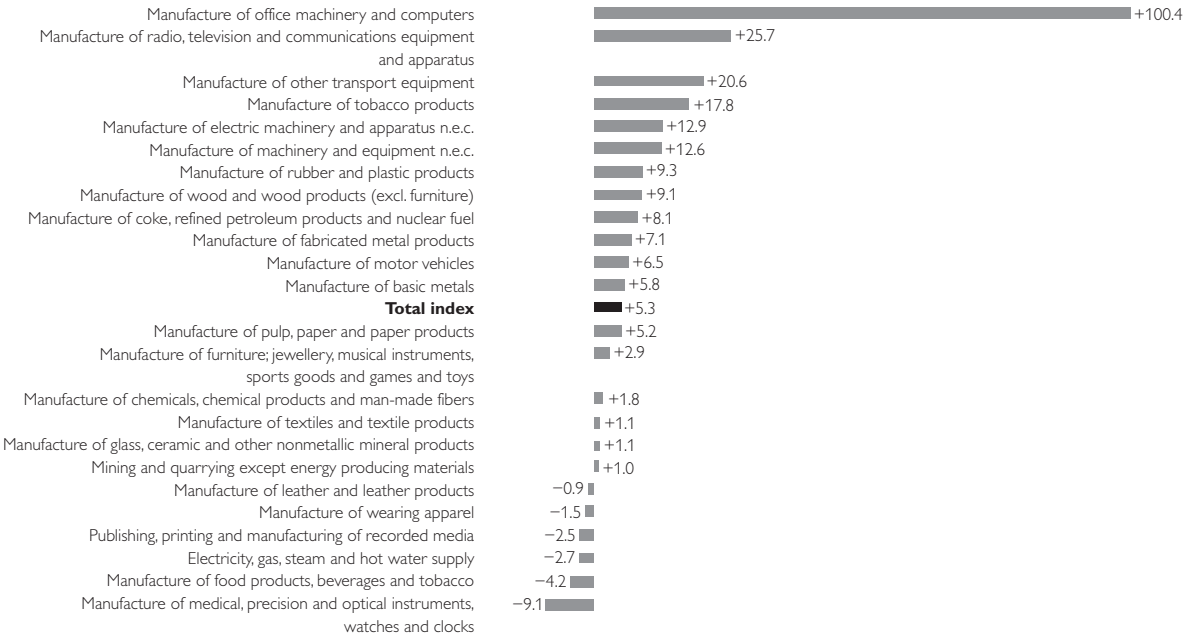
With the 1997 deficit coming to 1.9% of GDP according to the budget notification of September 1998, the government succeeded in undershooting the target for the year. The management of the state and municipal budgets contributed importantly to this outcome. Austria's debt ratio ran to 64.3% of GDP in 1997, down from nearly 69.5% in 1996.

Ongoing Manufacturing Boom

According to the business survey conducted by the Austrian Central Statistical Office, manufacturing increased 6.4% in 1997, with intermediate goods (+8.75%) and capital goods (+5.2%) racking up particularly hefty gains. By contrast, production of durable consumer goods was on the decline

Manufacturing Indices According to the Austrian Statistical Classification of Economic Activities (ÖNACE) January to July 1998

Annual change in % from January to July 1997 averages



Source: ÖSTAT.

(-2.3%). Interim data show capital goods and durables gathering momentum in the second half. Construction services advanced 4.3% on average in 1997.

The manufacturing boom continued throughout the first seven months of 1998, slightly trailing the 1997 average with a growth rate of 5.3% year on year. Capital goods (+11.3%) and durables (+23.3%) displayed a pronounced upward trend, whereas intermediate goods (+4.4%) contracted markedly. Those figures tie in with the overall picture of dwindling export momentum offset by strengthening domestic demand.

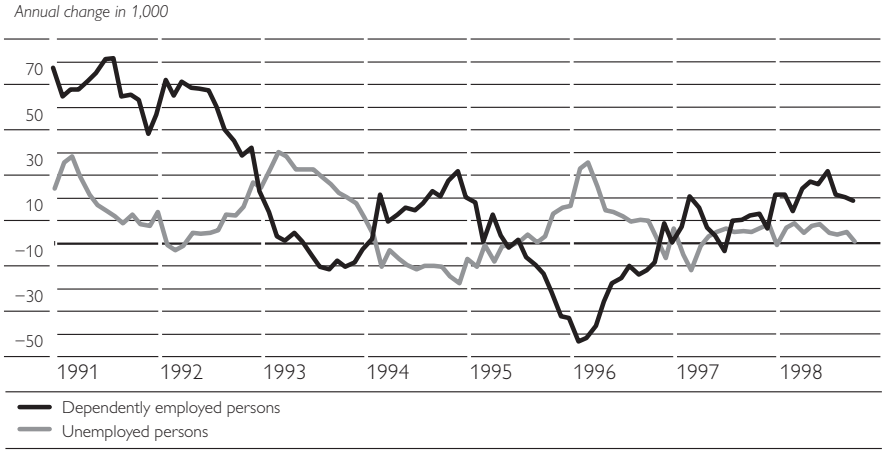
Business expectations of future developments have been getting gloomier since the first quarter of 1998. According to the October business survey conducted by the Austrian Institute of Economic Research, the number of companies banking on output increases shrank to 2% net (as offset by companies expecting output drops). The downward trend is especially conspicuous with basic and intermediate goods, whereas the outlook of the capital and consumer goods industries continues to be rosy.

More Jobs Added in the Services Sector

The 1997 economic uptrend benefited the labor market, driving a 0.4% increase, but the effects were still subdued. Employment has been rising robustly throughout 1998, exceeding the analogous 1997 figure by 1.0% in October. There has been a marked shift in jobs away from (export-oriented) manufacturing to services.

While in June employment in manufacturing had still been up 2.3% on a year before, the surplus had shrunk to 1.5% by September. The services sector, by contrast, expanded in the past few months. From a June growth rate of 0.7% year on year, it edged up to 1.1% in September. By comparison with a year ago, healthy increases in business-related services on the order of 6.3% were juxtaposed with a more languid development in trade and health services. In the most recent months, though, trade and health services were the very segments that led the recovery, with the effect that trade jobs now trail the year-earlier figures by a mere 1.1%, down from 2.2% in June.

Employment and Registered Unemployment



Source: Austrian Public Employment Office, Association of Austrian Social Security Institutions.

As the creation of new jobs was accompanied by an expansion of the pool of eligible labor, the unemployment rate, 7.1% in September, continued to be above the analogous 1997 figure. Austria's labor market has always been characterized by labor supply that is highly responsive to heightened demand. In 1998, however, this underlying tendency was further reinforced through legislative changes taking effect (reduction of the period of parental leave, the phasing out of special assistance payments pending retirement), which led to a structural increase in women's rate of labor force participation. Not until 1999 is the upturn expected to make inroads into the ranks of the unemployed.

Austria Remains a Price Stability Leader in the EU

Austria has been one of the EU-wide role models for price stability since 1997. The inflation rate according to the Harmonized Index of Consumer Prices (HICP) ran to 1.2% in 1997, and the CPI rate to 1.3%. As 1998 progressed, the pace of price increases diminished steadily. In September 1998, HICP inflation amounted to just 0.6% year on year, down from 1% in May. In other words, there was close to no uptick in prices in the third quarter.

Several factors are likely to have coincided to produce this inflation result. To begin with, a moderate wage policy has been pursued since 1995 to absorb burgeoning unemployment and to offset the deterioration of competitiveness resulting from the schilling's strength against other currencies in 1995. Consequently, real wages dropped 1.1% on balance between 1996 and 1997, with wages therefore exerting no upward pressures on inflation. Moreover, world market prices for nonfuel crude materials sank some 10%, and crude oil prices even roughly 30% in the first few months of 1998. In the year to September this caused retail fuel prices to go down 4.4% year on year, which translated into a 0.4% drop of the HICP. This is likely to have also pushed the wholesale price index down, which in October lay 1.6% below the analogous 1997 figure.

The depreciation of the U.S. dollar, among other things, triggered a turnaround in the movements of effective exchange rates toward the middle of 1998. Following a two-year downward trend, the September index of nominal exchange rates jumped to 2.0% above the corresponding 1997 figure. Reaching 1.2%, the upward movement of the real effective exchange rate index was somewhat slower, due to the negative inflation differential.

Development of Selected Economic Indicators

	1996	1997	1998[1])	1999[1])	last recently available period	
					1997	1998
	Annual change in %					
Economic output					*1st half*	
Real GDP at 1983 prices	+ 2.0	+ 2.5	+ 3.3	+ 2.8	− 1.3	+ 4.2
thereof: investment	+ *2.5*	+ *2.8*	+ *5.3*	+ *3.6*	+ *1.5*	+ *7.0*
private consumption	+ *2.0*	+ *0.7*	+ *1.8*	+ *2.0*	− *0.5*	+ *2.0*
Productivity					*January to July*	
GDP per employee	+ 2.6	+ 2.4	+ 2.3	+ 1.9	×	×
Industrial output	+ 1.3	+ 5.3	+ 6.5	+ 4.0	+ 4.1	+ 5.3
Productivity per hour	+ 4.6	+ 5.9	+ 5.5	+ 4.5	×	×
Labor market					*January to October*	
Dependent employment	− 0.7	+ 0.3	+ 0.8	+ 0.8	+ 0.3	+ 0.7
Registered unemployment	+ 6.9	+ 1.2	+ 2.1	− 1.3	+ 0.8	+ 2.2
	%					
Unemployment rate						
EU concept	4.3	4.4	4.5	4.4	4.4	4.5
National concept	7.0	7.1	7.2	7.0	7.0	7.1
	Annual change in %					
Prices						
National CPI	+ 1.9	+ 1.3	+ 1.0	+ 1.0	+ 1.4	+ 1.0
HCPI	+ 1.8	+ 1.2	×	×	+ 1.2	+ 0.9
Wholesale price index	+ 0.0	+ 0.4	×	×	+ 0.3	− 0.2
Wages						
Negotiated standard wage rate index	+ 2.4	+ 1.8	+ 2.2[2])	+ 2.7[2])	+ 1.8	+ 2.2
Unit labor cost						
General	− 0.5	− 0.5	+ 0.0	+ 0.8	×	×
Manufacturing industry	− 1.0	− 5.0	− 4.0	− 1.5	×	×
Relative unit labor cost[3])						
Vis-à-vis major trading partners	− 2.2	− 4.9	− 2.8	− 0.8	×	×
Vis-à-vis Germany	− 0.6	− 0.6	− 1.9	− 0.9	×	×
External trade (ÖSTAT)					*January to August*	
Imports, in nominal terms	+ 6.7	+10.9	+ 8.3	+ 8.1	+ 9.6	+ 7.9
Exports, in nominal terms	+ 5.5	+16.8	+ 9.6	+ 8.1	+15.0	+9.5
	ATS billion					
Balance of payments[4])					*January to September*	
Current account balance	−52.3	−56.1	−48.4	−47.5	−32.5	−36.9
Goods balance	−77.3	−51.7	×	×	−46.0	−51.8
Service balance	+48.4	+20.8	×	×	+27.1	+34.9
Travel balance	+22.7	+18.9	+25.4	+31.6	+11.7	+19.6
	%					
Interest rates					*October*	
Call money rate	3.19	3.27	×	×	3.37	3.37
Secondary market yield (government bonds)[5])	6.32	5.68	4.80	4.60	5.62	4.30
	Annual change in %					
Effective exchange rate					*January to September*	
Nominal	− 1.5	− 2.3	+ 0.6	+ 1.3	− 2.5	− 0.3
Real	− 2.1	− 3.3	− 0.6	− 0.2	− 3.4	− 0.5
	% of GDP					
Budget						
Central government deficit	3.7	2.7	2.6[6])	2.6	×	×
General Government deficit	3.7	1.9	2.2[6])	2.1	×	×

Source: OeNB, ÖSTAT, WIFO, AMS, Association of Austrian Social Security Institutions.

[1]) WIFO forecast of October 1998.

[2]) Change in gross earnings per employee.

[3]) Manufacturing industry.

[4]) Interim cash balance.

[5]) Ten-year federal government bonds (benchmark).

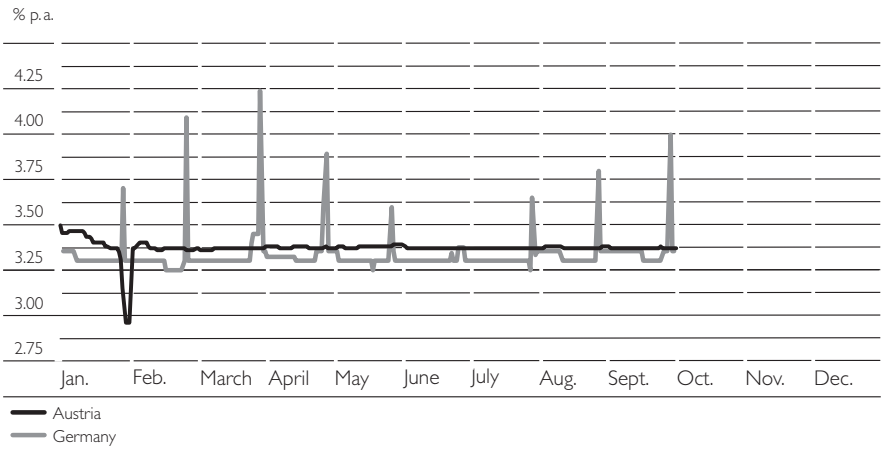
[6]) Budget notification of September 1998.

Money and Credit in the First Three Quarters of 1998

Ample Liquidity on the Money Market

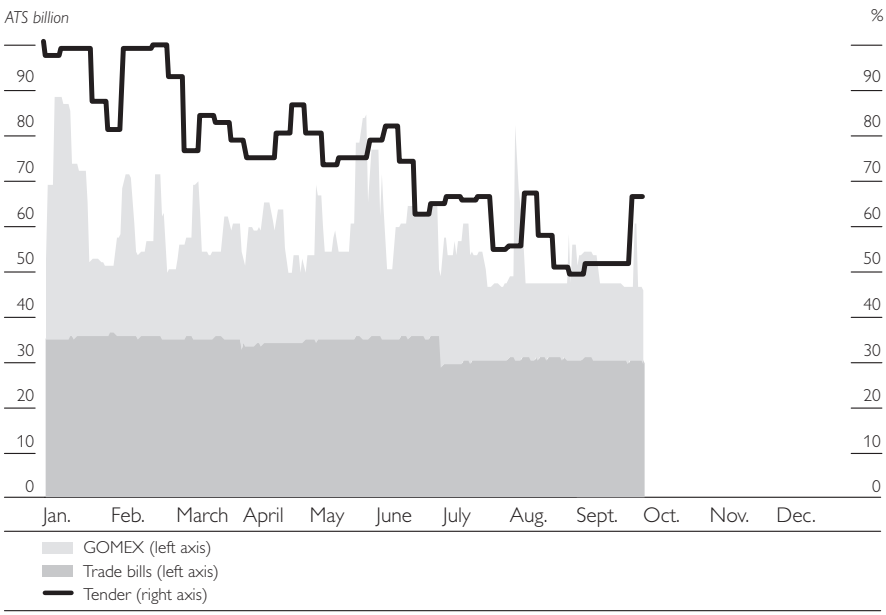
Schilling money market rates remained highly stable in the first nine months of 1998. It was only towards the close of January/beginning of February – as pointed out in Focus on Austria 2/1998 – that the call money rate reached an exceptional low at 2.95%, dipping below the tender rate, and then fluctuated between 3.35 and 3.40%, i.e. within an extremely narrow bracket. Thus, Austrian short-term rates lay somewhat higher than comparable Euro-Deutsche mark rates throughout the review period, with the exception of the temporary drop of the call money rate end of January and the Deutsche mark gyrations at the end of each month.

Call Money Rates Austria – Germany 1998



Quelle: OeNB.

Tenders and Refinancing Limits in 1998



Source: OeNB.

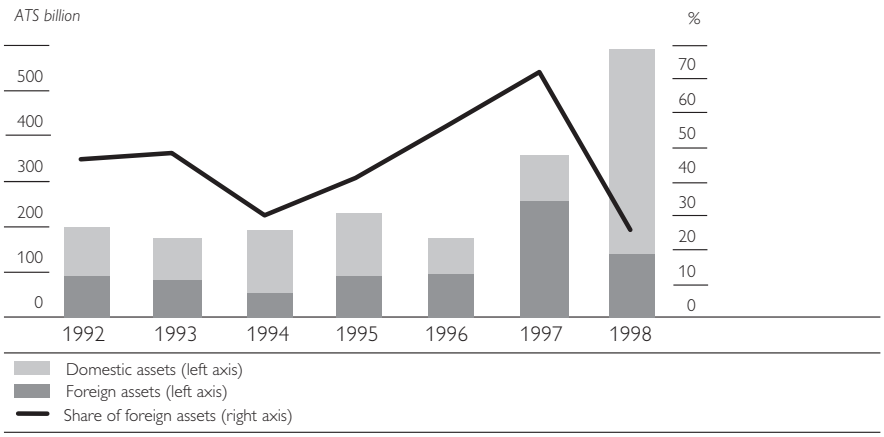
Throughout the first nine months of 1998, the OeNB left the tender rate unchanged at 3.2%. The discount and lombard rates (2.5 and 4.75%, respectively) as well as the interest rate for GOMEX transactions (3.4%) also stayed unaltered in the period under review.

Austria's money market was generally awash with liquidity during the entire survey period. Banks used the central bank's standard refinancing lines to a slightly greater extent (58% on average) than in the analogous 1997 period (51%). At over 90%, the allocation of central bank money via tender operations was relatively high in the first quarter. In the following months it declined gradually, averaging 75% in the second quarter and retreating to 58% in the third quarter.

Balance Sheet Total Grows on the Back of Interbank Business

In the first three quarters of 1998, Austrian credit institutions' balance sheet total jumped by ATS 577 billion or 9.6% and thus at a much more rapid clip than in the years before. The hefty rise in domestic interbank business in the past few months was a major driving force behind this expansion, with interbank claims soaring by ATS 273 billion or 31% and interbank liabilities mounting by ATS 256 billion or 28% in the course of 1998. At +5% (ATS 175 billion), domestic nonbank business also grew somewhat more than in the two previous years, however. Domestic demand both in terms of direct lending and deposits continued to shift from schilling to foreign currency.

Change in Balance Sheet Total
in the First Three Quarters of 1998



Source: OeNB.

Marginal Slackening of International Business

Foreign activity lost momentum from the year before, contributing only about one quarter to balance sheet total growth in the first nine months of 1998 – the lowest proportion recorded in the last seven years. The share of foreign assets in the balance sheet total sank by 0.9 percentage point to 25.1%.

Foreign assets advanced by ATS 144 billion or 9.9%, while foreign liabilities rose by ATS 171 billion or 10.4%. Net foreign liabilities thus increased by ATS 28 billion to ATS 227 billion. Unlike domestic transactions, interbank business was boosted at a much slower pace than the year before, with growth of interbank transactions on both the assets and liabilities side suffering a contraction by more than 50%.

Foreign nonbank business also lost steam. Both on the assets and the liabilities side, the increment was about one third lower than the year before, although its share in the additional foreign business volume was slightly higher than in the analogous 1997 period. On the assets side, nonbank business accounted for about two thirds of the expansion, on the liabilities side, for almost half. Lending to foreign nonbanks suffered a particularly sharp contraction, rising by only ATS 27 billion or 6.9% compared to ATS 80 billion or 26.1% in the corresponding 1997 period. The growth of investments in foreign securities and participations, by contrast, slowed down only marginally from ATS 69 billion or 32.4% to ATS 68 billion or 23.5%.

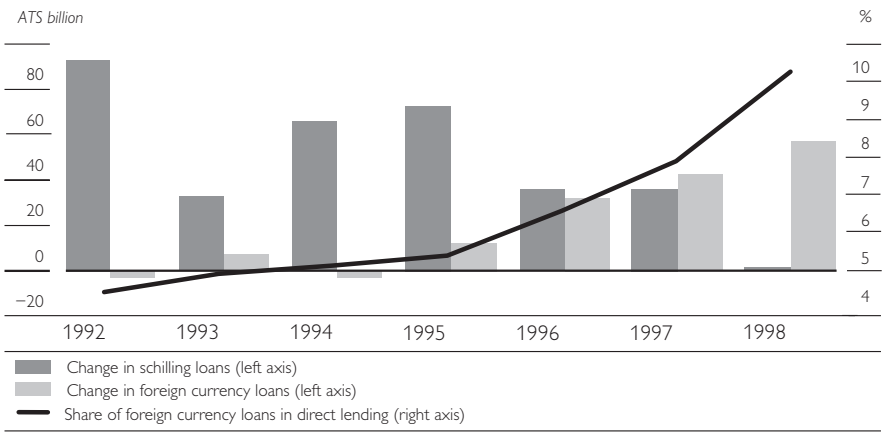
Close to one third of the inflow of funds from abroad, approximately ATS 52 billion or 12.1%, was derived from issues on international capital markets. Foreign deposits progressed by ATS 30 billion or 10.0%.

Domestic Demand for Direct Loans Subdued, Growth Only in Foreign Currency Loans

In the first three quarters of 1998, domestic direct lending grew by ATS 58 billion or 2.2%, the lowest increase in the last five years. As in the year before, the public sector scaled back its demand for direct loans, whereas households and enterprises, at +4.2%, enlarged their liabilities virtually to the same extent as in 1997 (4.3%).

In the survey period, overdrafts expanded by 9.3% and thus at more than triple the rate year-on-year. One-off loans rose by 3.7%, somewhat less than in the previous year. Loans based on loan agreements contracted by 2.1%, after posting an expansion of almost the same order in the previous year. The

Changes in Direct Lending in the First Three Quarters of 1998



Source: OeNB.

rise in cash advances decelerated from 11.2 to 6.6%. At +4.5%, the growth of loans taken out to acquire and maintain housing reached only about one quarter of the value recorded in the corresponding 1997 period. Broken down by maturity, short-term loans with a term of up to 12 months in particular accounted for a comparatively large share of the increase (+10.5%).

The replacement of schilling loans by foreign currency loans picked up more speed in the first three quarters of 1998. Schilling direct loans edged up only ATS 1 billion in the period under review. The shift from bills discounted to other schilling loans is traceable to changes in export financing, where lending is no longer based on bills but on book credits instead. Hence, loans are no longer reported as bills discounted but as interbank liabilities or claims on nonbanks.

Foreign currency loans sustained their momentum, rising by more than one quarter just like the year before, with the volume of such loans extended to private households almost doubling. Enterprises also expanded their foreign currency liabilities, albeit at a somewhat less rapid clip than in the analogous 1997 period, whereas the public sector reduced its foreign currency loans. The share of foreign currency loans in total direct loans ran to 10.2% at the end of September, having doubled over the past four years. The continued low interest rates of a number of foreign currencies – below those of the schilling rates – make such financing especially attractive.

Unlike in the previous year, securitized loans including GOMEX transactions recorded a slight increase by ATS 3 billion or 0.8% in the period under review. Again, foreign currency financing posted larger gains than its schilling counterpart, having surged by 39% in the first nine months of 1998.

Holdings of domestic bank bonds advanced to a somewhat lesser extent than the year before; fixed-income securities of enterprises, by contrast, were curbed by about a quarter. Holdings of stocks also slid, whereas both schilling and foreign currency investment certificates were snapped up considerably (+18.8%).

The expansion of domestic interbank business was also heavily foreign-currency-oriented. In the first three quarters of 1998, claims mounted by ATS 273 billion or 30.7%, after having receded by ATS 44 billion or 5.0% in the first nine months of 1997. Liabilities rose by ATS 256 billion or 27.6% following a decline by ATS 28 billion or 2.9% a year earlier. The major part of this increase can be traced to shifts within company groups induced by the restructuring of the Austrian banking system. Without these one-off effects, the interbank business volume widened by some 5% in the period under review, with part of this increase attributable to the aforementioned reclassification of export financing bills.

Foreign Currency Deposits Continue to Rise

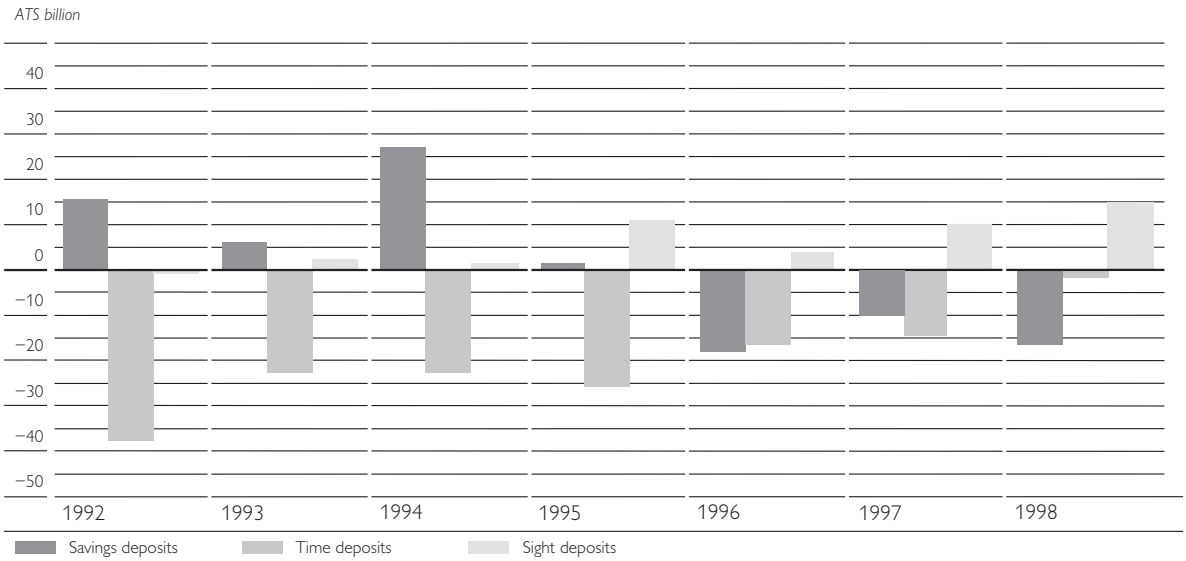
Schilling deposits at credit institutions declined for the fourth year in a row in the first nine months (–ATS 3.0 billion or 0.1%). The contraction slowed down noticeably in 1998, though. This was mainly due to the rather moderate reduction in time deposits, which decreased by ATS 1.3 billion (after ATS 14.1 billion). At –ATS 6.6 billion, the public sector cut its time

deposits to a significantly lesser extent than in the comparable 1997 period. Austrian enterprises raised their time deposits by roughly ATS 7 billion and thus by almost as much as in the corresponding 1997 period, while private households, following a marked decrease in the first nine months of 1997, enlarged their deposits only insignificantly.

Sight deposits grew at a much quicker pace than one year previously. Enterprises boosted their deposits after a contraction in the first three quarters of 1997, while growth of private households' deposits accelerated from the year before. Authorities, by contrast, cut their sight deposits more substantially than in the analogous period of 1997. On balance, sight deposits grew by ATS 15 billion or 4.9% (1997: ATS 9.9 billion or 3.5%).

As in the preceding two years, savings deposits contracted in the first three quarters of the year (–ATS 16.7 billion or 1.0%). The decrease was particularly pronounced with deposits with maturities of up to 12 months, while savings tied for more than five years posted strong gains and savings bonds edged up slightly. Building society deposits continued to rise, too.

Schilling Deposits in the First Three Quarters of 1998



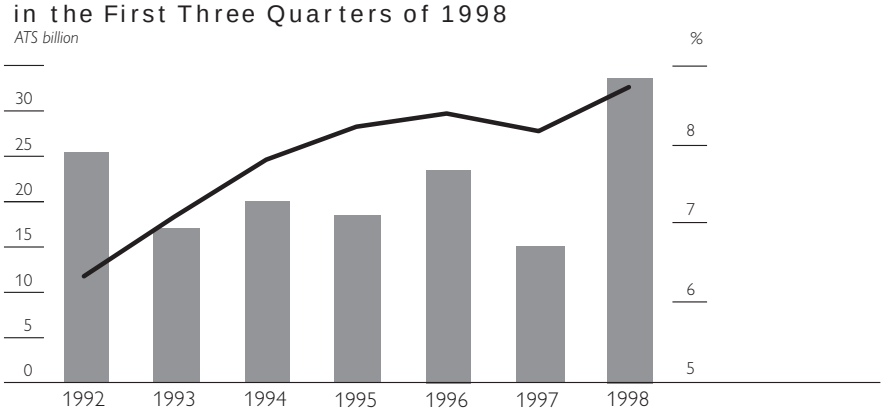
Source: OeNB.

The increment in foreign currency deposits accelerated further; in the first three quarters, such deposits posted a record plus of ATS 33.6 billion. The share of foreign currency deposits in total deposits thus increased from 7.3% at year-end 1997 to 8.7%.

All in all, deposits of domestic nonbanks augmented by ATS 30.6 billion in the first nine months of 1998 (January to September 1997: ATS 1.0 billion). Sales of credit institutions' own domestic issues (minus paper sold to other banks and open market transactions) increased from ATS 2.3 billion or 0.4% to ATS 5.8 billion or 1.0%.

In the survey period, the nominal value of banks' special off-balance-sheet transactions diminished by 1.1% to ATS 6,130 billion, which contrasts with a 20.5% expansion in the corresponding 1997 period. Interest rate

Change in Foreign Deposits
in the First Three Quarters of 1998



Source: OeNB.

contracts, which account for about two thirds of the special off-balance-sheet transactions, fell by 5.0%, while exchange rate contracts, accounting for close to one third, jumped by 10.2%. In relation to the balance sheet total, the nominal value of the special off-balance-sheet transactions sank from 107% at the end of the third quarter of 1997 to 93% at the end of the period under review.

Rise in the Equity Ratio to 13.38%

In the first three quarters of 1998, domestic credit institutions' own funds advanced by ATS 30.6 billion or 7.7% to a total of ATS 426.8 billion, slightly lagging behind last year's boost. They had mounted by ATS 33.4 billion (9.6%) in the corresponding year-earlier period. The banks' equity ratio according to § 23 of the Austrian Banking Act 1993 thus improved from 12.94 to 13.38%.

Balance of Payments in the First Half of 1998[1])

1 Current Account[2])

With recording governed by the transaction principle, Austria's current account closed the first half of 1998 with a deficit of roughly ATS 25 billion, which compares with a shortfall of nearly ATS 27 billion registered in the like period of 1997 (see Table 1).

The narrowing of the gap by almost ATS 2 billion year on year was driven by a contraction of the deficit on goods and services, which actually improved ATS 9 billion. However, much of this improvement was wiped out by a widening of the deficit on income by more than ATS 4 billion and of the deficit on current transfers by less than ATS 3 billion.

Broken down by the two successive quarters, the Austrian current account deficit declined ATS 3 1/2 billion year on year from January to March 1998, while it newly rose ATS 1 1/2 billion from April to June.

In more detail, the key subaccounts of the balance of payments statistics yielded the following results for the first half of 1998:

1.1 Goods

By contrast to the less detailed monthly cash balance, there is a separate entry for goods in the quarterly transaction balance. The goods subaccount by and large mirrors the foreign trade data compiled by the Austrian Central Statistical Office (ÖSTAT), the big difference between the ÖSTAT and the OeNB statistics being that the latter consider not just goods exports but also imports on an f.o.b. basis, i.e. exclusive of insurance and freight. The recorded transactions and the corresponding merchandise flows do not fully tally; the difference is booked as "unclassified transactions" in the services balance.

Following an erstwhile peak in merchandise flows in mid-1997, marked by a 15% gain in half-year 1997 exports over half-year 1996 exports, the pace of deliveries abroad slowed down in the first six months of 1998 (annual change: +10%). Import growth, by contrast, dropped only marginally in this period, from almost 9 to 8%, but the cumulative half-year figure masks a slump in the second quarter. On balance, the positive export growth differential sufficed to bring the deficit in the goods balance down ATS 4 1/2 billion in the first half of 1998. This figure is put in perspective somewhat, though, by the fact that the deficit on unclassified transactions widened close to ATS 4 billion over the same period.

More in-depth information, such as a *regional breakdown* (see Table 2) and details on the commodity structure of exports and imports can be gleaned from the ÖSTAT's foreign trade statistics. According to these data, the Austrian merchandise volume grew ATS 5 billion in the first half of 1998, with shipments to the EU region (+ATS 7 billion) and the U.S.A. (+ATS 2 1/2 billion) being the main driving force behind the improvement. By contrast, trade with Central and Eastern Europan trading partners, a recent boom position, contracted almost ATS 2 billion. With a decline by somewhat less than ATS 3 billion, trade with Japan slumped even more sharply.

An analysis of the *commodity structure* (see Table 3) shows that the improvement in the merchandise balance was spurred above all by livelier

exports of semimanufactured goods, which added under ATS 4 billion to the tally. Manufactured goods, i.e. capital goods and consumer goods, plus miscellaneous manufactured articles helped bring down the deficit roughly ATS 1/2 billion. Furthermore, the fuel balance improved more than ATS 1 billion.

1.2 Services

In the first half of 1998, the surplus on the services subaccount jumped ATS 4 1/2 billion to ATS 16 billion, last but not least because of the favorable trend of the travel component. With receipts from foreign tourists up some ATS 2 billion and expenditure of Austrian tourists abroad down ATS 2 billion, the travel surplus grew more than ATS 4 billion to ATS 17 1/2 billion.

1.2.1 Travel[3])

On the back of the ongoing heightened appeal of upscale tourism, *foreign exchange receipts* (see Table 4) from nonresident vacationers expanded 3% in the first half of 1998 even in the face of stagnating foreign tourist bednights. The continued trend toward stays in first-rate accommodation, accentuated by flatter demand for no-frills accommodation, is also reflected in the number of *overnight stays* in the various categories. By contrast, Austrian tourists' travel expenses abroad went down. For one, the subdued increase in personal incomes in 1996/97 caused Austrians to spend less abroad. For another, the cost of foreign travel has grown markedly faster than the cost of stays in Austria, which made domestic vacations slightly more attractive again. Unchanged from 1997, shoppers abroad moreover stuck to their wallets more closely, which can, among other things, be ascribed to price adjustments and changes in the legal situation. Following a succession of years of sinking foreign exchange receipts, a trend reversal in the travel subbalance thus appears to be in the offing for 1998.

1.2.2 Other Business Services

Beside travel, a number of other subcomponents of the services balance also posted very healthy half-year results. For instance, the surplus on other *business-related services* more than doubled from ATS 3 billion to almost ATS 8 billion. While merchanting and other trade-related services contained therein deteriorated somewhat, the surplus on operational leasing edged up ATS 1/2 billion, and the surplus on miscellaneous business, professional and technical services jumped nearly ATS 4 billion, respectively.

Net receipts from *construction services* augmented ATS 3/4 billion to ATS 1 1/2 billion, on account of stepped-up construction services abroad.

Cross-border *financial services* (e.g. banking fees, custody account charges and issuing fees) by and large remained unchanged from the first six months of 1997, both with regard to volume and regional distribution. Both receipts and expenditures totaled roughly ATS 4 1/2 billion in the first half of 1998. The bulk of these services involved transactions with Germany, the United Kingdom and the U.S.A.

By contrast, the showing of *royalties and license fees* was not satisfactory. Receipts ran to slightly more than ATS 1/2 billion in the first half of 1998,

whereas outlays exceeded ATS 5 billion. Almost 90% of all Austrian royalty and license fee payments flowed to Germany, the United Kingdom and the U.S.A. The bulk of the outlays made from January to June 1998 can be traced above all to companies in the audio/video, mechanical engineering and automobile sectors. Against the first half of 1997, the deficit widened by more than ATS 1 billion, which is above the long-standing average half-year expansion (1992 to 1997: ATS $^1/_2$ billion every six months).

At ATS 2 billion, the half-year surplus on *government services* was somewhat lower than in the first half of 1997.

1.3 Income

The income subbalance closed the first half of 1998 with a deficit of almost ATS $5^1/_2$ billion, over ATS 4 billion more than in the corresponding 1997 period. While the item compensation of employees posted a surplus of roughly ATS $3^1/_2$ billion, unchanged from 1997, investment income plunged deeper into the deficit Austria runs on account of its net liability position and the overhang of inward FDI over outward FDI. In the first half of 1998, the deficit widened to around ATS 9 billion from under ATS $4^1/_2$ billion in the corresponding 1997 period.

In line with international conventions, under the new balance-of-payments concept interest income derived from portfolio investment is recorded at the time when income is created, and not at the time when the actual payment is made. As a consequence, income accrued from debt securities is shown more evenly distributed over the calendar year than in the monthly cash balances, which are primarily based on payment flows.

On an accrual basis, income from portfolio investment and income from other investment income shrank ATS 1 billion each in the first half of 1998 as compared with the corresponding 1997 period.

Contrary to the monthly balance of payments, in which direct investment income is shown net of reinvested earnings, the half-year balance drawn up on a transaction basis also includes ploughed-back earnings. Interim 1998 results on direct investment income show the half-year 1997 deficit enlarged by about ATS 2 billion.

1.4 Current Transfers

Under the new concept, current transfers encompass just those transactions which directly reduce the income and consumption of the donor and directly increase the income and consumption of the recipient. This is why capital transfers, which used to be subsumed under the transfer balance, no longer feature in this position. In the first half of 1998, current transfers posted a deficit of almost ATS $13^1/_2$ billion, which compared with ATS $10^1/_2$ billion for the first half of 1997. This increase is mainly attributable to higher private sector tax payments to Germany and the U.S.A. By contrast, net public transfers, which among other things include contributions to and reimbursements from the EU (see box "EU transactions"), remained virtually unchanged.

EU transactions

Austria's transactions with the EU are recorded in two separate subbalances, in the transfer balance referred to above, and in the capital account.

As under the old concept, the transfer balance encompasses all of Austria's contributions to the EU budget, plus the lion's share of EU funds channeled back to Austria. In the first half of 1998, contribution payments totaled ATS 15 1/2 billion, same as in the January to June 1997 period, while reimbursements came to somewhat below ATS 8 billion. EU subsidies to Austrian infrastructure projects (ATS 1/2 billion in the survey period), by contrast, are entered in the capital account.

2 Capital account

The capital account covers transactions which, while changing the stock of assets of the countries involved, have no immediate impact on income and consumption. For transfers to be classified under capital transfers, it suffices for the transaction to be considered "unilateral" by one of the parties concerned.

The capital account closed the survey period with a deficit of ATS 1 billion, which can be mainly attributed to private sector debt forgiveness.

2.1 Financial Account

On the financial account, which also covers transactions with currency reserves, net capital imports of some ATS 23 1/2 billion were recorded in the first half of 1998 (see Table 6). This result can be primarily traced to the second quarter of 1998, since the first quarter saw net exports on the order of almost ATS 2 billion.

2.1.1 Direct Investment

Under the direct investment item, direct equity holdings in companies, real estate assets as well as reinvested earnings are subsumed. As of the reporting year 1997, credits between affiliated enterprises have also been entered under this heading, since they can be seen as a permanent reinforcement of a direct investment relationship.

Austria's net capital exports in terms of outward direct investment came to roughly ATS 7 1/2 billion in the second quarter of 1998, trailing first-quarter results by a very narrow margin. This adds up to a half-year result of more than ATS 15 billion, or approximately two thirds of the 1997 total.

The bulk of *outward direct investments,* which surpassed inward direct investments by roughly ATS 12 billion, can be pinpointed to injections of new equity capital (including plants and premises). An additional ATS 3 billion are traceable to reinvested earnings from equity capital invested before 1998. The volume of intercompany credit between Austrian investors and their affiliated enterprises changed but marginally in the first two quarters of 1998, while in the whole of 1997 this subcomponent had reduced total claims on foreign affiliates by somewhat more than ATS 2 billion.

The second quarter saw less investment into single major projects than the first quarter. On balance, half-year net investments were dominated by

trading companies and banks. On a minor scale, a few larger equity stakes changed hands in the manufacturing industry, notably in food, oil and paper companies. In terms of a regional breakdown, Austrian outward direct investment flows to both Central and Eastern European countries and EU Member States totaled roughly ATS 4 billion each.

Inward direct investments were very buoyant in the survey period. Tallying nearly ATS 12 billion in the first quarter and ATS 16 billion in the second quarter, the half-year results for 1998 almost equaled total net capital inflows for the whole of 1997.

Approximately ATS 16 1/2 billion (or roughly 80% of aggregate 1997 net inflows) were accounted for by new equity capital (participation in companies, including plants and premises). Earnings reinvested in the first two quarters added up to more than ATS 9 billion already. Similar to the development in outward direct investment, intercompany credits between affiliated enterprises trailed 1997 volumes considerably. Other investments made in the first half of 1998 caused the net item to expand by approximately ATS 2 1/2 billion.

Capital inflows in the second quarter were dominated by equity capital invested in pharmaceutical companies, but above all by major investments in the energy sector and automotive industry. Furthermore, Austrian banks continued to attract foreign equity capital. All in all, roughly half of all inward direct investment can be traced to EU residents.

2.1.2 Portfolio Investment

What with interest rates remaining low, yields of ten-year government bonds denominated in euro-zone currencies having converged on each other and investor confidence in stock markets yet being strong in the first half of 1998, investors were drawn more strongly to securities. Securities stocks expanded both on account of new acquisitions and interest payments due. The selection of euro participants in May 1998 is not deemed to have triggered any substantial portfolio diversifications, since the markets had been anticipating the outcome.

Domestic investors upped their portfolio investments in foreign securities in the second quarter of 1998 by roughly the same amount as in the first quarter (ATS 50 billion) through net acquisitions and rising interest payments due.

The lion's share of the April to June increase is attributable to purchases of debt securities, which totaled ATS 38 1/2 billion (including interest accrued). Most of this sum can in turn be ascribed to investment in capital market paper. Holdings of the latter thus expanded to almost ATS 70 billion in the first half of 1998, with banks and institutional investors accounting for a share of 85%, same as in the corresponding 1997 period. In addition to bonds and debt certificates issued by foreign credit institutions and public bodies, German mortgage certificates also held a heightened appeal for investors.

Some 50% of aggregate investment in foreign debt securities was made in the currencies of the 11 countries slated for participation in EMU. As in the past, DEM-denominated securities dominated this group. Among non-

euro-zone currencies, securities denominated in Greek drachmas and U.S. dollars topped the list.

Acquisitions of foreign equity securities, with German, UK, French and U.S. listed stocks added back to the portfolio, totaled slightly over ATS 10 billion in the second quarter of 1998 (down from almost ATS 14 billion in the first quarter). At ATS 24½ billion (to which institutional investors contributed roughly ATS 15 billion), net half-year purchases of foreign equities thus were already close to the previous year's total (ATS 30 billion in the whole of 1997).

Nonresident investors added ATS 120 billion to their portfolios of domestic securities in the first half of 1998, through both net acquisitions and increases in interest payments due, surpassing the corresponding 1997 results by roughly ATS 50 billion.

Among public sector issues, Austrian federal government bonds appealed most strongly to foreign investors given their high liquidity and benchmark function. On the primary market, the federal government increased the two schilling bond issues launched in the first quarter, with nonresidents accounting for approximately half of the net purchases. From January to June, foreign investors expanded their holdings of public sector long-term securities by some ATS 58 billion (corresponding 1997 figure: ATS 22½ billion).

DEM-denominated Austrian Treasury bills (DEM 3 billion) issued in June 1998 on a six-month revolving basis were also snapped up by foreigners a lot. Nearly 60% of the first tranche, maturing in December 1998, were bought by nonresidents.

Turning to first-half purchases of long-term bank bonds, nonresidents spent almost twice as much on such instruments as in the first six months of 1997. Transaction-induced changes reached more than ATS 44 billion in the first half of 1998, while higher redemptions of foreign currency money market paper (commercial paper in particular) led to net capital outflows. On balance, nonresidents increased their holdings of domestic bank issues by around ATS 32 billion.

Domestic stocks were in demand by nonresidents only in the first quarter of 1998; the second quarter, by contrast, saw net sales by foreigners on the order of roughly ATS 6 billion. Cumulative net purchases (ATS 2 billion in the first half of 1998) were thus dwarfed by the 1997 total of ATS 18 billion. Domestic investment certificates fared better; a volume of almost ATS 8 billion sold to nonresidents in the first half of 1998 was in keeping with long-standing averages.

2.1.3 Other Investment

The development of other investment (deposits, loans and other capital transactions) is traditionally influenced by the capital transactions carried out by credit institutions. In the first quarter of 1998, banks' transactions caused sight and time deposits to grow both on the assets side (roughly +ATS 45 billion) and on the liabilities side (+ATS 57 billion). Large-scale withdrawals of deposits, on the order of more than ATS 32 billion on the assets side and totaling ATS 29 billion on the liabilities side, triggered net capital imports of

ATS 15 billion in the first half of 1998. On the assets side, loans expanded strongly, above all in the first quarter (+ATS 22 billion), whereas they stagnated more or less in the second quarter at roughly ATS 2 billion. On the liabilities side, banks upped their credit liabilities only in the second quarter, by some ATS 6 billion.

Banks' share of total capital exports from other investment came to approximately 30% in the January to June period of 1998.

2.1.4 Official Reserves

The balance of payments records such changes in the stock of official reserves as are actually caused by transactions. The difference between transaction-induced changes and the net decrease recorded for the first half of 1998 can be explained above all with lower yields in the investment currencies and their appreciation vis-à-vis the Austrian schilling.

Through transactions, official reserves shrank ATS 4 billion in the first half of 1998, basically on account of securities sales and maturing time deposits on the order of ATS 7 billion on the one hand, and an increase of the reserve position with the IMF by ATS 3 billion on the other hand.

By comparison, in the first half of 1997 official reserves had contracted roughly ATS 17 billion (taking into account transactions only). The need for the comparatively higher capital imports at the time arose because very high capital outflows into foreign financial instruments (especially securities) were not offset by adequate capital imports of the other sectors that would have covered the current account deficit of roughly ATS 27 billion.

1 Transaction account.

2 As of the reporting period January 1998, sweeping conceptual and schematic changes took effect in Austria's balance of payments. A review of the changes and a detailed presentation of the new balance-of-payments structure were published in issue 2/1998 of the OeNB's "Focus on Austria" quarterly ("Conceptual Changes in the Austrian Balance of Payments"). One of the main new introductions is that the quarterly balance of payments henceforth measures "economic transactions" rather than payment flows. Note: Owing to the recent conceptual changes, monthly totals do not add up to the corresponding half-year total.

3 Note that under the new concept the definition of travel is less broad than before; transport services now only extend to the use of private or public transport within the country of destination. For "international passenger transport," which mainly refers to international flights, a separate entry has been added. Errors and omissions, which in the past were calculated just once a year, are now being recorded continuously, so that the sum of the quarterly results is now on a par with what used to be the preliminary revised annual result as far as the quality of the data is concerned.

Table 1

Balance of Payments Summary

	First half 1997[1])	First half 1998[2])	Annual change
	ATS million		
Current account	−26,930	−24,972	+ 1,958
Goods, services and income	−16,365	−11,631	+ 4,734
Goods and services	−15,351	− 6,166	+ 9,185
Goods	−26,805	−22,178	+ 4,627
Services	+11,454	+16,012	+ 4,558
thereof:			
Travel	*+13,176*	*+17,484*	*+ 4,308*
Construction services	*+ 694*	*+ 1,356*	*+ 662*
Financial services	*+ 247*	*+ 168*	*− 79*
Royalties and license fees	*− 3,211*	*− 4,541*	*− 1,330*
Other business services	*+ 4,922*	*+ 7,828*	*+ 2,906*
Government services, n.i.e.	*+ 2,244*	*+ 2,059*	*− 185*
Unclassified transactions	*−11,058*	*−14,786*	*− 3,728*
Income	− 1,014	− 5,465	− 4,451
Compensation of employees	+ 3,436	+ 3,449	+ 13
Investment income	− 4,450	− 8,914	− 4,464
Current transfers	−10,565	−13,341	− 2,776
General government	−10,234	−10,430	− 196
Private sector	− 331	− 2,911	− 2,580
Capital and financial account	+27,236	+22,626	− 4,610
Capital account	+ 8	− 989	− 997
thereof:			
General government	*+ 565*	*+ 498*	*− 67*
Private sector	*− 761*	*− 1,409*	*− 648*
Financial account	+27,228	+23,615	− 3,613
Direct investment	− 1,631	+12,630	+14,261
Portfolio investment	−36,240	+17,934	+54,174
Other investment	+48,345	−10,898	−59,243
Official reserves[3])	+16,754	+ 3,949	−12,805
Errors and omissions	− 306	+ 2,346	+ 2,652

Source: OeNB.

[1]) Revised figures.

[2]) Provisional figures.

[3]) OeNB: Gold and foreign exchange, Reserve Position in the Fund, SDRs, etc.; increase: - / decrease: +.

Table 2

Merchandise Exports and Imports as Recorded in the Foreign Trade Statistics

Goods by geographic area

	First half 1998					
	Exports		Imports		Balance	
	Annual change	Share of total exports	Annual change	Share of total imports		Annual change
	%				*ATS million*	
OECD	+10.9	81.8	+ 7.5	85.4	−42,337	+5,725
EU	+11.6	64.0	+ 6.8	69.3	−42,918	+7,038
EMU	+12.1	57.6	+ 7.0	64.0	−45,482	+6,234
thereof:						
Germany	*+11.3*	*36.0*	*+ 7.6*	*41.5*	*−34,736*	*+1,709*
Italy	*+16.7*	*9.0*	*+ 2.8*	*8.3*	*− 101*	*+3,931*
France	*+11.4*	*4.2*	*+ 2.2*	*4.8*	*− 3,594*	*+1,204*
CEECs[1])	+ 9.1	16.7	+16.9	11.6	+15,119	−1,671
U.S.A.	+29.6	4.0	+ 4.3	4.7	− 4,429	+2,611
Japan	−31.9	0.8	+15.3	2.4	− 6,842	−2,797
Total	+ 9.9	100.0	+ 7.6	100.0	−33,317	+5,084

Source: ÖSTAT.

[1]) Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Ukraine, Belarus, Moldova, Russia, Armenia, Azerbaijan, Kazakhstan, Turkmenistan, Usbekistan, Tajikistan, Kirgizstan; Rumania, Bulgaria, Albania, Georgia, Slovenia, Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Former Yugoslav Republic of Macedonia.

Table 3

Merchandise Exports and Imports as Recorded in the Foreign Trade Statistics

Goods by commodity category

	Exports			Imports			Balance	
	First half 1998	Annual change		First half 1998	Annual change		First half 1998	Annual change
	ATS million		%	*ATS million*		%	*ATS million*	
Foodstuffs	15,949	+ 1,570	+10.9	22,670	+ 1,061	+ 4.9	− 6,721	+ 509
Crude materials	17,053	+ 571	+ 3.5	35,174	+ 104	+ 0.3	−18,121	+ 487
thereof: fuels (SITC 3)	*3,567*	*− 13*	*− 0.3*	*18,045*	*− 1,141*	*− 5.9*	*−14,478*	*+1,128*
Semimanufactured goods	64,196	+10,896	+20.4	59,845	+ 7,210	+13.7	+ 4,351	+3,686
Manufactured goods	278,456	+19,492	+ 7.5	289,723	+17,607	+ 6.5	−11,267	+1,885
Capital goods	96,455	+ 7,765	+ 8.8	92,703	+ 6,447	+ 7.5	+ 3,752	+1,318
Consumer goods	182,002	+11,728	+ 6.9	197,021	+11,161	+ 6.0	−15,019	+ 567
Miscellaneous manufactured articles	1,662	+ 1,599	x	3,220	+ 3,062	x	− 1,558	−1,483
Total	377,316	+34,128	+ 9'9	410,633	+29,044	+ 7'6	−33,317	+5,084

Source: ÖSTAT,

Table 4

Travel and International Passenger Transport

	First half 1997[1])	First half 1998[1])	Annual change	
	ATS million		%	
Travel				
Incoming	69,631	71,715	+2,084	+ 3.0
Outgoing	56,455	54,231	−2,224	− 3.9
Balance	13,176	17,484	+4,308	+32.7
International passenger transport				
Incoming	6,837	9,111	+2,274	+33.3
Outgoing	3,116	5,032	+1,916	+61.5
Balance	3,721	4,079	+ 358	+ 9.6
	in 1,000		%	
Foreign tourist bednights	39,424	39,628	+204	+ 0.5

Source: ÖSTAT, OeNB.

[1]) Revised figures.

[2]) Provisional figures.

Table 5

Foreign Tourist Bednights in Austria by Nationalities

	First half 1998			
	Overnight stays	Annual change		Share
	in 1,000		%	
Germany	25,666	− 70	− 0.3	64.8
Netherlands	3,637	−251	− 6.5	9.2
United Kingdom	1,377	+104	+ 8.2	3.5
Belgium, Luxembourg	1,001	−156	−13.5	2.5
Switzerland, Liechtenstein	1,301	− 12	− 0.9	3.3
Sweden	383	+ 11	+ 3.0	1.0
France	773	− 14	− 1.8	2.0
Italy	851	+ 54	+ 6.8	2.1
Spain	143	+ 18	+14.4	0.4
Finland	91	+ 11	+13.8	0.2
U.S.A.	680	+ 78	+13.0	1.7
Japan	220	+ 6	+ 2.8	0.6
Hungary	348	+ 25	+ 7.7	0.9
Slovakia	76	+ 25	+49.0	0.2
Czech Republic	378	+ 62	+19.6	1.0
Poland	477	+ 81	+20.5	1.2
Commonwealth of Independent States	213	+ 50	+30.7	0.5
Slovenia	137	− 2	− 1.4	0.3
Croatia	169	+ 21	+14.2	0.4
Other countries	1,706	+164	+10.6	4.3
Total	39,628	+205	+ 0.5	100.0
Memorandum item: Austrian tourists	*13,673*	*+282*	*+ 2.1*	*x*

Source: ÖSTAT.

Table 6

Financial Account

(including change in official reserves)

	1997[1])	First half 1998[2])	2nd quarter 1998[2])
	ATS million net		
Financial account	+ 54,863	+ 23,615	+25,381
Direct investment	+ 5,334	+ 12,630	+ 8,565
Direct investment abroad	− 23,758	− 15,246	− 7,357
Equity capital	− 21,118	− 12,162	− 5,853
Reinvested earnings	− 4,867	− 3,374	− 1,568
Other capital	+ 2,227	+ 207	− 19
Direct investment in Austria	+ 29,092	+ 27,876	+15,922
Equity capital	+ 20,869	+ 16,434	+12,764
Reinvested earnings	+ 9,547	+ 8,878	+ 3,310
Other capital	− 1,324	+ 2,474	− 9
Portfolio investment	+ 13,896	+ 17,934	+ 6,130
Portfolio investment in foreign securities	−123,542	−102,417	−50,049
Equity securities	− 30,070	− 24,449	−10,730
Long-term debt securities	− 95,106	− 68,736	−32,247
Money market instruments	+ 3,978	− 9,448	− 6,218
Financial derivatives	− 2,344	+ 216	− 854
Portfolio investment in domestic securities	+137,438	+120,351	+56,179
Equity securities	+ 32,027	+ 9,913	− 2,049
Long-term debt securities	+ 87,112	+109,525	+43,461
Money market instruments	+ 15,490	+ 690	+15,049
Financial derivatives	+ 2,809	+ 223	− 282
Other investment	− 252	− 10,898	+ 484
Assets	− 63,312	− 47,418	+25,711
Trade credits	+ 2,904	+ 1,600	+ 1,500
Loans	− 52,133	− 28,086	221
Sight and time deposits	+ 12,667	− 20,627	+24,810
Other assets	− 26,750	− 305	− 820
Liabilities	+ 63,060	+ 36,520	−25,227
Trade credits	+ 4,887	− 2,000	− 500
Loans	− 5,104	+ 8,052	+ 2,652
Sight and time deposits	+ 66,165	+ 28,125	−28,928
Other liabilities	− 2,888	+ 2,343	+ 1,549
Official reserves[3])	+ 35,885	+ 3,949	+10,202

Source: OeNB.

[1]) Revised figures.

[2]) Provisional figures.

[3]) OeNB: Gold and foreign exchange, Reserve Position in the Fund, SDRs, etc; increase: - / decrease: +.

STUDIES

Credit Risk Models and Credit Derivatives

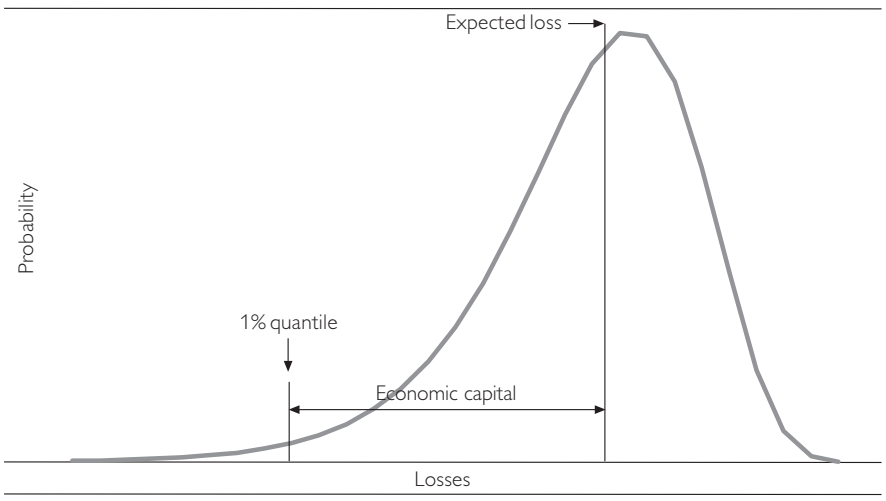
Annemarie Gaal,
Manfred Plank

1 Introduction

In the past few years it has become ever more obvious that, generally speaking, the regulatory capital regime offered by the 1988[1]) Basle Capital Accord does not adequately address credit risks. A case in point is regulatory capital arbitrage, which allows for a reduction of the regulatory capital, even though the credit risk incurred by an institution has not really changed. The same financial instrument must be backed with differing amounts of capital depending on whether it concerns the trading book or the bank book. Faced with this discrepancy between the regulatory capital charge and economically sound capital allocation, many large banks have in recent years developed complex mathematical-statistical models for quantifying credit risks. They currently use such models to determine in-house the economic capital for covering credit risks as well as to manage credit risks in a more effective way. After all, these credit risk models do not yet lend themselves to ascertaining the regulatory capital charge to be applied to credit risks.

Although the various modeling approaches differ significantly, all of them must invariably consider default probabilities and expected loss ratios. Furthermore they must be capable of estimating the loss distributions, on whose basis the expected loss and the economic capital are determined. These models allow for the first time to set limits for concentrations of individual counterparty risk, industrial sectors or geographical regions in a sound way. To do just that, the loss distribution of the credit portfolio is determined either analytically or via numerical simulations. As opposed to the distributions in connection with market risks, this distribution is not symmetric, but negatively skewed. The economic capital corresponds to the 1% quantile of the loss distribution.

Loss Distribution of a Credit Portfolio



Source: OeNB.

The input data requirements pose one of the main problems of modeling credit risks. Given the limited availability of such data, credit institutions are frequently compelled to make numerous simplistic assumptions, such as the

independence of various sectors or the time-independence of statistical parameters. Such misspecifications may, however, totally distort the tail of the loss distribution, which is of central interest. Furthermore, it is difficult to determine the statistical quality of such models by means of backtesting, as this testing method necessitates random sampling covering at least one credit cycle, for which the available data are usually insufficient.

Using credit risk models allows for quantifying credit risks and hedging them via appropriate financial instruments. Small wonder that the development of credit risk models goes hand in hand with the design of credit derivatives. Credit derivatives for the first time allow for an active management of credit risks of both individual credits and entire credit portfolios and they significantly boost the market liquidity of credits. The following chapter introduces two commonly used approaches to credit risk modeling, draws a comparison between the two models and deals with the possible uses of credit derivatives for actively managing credit risk.

2 CreditMetrics

CreditMetrics[2]) was designed by J. P. Morgan and serves to measure credit portfolio losses. It takes into account credit quality rating migration, credit defaults, recovery rates and obligor correlations derived from the respective stock price correlations. Unlike CreditRisk+[3]), CreditMetrics is capable of modeling changes in credit ratings, recovery rates and obligor correlations. Due to this additional modeling it is no longer possible to present the loss distribution of the portfolio in an analytically closed form. Instead, Monte Carlo simulations are used to approximate the loss distribution. For each scenario of the simulation, the present value of the portfolio is calculated as the sum total of the present values of the individual instruments and then weighted by the given scenario's probability of occurring. The downside of this approach is that a broad data basis is necessary to parameterize this model: in particular, credit default probabilities, credit quality migration likelihoods, credit spreads[4]), recovery rates[5]), stock prices and industry indices.

2.1 Computing the Portfolio Value

For a credit portfolio consisting of n instruments, each of which may have k different ratings (including insolvency), the number of possible scenarios comes to k^n at the end of the observation period (e.g. one year). The value V_i^j ($i=1, \ldots k^n$, $j=1,\ldots,n$) of each instrument is calculated for each of these scenarios. To determine the present values, you need to know the cash flows generated by the instrument and the discount factors of a given scenario, which are derived from the credit spreads and the associated reference interest rates.

When calculating the present value, a basic distinction is made between changes in the rating category and the obligor's default. In the former case, the calculation is reduced to revaluating the instrument by means of the respective discount factors; in the latter case, the recovery rate is estimated based on the seniority class of the liability.

At the end of the observation period the value V_i of the portfolio for a given scenario is the sum total of the individual values of the instruments under this scenario:

$$V_i = \sum_{j=1}^{n} V_i^j,\ i = 1, \ldots, k^n.$$

These portfolio values must then be weighted for the respective scenario probabilities to obtain the loss distribution of the portfolio.

2.2 Computing the Scenarios' Probabilities of Occurring

To determine the distribution of the portfolio values, the probability of occurring of each scenario is required. Empirical research has shown that changes in the credit ratings of individual obligors are correlated, as they are in part influenced by the same macroeconomic variables. Therefore the probability of occurring of a scenario may not be calculated as the product of individual changes in an obligor's credit quality rating. Instead, it is necessary to pinpoint these probabilities indirectly, i.e. via measures observed on the market. In this context, CreditMetrics assumes that there is a relationship between changes in credit ratings and changes in an enterprise's asset value. As changes in asset values are not directly observable either, they are approximated via the returns of the stock prices for which observed market prices are available on a continuous basis.

First, each rating is assigned an interval of stock returns, with the interval bounds S_i to be calculated by means of the individual probabilities of the credit rating changes:

$$P(R^j = i) = P(S_{i-1} < X_j < S_i).$$

R^j denotes the rating of the jth obligor and X_j designates the respective stock return. The probability of occurring of a scenario (i.e. a joint change in the obligors' credit ratings) is derived from the joint distribution of the returns. This distribution is assumed to be a multivariate normal distribution with the density function $f(x_1, \ldots, x_n; \Sigma)$:

$$P(\text{Scenario} = (i_1, i_2, \ldots, i_n)) = P(R^1 = i_1, R^2) = i_2, \ldots R^n = i_n) =$$
$$= \int_{S_{i_1-1}}^{S_{i_1}} \ldots \int_{S_{i_n-1}}^{S_{i_n}} f(x_1, \ldots, x_n; \Sigma) dx_1 \ldots dx_n.$$

To characterize this distribution completely, the correlation matrix Σ of the stock returns[6]) is necessary. CreditMetrics calculates this matrix from the stock prices of the enterprises, not for each pair though, but only across the industries of individual countries. The calculation is based on historical weekly returns, and the observations are equally weighted. Each enterprise is assigned various industry indices, which has the advantage that only correlations between industry indices need to be computed. The correlations between individual enterprises are calculated via the correlations between the industry indices, factoring in company-specific data.[7])

2.3 Computing the Standard Deviation and the Quantile

The standard deviation is one of the most commonly used risk measures. Here, it shows the average deviation from the expected loss and is calculated for a portfolio which consists of n instruments as follows:

$$\sigma_p = \sqrt{\sum_{i=1}^{n}\sigma^2{}_i + 2\sum_{i=1}^{n-1}\sum_{j=i+1}^{n}\sigma_i\sigma_{j\ ij}}.$$

As the distribution of portfolio losses of a credit portfolio is not symmetric, the standard deviation is not an adequate risk measure. If, however, the value of each portfolio and the corresponding probability of occurring are known, it is possible to determine any quantile of the distribution of the portfolio values and use it as a measure of risk. When it comes to the economic capital, the 1% quantile is, as a rule, applied.

2.4 Simulation

In the case of a portfolio which is made up of a large number of instruments it would take up an enormous amount of computer time to calculate all individual values and the corresponding probabilities of occurring. If there are merely ten instruments in the portfolio, with eight rating categories (including insolvency) this already results in $8^{10} \approx 10^9$ scenarios. In light of the computer time needed an analytical calculation is no longer feasible, which is why simulations are used to approximate the distribution of the portfolio values.

Since the multivariate normal distribution was assumed for the joint distribution of returns, multivariate normally distributed random variables need to be generated. This is achieved via Cholesky factorization or eigenvector decomposition.[8]) Both the correlation matrix of the returns and the individual probabilities of changes in the obligors' credit ratings, which are used to calculate the interval bounds, serve as input for the simulation. These interval bounds are employed to assign rating categories to the simulated returns.

In case the rating category changes, the portfolio values are calculated by revaluating the instruments according to this scenario. However, if a default event occurs, the recovery rate is simulated as an additional random variable (beta distribution[9])), since empirical research has shown that the recovery rate is not constant.[10])

Approximation of the loss distribution increases in quality with the number of generated scenarios. This, of course, means that computer time also mounts.

3 CreditRisk+

CreditRisk+ was developed by Credit Suisse Financial Products, and unlike J. P. Morgan's CreditMetrics, it employs an actuarial approach to present, in terms of probabilities, the losses of a bond or credit portfolio resulting from loan defaults. Here, only the credit default risk is modeled, under the assumption that the enterprise's capital structure is independent of default risk. The risk arising from the change in the company's rating or from credit

spreads is not considered. As is the case with the commonly used market risk models, the factors causing loan defaults are not explicitly modeled. On the one hand, this reduces the risk of modeling errors, on the other, this has the added advantage of allowing for a closed-form model approach. Consequently, the data required for parameterizing the model may be cut to the minimum. Fewer simulations, in turn, make for greater computer speed. This way it becomes possible to determine the credit risk of very sizeable bond and credit portfolios and to analyze the marginal effects of incorporating additional products into the portfolio.

3.1 Basic Model

Credit default losses are caused by the default of one or more obligors, yet at the time of the credit default any expected offsetting payments[11]) must be subtracted from the claims outstanding. In CreditRisk+ defaults represent the main risk to which everything else may be traced. It is, above all, possible to determine the distribution of a portfolio's default losses, which is of central interest, from the probabilistic distribution of the number of defaults. The theory of generating functions[12]) is an especially useful and efficient tool for carrying out the necessary mathematical manipulations.

In practice, the credit portfolio is first divided into several independent sectors S_k, with each sector comprising loans which have about the same credit risk. The sectors are typically grouped by country and by rating group, i.e. where obligors come from and the group they belong to. Once the individual sectors' loss distribution is known, it is possible to calculate the entire portolio's loss distribution by multiplying the individual sectors' loss distributions on the assumption that they are independent of each other. The upside of this method is that it allows focusing on a given sector in a further analysis without losing sight of the overall situation. The downside, however, is that correlations between the individual sectors are not considered.

3.1.1 Distribution of the Number of Credit Defaults within a Sector

With credit portfolios, it is impossible to precisely predict the number of credit defaults or the point in time when they will occur. Experience shows, however, that it can, for a start, be assumed that credit defaults occur very seldom and that the likelihood of their occurrence is not contingent on the time period. This statistical property of being a "rare event" represents the formal link between credit risk and the typical risks inherent in insurance exposures. Due to this property, it is possible to describe the number of credit defaults X within a fixed period (e.g. one year) in probabilistic terms via a Poisson distribution[13]), whose probability function is

$$P(X = n) = \frac{\mu^n e^{-\mu}}{n!},$$

where μ designates the expected number of defaults within the selected time frame.

Since, according to the model, a one-to-one mapping exists between credit default losses and the number of credit defaults, it is possible to infer

the distribution of the default losses from the statistical law of the number of credit defaults.

3.1.2 Distribution of Credit Default Losses within a Sector

To minimize the data that have to be incorporated into the calculation, it makes sense to rank the number of all potential default losses within a sector by size and to group them in exposure bands, or classes, with a predefined exposure with L (e.g. ATS 1 million). All default losses within a band j are represented by their upper band bound $L \cdot j$. A default in the first class thus, for instance, corresponds to a loss of ATS 1 million, a default in the second class designates a loss to the amount of ATS 2 million, etc. In general, the expected number of credit defaults does not only depend on the sector, but also on the given band within a sector. When μ_j denotes the expected number of default events in the jth band, X_j refers to the number of defaults in the jth class, and V_j designates the amount of the default losses in the jth band in units of L, then it follows:

$$P(V_j = n \cdot j) = P(X_j = n) = \frac{e^{-\mu_j}\mu^{n_j}}{n!} .$$

The generating function $G_j(z)$ of the loss probabilities of the jth band is therefore given by

$$G_j(z) = \sum_{n=0}^{\infty} P(V_j = n \cdot j) z^{n \cdot j} = \sum_{n=0}^{\infty} P(X_j = n) z^{n \cdot j} = \sum_{n=0}^{\infty} \frac{e^{-\mu_j}\mu^{n_j}}{n!} z^{n \cdot j} = e^{-\mu_j(1-z^j)}.$$

As a consequence of assumed independence between the losses of the individual classes, the probability generating function for the respective sector S_k is the product of the individual classes' probability generating functions:

$$G_{s_k}(z) = \Pi G_j(z) = e^{-\Sigma\mu_j + \Sigma\mu_j z^j}.$$

The probability function of the default losses of the sector S_k is achieved by successively differentiating the generating function. The probability function of the credit default loss of sector S_k may be expressed as the following recurrence relation[14]):

$$P(V_{s_k} = n \cdot L) = \sum_{j=1}^{n} \frac{\mu_j j}{n} P(V_{s_k} = (n-1) \cdot L), \text{ where } P(V_{s_k} = 0) = e^{-\Sigma\mu_j}.$$

Thanks to this recurrence relationship, the loss distribution in any given sector – and therefore also the loss distribution of the entire portfolio – is known in an analytically closed form. This, in turn, allows for the computation of any statistical variable of the distribution, such as the expected loss and the losses assigned to certain predefined percentiles.

3.2 Adjustment of the Basic Model to the Available Data Set

To employ the approach described above to forecasting potential credit default losses at a specified confidence level, it is necessary to parameterize

the model with the available input data. The data required concern recovery rates and expected default rates per sector class. As recovery rates are not statistically modeled in CreditRisk+, the multi-year average of recovery rates, as periodically issued by Standard & Poor's or Moody's[15]), serves as exogenous model input.

The number of credit defaults within a sector class were modeled by means of a Poisson distribution necessitating a calibration of the distribution. Poisson distributions are characterized by one single parameter which corresponds to the expected value and the variance of the distribution. Statistics on the incidence of default events as periodically published by Standard & Poor's[16]) or Moody's demonstrate that the variance of the number of credit defaults is significantly higher than their expected value. This empirical evidence implies that the parameter of the Poisson distribution should not be presumed to be constant but should be modeled as a stochastic value. The randomness of expected credit defaults is due to macroeconomic factors, such as economic growth or the interest rate policy pursued by central banks, which observedly influence the fortunes of obligors. CreditRisk+ assumes in this context that the average yearly defaults may be described by a Gamma distribution[17]). The two parameters α and β of this distribution are computed from the empirically derived mean and the variance of the number of default events. By using the probability generating functions it is possible to show that the number of credit defaults X within a sector class are no longer reflected by a Poisson distribution but a Negative Binomial distribution[18]). The associated probability function is given as

$$P(X = n) = \binom{n+\alpha-1}{n} p^n(1-p)^\alpha, \quad p = \frac{\beta}{1+\beta} .$$

Due to stochastic modeling of the default rates the distribution function becomes significantly positively skewed, which is why the risk of a high number of credit defaults grows. The probability function for the number of credit defaults given stochastic default rates forms, as is the case with constant default rates, the input for computing the probability function of the credit default losses via the associated generating function. The concrete computations again lead to a recurrence relation[19]) of the portfolio probabilities.

Even after adjusting the basic model as required, the portfolio loss distributions may be presented as a closed-form solution. This renders the model approach especially attractive for large portfolios and allows for the analysis of marginal credit risks.

4 Comparison of the Two Models

The two models outlined above quantify credit risk and produce a credit value at risk. While in CreditRisk+ only a credit default qualifies as a credit event, CreditMetrics also considers a credit rating change as a credit event. In CreditMetrics correlations are explicitly modeled, whereas the CreditRisk+ approach takes account of obligor correlations in an implicit way only. The recovery rate, which is an exogenous input variable in

CreditRisk+, is simulated as a random variable in CreditMetrics. While the data requirements are very low for CreditRisk+, CreditMetrics relies on a broad data basis. Correlations can, however, only be considered between listed obligors, which is why it is difficult to capture the credit risk of unlisted obligors. CreditRisk+ allows for the closed-form presentation of the portfolio's loss distribution. CreditMetrics, by contrast, requires simulations, thus stepping up computer time. In CreditMetrics and CreditRisk+ alike, it is very difficult to integrate nonlinear products, such as options and forex swaps.

The following Table again summarizes the most important characteristics of both models.

Feature	Credit Risk Model	
	CreditMetrics	CreditRisk+
Modeling of credit event correlations	yes	partly
Rating category change classified as a credit event	yes	no
Modeling of credit rating migration	yes	no
Modeling of recovery rate	yes	possible
Consideration of industry- and country-specific correlations	yes	partly
Consideration of unlisted obligors possible	difficult	yes
Outcome may be interpreted as credit VaR	yes	yes
Use of simulations required	yes	no
Consideration of derivatives possible	partly	partly
High computer power requirements	yes	no
Data-intensive	yes	no

Source: OeNB.

5 Credit Derivatives

Credit risk models for the first time allow for the identification and quantification of the typcial risks inherent in credit portfolios. Actively managing credit risk is, however, not comparable to buying and selling market risks, as it is at present quite difficult, if not impossible, to buy or sell many types of credit risks on financial markets. The reasons for this are manifold. On the one hand, the market liquidity of credits is low, and on the other hand, it is frequently impossible to get a credit instrument with the desired maturity and the desired risk profile on the market. Apart from the fiscal, accounting and regulatory hurdles another factor lies at the root of the low market liquidity of credits: selling credits generally has an adverse impact on the business relations with the obligors, as a credit sale necessitates the disclosure of information on the client some of which needs to be treated confidentially. This is why credit derivatives present a simple, efficient and, at least, partial solution to these problems. They enable portfolio managers to actively manage credit portfolios in an effective way, who may use credit derivatives

– to reduce the concentration risk of a credit portfolio through active country and industry risk management;
– to diversify the credit portfolio with the help of new credit risks without possessing the underlying security;
– to actively manage the credit risks of individual large credits while maintaining the existing client relations;

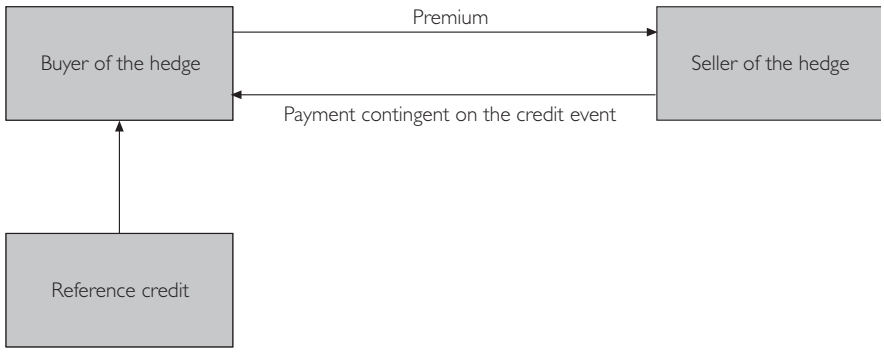
– to actively manage the credit risk of on-balance-sheet instruments without impacting the balance sheets;
– to create the desired cash flow and risk profiles;
– to hedge the dynamic credit risks, such as the counterparty risk in an interest rate swap, whose size is determined by market moves;
– to protect against credit defaulting and undesired credit spread changes;
– to open speculative positions at low refinancing costs.

5.1 Active Portfolio Management Using Credit Derivatives – Select Examples

Credit derivatives[20]) refer to OTC contracts which are tailored to meet existing customer demands and serve to pass on credit risks of individual credits or entire credit portfolios to one or more contract partners either in part or completely. The following describes the use of credit default options, total return swaps and credit spread options in active portfolio management.

5.1.1 Credit Default Option/Swap

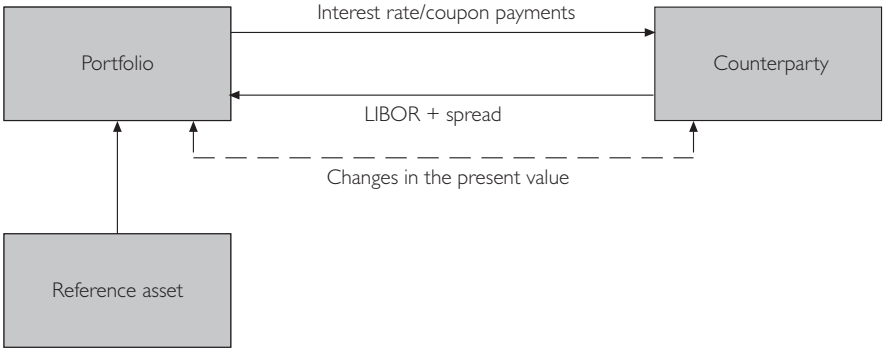
A credit default option/swap is a transaction where one party to the contract makes an advance or periodical payment and receives a contingent payment from the other party in turn, provided a certain credit event as defined at the time when the contract was closed occurs within a predefined period of time. Such instruments may be used to hedge the credit default risk of a reference credit without influencing the existing relations with the client and altering the bank's balance sheet. The definition of credit events must be agreed on in the contract in advance. Such events usually refer to the default of a reference credit or of a specific payment. The following figure illustrates the key components of a credit default option/swap.



5.1.2 Total Return Swap

A total return swap designates a bilateral contract which allows the parties to the contract to cede any returns on a credit or credit portfolio, such as coupon payments and changes in the present value, to or accept them from one another in exchange for receiving or making periodical cash flow payments. Such payments are, as a rule, linked to a reference interest rate, e.g. the LIBOR. Portfolio managers may take advantage of total return swaps to diversify their portfolios without actually possessing the underlying assets. Total return swaps lend themselves to protecting against a company's credit

defaults and credit ratings migration and to reducing concentrations in portfolios.



5.1.3 Credit Spread Options

Credit spread options allow for fixing the spread of a corporate bond at a future point in time with regard to a benchmark interest rate agreed upon in the contract. A credit spread put option, for instance, enables the buyer to sell a given corporate bond at a later point in time at a spread on a reference interest rate which is fixed at the present time. Credit spread options may be used in portfolio management to hedge against undesired spread movements. They are not only suitable for hedging default risk but also risks associated with changes in the company's credit rating; besides, they may be used to contain the maximum possible loss of a corporate bond.

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1 See Basle Committee on Banking Supervision (1988).

2 See J. P. Morgan (1997).

3 See Credit Suisse Financial Products (1997) and section 3.

4 The credit spread refers to the premium on the risk-free interest rate which the borrower or issuer has to pay.

5 The recovery rate refers to the share of the exposure repaid in case of default.

6 The mean return is assumed to be zero.

7 For details on the computation of the covariance matrix see J. P. Morgan (1997): 100f.

8 See G. Strang (1988).

9 For details on the beta distribution see Rohatgi (1976): 213.

10 It is assumed that each obligor's recovery rate is independent of the values of the instruments making up the portfolio.

11 In CreditRisk+ offsetting payments are assumed to be given exogenously, which is why they are among the required model input data.

12 The generating function G(z) of a discrete random variable X with the probability function P(X=i) is expressed as

$$G(z) = \sum_{i=0}^{\infty} P(X = i) z^i$$

Successive differentiating of the generating function of a discrete random variable results in the probability function, to which the following relationship applies:

$$P(X = i) = \frac{d^i G(z)}{i! \, dz^i}\bigg|_{z=0}$$

For more details see Rohatgi (1976): 93f.

13 For more details see Rohatgi (1976): 194.

14 For more details see Credit Suisse Financial Products (1997): 38.

15 See e.g. Moody's Investor Service Global Credit Research.

16 See e.g. Standard and Poor's Ratings Performance.

17 For more details see Rohatgi (1976): 206.

18 The Negative Binomial distribution is also sometimes referred to as Pascal distribution. For details see Rohatgi (1976): 186f.

19 See Credit Suisse Financial Products (1997): 46f.

20 See J. P. Morgan (1998b) and J. P. Morgan (1998a).

A Comparison of Value at Risk Approaches and Their Implications for Regulators[1])

Gabriela de Raaji,
Burkhard Raunig

1 Introduction

Over the last decades many financial institutions have significantly stepped up their trading activities, especially in the field of derivatives. Jorion (1997) identifies increased volatility, technologically enhanced physical equipment, advances in finance theory and political developments, such as more market-oriented policies and deregulation of financial markets, as the driving force behind this process. In addition, many new financial products have been developed, some in response to regulation. Although such products may offer certain advantages in hedging financial risks or provide speculative opportunities, under certain circumstances they may also generate huge losses. The last decade has, indeed, seen spectacular financial disasters related to derivatives trading. Britain's 233-year-old Barings bank went bankrupt on February 26, 1995, when Nick Leeson lost USD 1.3 billion from derivatives positions. Other well-known cases are the USD 1.3 billion loss the German Metallgesellschaft firm suffered and Daiwa Bank's USD 1.1 billion loss. Most of those (and other) financial disasters could probably have been avoided, had properly functioning internal controls and adequate risk management systems been in place.

The financial industry and regulatory authorities have clearly recognized that, in order to ensure financial stability, it is imperative to accurately measure financial risks and implement sound risk management. The concept of Value at Risk (VaR), in particular, has received much attention and is now widely accepted as a useful measure of financial risk. In short, VaR is the expected maximum loss over a target horizon for a given confidence interval. To be more precise, let P be the price of a portfolio that contains m contracts C_j ($j = 1 \ldots m$) where the changes in value of the contracts ΔC_j depend on n risk factors r_i ($i = 1 \ldots n$). These risk factors are stochastic and may be specific equity prices, interest rates, exchange rates, etc. The portfolio profit/loss ΔP over a given horizon is a function of the changes in the value of the contracts. Thus, the change in the value of a portfolio $\Delta P(r_1,\ldots,r_n) = \Sigma_m \Delta C_m(r_1,\ldots,r_n)$ may be expressed as a function of the underlying risk factors.[2]) Let $F(\Delta P)$ be the cumulative probability distribution of the changes in the market value of a portfolio. So, VaR can formally be defined as

$$VaR = F^{-1}(p), \tag{1}$$

where p is a specified probability, for example 0.05 or 0.01, and $F^{-1}(p)$ denotes the inverse of F(.). Thus, losses greater than the estimated VaR should only occur with the probability p. For example, if a VaR calculated at the 95% confidence level is accurate, then losses greater than the VaR measure, so-called "tail events", should on average only occur five times in every 100 trading days.

The VaR approach is attractive because it is easy to understand (VaR is measured in monetary units) and it provides an estimate of the amount of capital that is needed to support a certain level of risk. Another advantage of this measure is the ability to incorporate the effects of portfolio diversification. Many banks (and other financial institutions) now base their

assessment of financial risk and risk management practices on VaR or plan to do so in the future.

According to the Basle Committee proposals, in most countries banks have the option to use VaR models, upon their regulatory authorities' approval, for determining their capital requirements for market risk. For capital requirement purposes the model parameters are standardized and require banks to use a one-sided confidence interval of 99%, an assumed holding period of 10 days and at least one year of historical data for the market risk factors underlying their trading books. Although the model parameters are standardized, banks do not have to employ any one particular approach to estimate VaR. In other words, banks may choose their individual approach towards VaR. This liberal view makes sense because there is no single "best" VaR approach. Besides, ongoing research in this area is far from being completed.

Financial institutions use their VaR models on a day-to-day basis, and reported VaR numbers may also provide regulators with useful information. From a regulator's point of view it would be valuable if reported VaR numbers could be utilized to compare risk-taking across different banks at a given point in time and to track market risk exposures over time. For example Hendricks and Hirtle (1997) argue that[3])

"…the information generated by the models will allow supervisors and financial market participants to compare risk exposures over time and across institutions."

And that[4]) "…a capital charge based on internal models may provide supervisors and the financial markets with a consistent framework for making comparisons across institutions."

This view is unduly optimistic since different approaches and assumptions may produce systematically different VaR estimates. This paper therefore attempts to provide an answer to the question whether it makes sense to compare VaR numbers generated by means of different models. To this end, variance-covariance methods and historical simulation approaches are used to estimate VaR numbers for one equally weighted portfolio and nineteen randomly chosen linear foreign exchange portfolios over a period of 1,000 trading days. In addition, a new method is applied. The method, which was recently proposed in Hull and White (1998), deals with fat-tailed distributions, which are typical of fx returns, but also of many other financial returns. In a next step the performance of the various models is compared over the simulation period with the help of a simple backtesting procedure to determine how accurately the models match the specified confidence intervals.

The paper is structured as follows: Section 2 briefly outlines the VaR approaches on which the calculations in this paper are based. Section 3 provides a description of the data used. Section 4 deals with the application of the various methods, section 5 presents and explains the results. Finally, section 6 contains a number of concluding remarks.

2 VaR Methods

The VaR estimates presented in this paper were derived by employing variants of the variance-covariance approach, historical simulations and Monte Carlo methods based on mixtures of normal distributions as proposed in Hull and White (1998).[5]) The variance-covariance approach assumes that the risk factors that determine the value of the portfolio are multivariate normally distributed, which implies that the changes in the value of a linear portfolio are normally distributed. Since the normal distribution is fully described by its first two moments, the VaR of a portfolio is essentially a multiple of the standard deviation. For a portfolio, the VaR under the variance-covariance approach is given by

$$VaR = -\alpha\sqrt{w'\Sigma w}, \tag{2}$$

where w is a vector of absolute portfolio weights, w' is its transpose, Σ denotes a variance-covariance matrix and α is a scaling factor, which is 1.65 for a 95% confidence interval and 2.33 for a 99% confidence interval. Formula (2) implies that an estimate of the covariance matrix of the risk factors is needed. The variances and covariances are usually estimated from daily historical time series of the returns of the relevant risk factors using equally weighted moving averages such as

$$\sigma^2_{ijT} = \sum_{t=T-n}^{T-1} \frac{r_{it}r_{jt}}{n}, \tag{3}$$

where the mean is often assumed to be zero.[6]) In expression (3) σ^2_{ijT} denotes a variance (or covariance) at time T, r_{it} and r_{jt} are returns and n is the number of observations, i.e. the window length, used to calculate the variances and covariances.

Another frequently used estimator is the exponentially weighted moving average (EWMA). In contrast to equally weighted moving averages, the exponentially weighted moving average weights current observations more than past observations in calculating conditional variances (covariances). The EWMA estimator in its recursive form is given by

$$\sigma^2_{ij/t} = \lambda\sigma^2_{ij/t-1} + (1-\lambda)r_{it-1}r_{jt-1}. \tag{4}$$

In equation (4) the parameter λ, which is sometimes termed the "decay factor", determines the exponentially declining weighting scheme of the observations.[7]) One difference between the two estimators is that the equally weighted moving average does not account for time-dependent variances, whereas the exponentially weighted moving average does.[8]) From equation (4) it is evident that an EWMA model is equivalent to an IGARCH (1,1) model without intercept.[9])

The second approach used is historical simulation. In contrast to variance-covariance methods, no specific distributional assumptions about the individual market risk factors, i.e. returns, are made, and no variances or covariances have to be estimated. Instead, it is only assumed that the distribution of the relevant market returns is constant over the sample

period. To calculate VaR numbers, the returns of the risk factors for each day within the historical sample period are viewed as a possible scenario for future returns. The portfolio is evaluated under each of the scenarios and the resulting profits/losses are ranked by size in ascending order. The resulting empirical distribution is viewed as the probability distribution of future profits and losses. The VaR is then determined as the quantile of the empirical profit/loss distribution that is implied by the chosen confidence level.

The approaches described above offer certain advantages and disadvantages. For example, the variance-covariance approach is relatively easy to implement and VaR numbers can be calculated quickly. On the other hand, the method is problematic if the portfolio contains a significant amount of nonlinear financial instruments, such as options, because then the resulting profit/loss distribution is typically not normally distributed. Another problem arises if the distributions of the underlying risk factors are not normal. Then the joint distribution of the risk factors cannot be derived analytically in most cases. Finally, the resulting VaR is very much contingent on the method used to estimate the variance-covariance matrix. Historical simulation methods avoid many of the problems of the variance-covariance approach because the underlying risk factors need not be normally distributed and the method can deal with nonlinear portfolios. In addition, no variance-covariance matrices have to be estimated. On the other hand, the method is data-intensive and requires more computer power. What is more, the resulting VaR depends heavily on the chosen window length of historical data.

The main idea of the third approach is to transform the original data in such a way that the resulting data are normally distributed. The convenient properties of the normal distribution may then be exploited. Let e_{it} be the return of risk factor i on day t and let G_{it} be the assumed probability distribution for e_{it}. The goal is to transform e_{it} into a new variable f_{it} that is normally distributed using the transformation

$$f_{it} = N^{-1}[G_{it}(e_{it})], \tag{5}$$

where N is the cumulative probability function of a normal distribution and N^{-1} is its inverse. Thus, the original variables e_{it} are mapped into variables f_{it} that are standard normally distributed on a "fractile to fractile" basis. To make this method operational, the functional form of the G-distributions of the risk factors must be chosen and the parameters of these distributions have to be estimated using historical data. The choice of the G-functions obviously depends on the characteristics of the distributions of the risk factors that drive the value of the portfolio (the specific choice for this paper is presented in a later section). Given the parameters of the G-functions, the f_{it} variables can be mapped back into actual outcomes using the relationship

$$e_{it} = G_{it}^{-1}[N(f_{it})]. \tag{6}$$

This methodology has the advantage that it can deal with risk factors that are not normally distributed. This is important when the objective is to

calculate VaR numbers using financial returns which are typically fat-tailed. Fat-tailed distributions imply that extreme observations are more likely to occur in a normal distribution. In addition, the method can also easily deal with nonlinear portfolios.

For this paper, Monte Carlo simulations were run with a view to generating a large number of f_{it} variables from standard normal distributions. To simulate the joint distribution of market risk factors, the correlation between the risk factors is incorporated via Cholesky factorization. The generated f_{it} variables are mapped into actual outcomes by using relationship (6). Individual portfolios may then be evaluated under each simulation trial. From the resulting profit/loss distribution (under the mapped outcomes e_{it}) VaR numbers can be calculated by using the appropriate quantile of this distribution.[10])

3 Data

The methods described above are applied to one equally weighted portfolio and nineteen randomly chosen fx portfolios. The assumption is that an investor holds a certain amount of dollars in foreign currencies. This is why changes in the value of these portfolios depend solely on changes in exchange rates. The calculations are based on the assumption that the amount invested in each portfolio is USD 100 billion. The reason for the choice of simple linear portfolio structures is that matters should not be complicated by issues concerning the valuation and mapping of complex financial instruments. Such complications would only add extra noise to the comparisons.

All of the portfolios contain the Australian dollar (AUD), Belgian franc (BEF), Swiss franc (CHF), Deutsche mark (DEM), Danish krone (DKK), Spanish peseta (ESP), French franc (FRF), British pound (GBP), Italian lira (ITL), Japanese yen (JPY), Dutch guilder (NGL), Swedish krone (SEK) and Austrian schilling (ATS). Daily exchange rates covering the period from June 16, 1986, to June 15, 1998, are used, which gives a total of 3,131 observations for each individual time series.[11]) All distributions of the returns of the individual currencies display excess kurtosis (see Table 1).[12])

Table 1

Excess Kurtosis of Exchange Rate Distributions

(Currencies Quoted against the USD)

Currency	Excess Kurtosis	Currency	Excess Kurtosis
AUD	4.84	GBP	3.44
BEF	2.91	ITL	8.49
CHF	2.04	JPY	4.81
DEM	2.30	NLG	3.50
DKK	4.18	SEK	6.07
ESP	5.69	ATS	2.87
FRF	3.04		

Source: OeNB.

As mentioned above, the fat tails of the distributions imply that extreme market shocks are more frequently observed than in normal distributions.[13]) For example, if we wanted to calculate the VaR for a position in a single currency at the 99% level of confidence, we would use 2.33 times the

standard deviation, assuming a normal distribution. If the underlying distribution has fat tails, we would underestimate the VaR because of the higher probability mass of the distribution on the left tail. Table 2 demonstrates this problem for the 1% and 5% quantiles of the empirical distributions.

For each currency the 1% quantile exceeds the 2.33 multiples implied by a normal distribution. On average, the 1% quantile is located 2.62 standard deviations below the mean. At the 5% quantile some multiples are above 1.65, as implied by the normal distribution, but the majority is below, indicating a tendency for slightly too conservative VaR estimates.

Table 2

Empirical 5% Quantiles and 1% Quantiles as Multiples of the Standard Deviation

Currency	5% Quantile	1% Quantile
AUD	1.49	2.46
BEF	1.64	2.61
CHF	1.66	2.80
DEM	1.68	2.66
DKK	1.63	2.56
ESP	1.56	2.49
FRF	1.62	2.75
GBP	1.60	2.60
ITL	1.57	2.54
JPY	1.64	2.80
NLG	1.62	2.64
SEK	1.53	2.53
ATS	1.66	2.60
Average	*1.61*	*2.62*

Source: OeNB.

4 Application of the Various VaR Models

This section describes the specific applications and variants of the VaR models used in the comparisons. Each model is used to generate daily VaR estimates of the overnight risk, i.e. on the assumption of a one-day holding period, inherent in each of the twenty portfolios at the 99% and 95% confidence intervals for the last 1,000 trading days of the sample. All calculations rest on the assumption that the means of the daily return series are zero.

The first model is the variance-covariance approach. The first variant of this model is based on daily variances and covariances estimated by means of equally weighted moving averages with a window length of 250 actual trading days. The equal weighting scheme implies that the VaR numbers generated by this model do not account for time-dependent variances.[14]) Since there is much empirical evidence that variances of financial returns may be predicted, equally weighted moving averages do not seem to be very attractive estimators.[15])

The next model is the variance-covariance approach using exponentially weighted moving averages. As opposed to the first model, the resulting VaR estimates incorporate effects, e.g. the well-known volatility clustering, of time-dependent variances. It follows from equation (4) that the persistence of the estimated variances (and covariances) depends on the chosen lambda. In accordance with J. P. Morgan, lambda is set at 0.94 for estimating the daily variances and covariances.[16])

Both the third and fourth model are based on historical simulation with a time window of 250 and 1,250 historical scenarios, respectively. To obtain the VaR numbers, the neighboring observations implied by the 1% and 5% quantiles of the ranked changes of portfolio values are interpolated linearly. Due to the equal weighting of each historical scenario these models do not discriminate between recent scenarios and scenarios further back in time. All scenarios (implicitly) carry the same probability of occurrence. Let us assume that markets are not very volatile at the moment, while the sample used for simulating VaR still contains a significant fraction of scenarios that stem from a highly volatile period. Such a case would result in an overestimation of VaR numbers. On the other hand, if we were in a highly volatile period, we would underestimate the VaR if the scenarios are based on a low volatility period. This issue will be discussed in greater detail when the results are presented.

To implement the Monte Carlo methods based on Hull and White, it is necessary to assume a particular form of the distributions of the risk factors that determine the values of the portfolios. Following Hull and White (1998), the assumption is that the empirical distributions are generated by a mixture of two normal distributions according to

$$G_{it}(e_t) = p_i N\left(\frac{e_{it}}{u_i \sigma_{it}}\right) + (1-p_i) N\left(\frac{e_{it}}{v_i \sigma_{it}}\right), \tag{7}$$

where $G_{it}(e_{it})$ denotes the value of the cumulative probability distribution for observation e_{it}, p_i and $(1-p_i)$ is a probability, N denotes the cumulative probability distribution of a normal distribution and u and v are parameters that scale the standard deviation σ_{it}.[17]) The parameters of the distribution must satisfy the restriction

$$p_i u_i^2 + (1-p_i) v_i^2 = 1, \tag{8}$$

since the variance of the mixture distribution must be the same as the variance of the observed empirical distribution.[18])

The p, u ,v and σ parameters have to be estimated for each individual risk factor. For technical reasons, the implied likelihood functions are not maximized directly. Instead, the data are grouped by each risk factor i into four categories: less than one standard deviation ($|e_{it}| \leq \sigma_{it}$); one to two standard deviations ($\sigma_{it} < |e_{it}| \leq 2\sigma_{it}$); two to three standard deviations ($2\sigma_{it} < |e_{it}| \leq 3\sigma_{it}$); and more than three standard deviations ($|e_{it}| > 3\sigma_{it}$). The maximization of the log-likelihood function follows

$$\sum_{j=1}^{4} \alpha_{ij} \log(\beta_{ij}), \tag{9}$$

which results from the comparison of the predicted fraction of data β_{ij} implied for particular values of p, u and v with the proportion α_{ij} of the data actually observed in each category, i.e. to determine the values of p, u and v that provide the best fit for the empirical distributions of the individual risk factors.

Two different versions of the model are estimated for each risk factor by using 1,880 historical observations. In the first version the data are categorized by means of equally weighted moving averages according to equation (3) with a window length of 250 trading days. In the second version the standard deviations are estimated by using exponentially weighted moving averages according to (4) with a weighting parameter of 0.94. The estimated parameters for both versions are summarized in Table 3.

Table 3

Parameter Estimates for Mixture of Normal Distributions

Currency	Equal Weights			EWMA		
	u	p	v	u	p	v
AUD	0.68	0.71	1.52	0.64	0.36	1.15
BEF	0.71	0.68	1.43	0.45	0.21	1.10
CHF	0.74	0.63	1.33	0.45	0.15	1.07
DEM	0.73	0.74	1.53	0.44	0.19	1.09
DKK	0.77	0.81	1.65	0.45	0.18	1.08
ESP	0.70	0.72	1.52	0.49	0.25	1.12
FRF	0.74	0.77	1.59	0.47	0.14	1.06
GBP	0.64	0.68	1.50	0.45	0.24	1.12
ITL	0.69	0.71	1.51	0.48	0.22	1.10
JPY	0.71	0.73	1.53	0.67	0.49	1.24
NLG	0.72	0.73	1.52	0.45	0.18	1.08
SEK	0.78	0.81	1.63	0.49	0.20	1.09
ATS	0.69	0.71	1.51	0.47	0.23	1.11

Source: OeNB.

Under both sets of parameters 10,000 Monte Carlo trials are run for each of the 1,000 trading days to simulate the joint distributions of the market risk factors for each of the twenty portfolios. In the simulations the estimated correlation matrices are used according to equations (3) and (4) that correspond to each individual trading day. Thus, for day t the joint distribution of the risk factors is estimated by using Choleski factorization that is implied by the estimated variances and correlations for day t for both versions of the model.

Since there is no closed-form solution for the transformations of the simulated values into the "actual" outcomes implied by the mixture of normal distributions, these values are iterated by means of the Newton scheme. Once the transformed values for day t have been obtained, the portfolios under each of the 10,000 scenario vectors for day t are evaluated and the VaR numbers are calculated as the corresponding quantiles from the resulting profit and loss distributions.

5 Results

This section states and discusses the results of the daily VaR estimates at the 99% and 95% confidence levels. All calculations are based on the assumption of a one-day holding period. In addition, the results derived from backtesting each method are presented. These results should provide information on how accurately the various methods perform.

The discussion starts out with an inspection of the plots of VaR numbers generated by the different models. Chart 1 shows the daily VaR at the 99%

confidence interval for the hypothetical portfolio with equal portfolio weights for each of the six methods.[19])

It clearly turns out that, although all methods measure the VaR of the same portfolio, the patterns are quite different for the various methods. On average, the historical simulation with 1,250 days of historical data produces the highest VaR. It is also evident that the plots for both historical simulation methods look rather different from the plots for all other methods. The VaR computed by historical simulation often does not change for rather long periods of time, yet once it changes, it changes in an abrupt fashion. Such changes are more drastic when only 250 historical observations are used. These patterns are driven by extreme events that influence the VaR numbers over long periods of time.

The VaR numbers computed by means of variance-covariance approaches are driven by the methods for estimating the daily variance-covarianc matrices. The equally weighted moving average estimator produces a much smoother VaR series than the EWMA estimator. The VaR obtained with EWMA reflects to some extent the kind of "volatility clustering" that is typical of most financial return series. When the VaR series computed with unweighted and weighted moving averages are compared more closely, it turns out that the unweighted VaR reacts more slowly to changes in market volatility. For example, although market volatility falls sharply over the period from the 300th to the 500th day of the simulations according to the EWMA-based VaR series, it stays at an approximately constant high level until around the 400th day and then falls only gradually for the equally weighted VaR series. Throughout this period the VaR always lies above the EWMA-based VaR.

This is followed by an examination of the differences between the various methods and the EWMA-based variance-covariance approach (benchmark) for the 99% confidence interval. This approach was chosen as the benchmark because it is frequently used and the variance-covariance matrices are available on the Internet (provided by J. P. Morgan/Reuters) free of charge. Table 4 illustrates the results of the comparisons. Obviously, the differences can be extremely large (276%), as observed for the historical simulation method with a window length of 250 trading days.

Table 4

Differences between VaR Methods

with a 99% Confidence Interval in Percent (Benchmark: Variance-Covariance Model with EWMA)

Model	Minimum[1])	Maximum[2])	Mean[3])
VCunw	0.0	133.7	25.7
HS250	0.0	243.1	59.1
HS1250	0.0	276.5	53.0
MNunw	0.0	167.6	31.0
MNewma	0.0	11.2	4.1

Source: OeNB.
VCunw: Variance-covariance approach with equally weitghted moving averages.
HS250: Historical simulation with 250 days of historical data.
HS1250: Historical simulation with 1,250 days of historical data.
MNunw: Mixture of normal distributions approach with equally weighted moving averages.
MNewma: Mixture of normal distribution approach with exponentially weighted moving averages.
[1]) Minimum denotes the minimum difference observed across all twenty portfolios.
[2]) Maximum denotes the maximum difference observed across all twenty portfolios.
[3]) Mean denotes the average difference across all twenty portfolios.

Consider a regulator who compares the VaR numbers of two banks in that period, with bank A using the parametric approach with EWMA and bank B using a 250-day historical simulation. Relying solely on the reported numbers, the regulator would conclude that bank B's trading book was nearly three times as risky as that of bank A, although both banks hold identical portfolios. It is obvious from Table 4 that similar conclusions hold for all other comparisons with the exception of the EWMA-based mixture of normal distributions model.[20]) The results presented in Table 4 clearly demonstrate that comparisons of risk exposures across financial institutions with VaR measures generated by different methods may lead to serious misinterpretations.

Although the results bear testimony to the fact that the differences between the methods may be huge, one should not conclude that the Value at Risk concept itself is flawed. First, the differences are, on average, in the range from 25 to 59%, which is not negligible but far below the observed maximum differences. Second, comparisons of risk exposures within institutions, e.g. among trading desks or different risk categories, etc., are useful if the calculations are based on the same methodology and VaR numbers are interpreted not only in an absolute sense but also in a relative context.

It is interesting to compare the VaR estimates from the mixture of normal distributions methods and the variance-covariance approaches. It is obvious from Chart 2 that at the 99% confidence interval the mixture of normal distributions model with variances based on equally weighted estimators always produces higher VaR numbers than the corresponding variance-covariance approach. This reflects the fact that the mixture of normal distributions method incorporates the excess kurtosis of the underlying market risk factors. On the other hand, the differences are small for both methods if the variances are estimated with exponentially weighted moving averages, although in this case the mixture of normal distributions VaRs provide a kind of upper boundary (see Chart 3). This finding indicates that the EWMA-based variances reduce, but do not eliminate, the effects of excess kurtosis of the distributions of the risk factors.

Chart 4 shows the VaR numbers at the 95% confidence level for the mixture of normal distributions model and the variance-covariance approaches. In the case of equally weighted estimators the mixture of normal distributions method generates VaR numbers that most of the time are slightly below the numbers derived from the corresponding variance-covariance approach. The reverse pattern occurs in the case of EWMA-based VaR calculations.

Having discussed the VaR patterns of the various approaches, it is interesting to compare the methods via backtesting to evaluate their accuracy with respect to the specified confidence intervals. To this effect, the models are tested by comparing the estimated VaR of each portfolio for day t with the profits/losses realized by the portfolios on day t. The cases in which the realized losses exceed the estimated VaR are then counted for each portfolio and method. Table 5 presents the percentages of observed "outliers" or "tail events" for each method averaged over the twenty portfolios. The minimum

and maximum numbers (in percent) of tail events are stated as well. The average percentage of tail events provides information about how accurate a method matches a specified confidence interval, i.e. the implied quantile of the profit/loss distribution.

Table 5

Backtesting of VaR Estimates

Method	Minimum	Maximum	Mean	Standard deviation
99% Confidence Interval				
VCunw	1.3	2.1	1.790	0.20494
VCewma	0.9	1.6	1.305	0.17614
HS250	1.3	2.1	1.790	0.20494
HS1250	0.9	1.6	1.305	0.17614
MNunw	0.8	1.6	1.170	0.23864
MNewma	0.7	1.7	1.010	0.22455
95% Confidence Interval				
VCunw	4.3	5.3	4.780	0.28023
VCewma	3.8	4.8	4.250	0.23508
HS250	4.3	5.3	4.250	0.28023
HS1250	3.8	4.8	4.250	0.23508
MNunw	4.6	5.6	5.030	0.28488
MNewma	3.7	4.6	4.160	0.25215

Source: OeNB.
VCunw: Variance-covariance approach with equally weighted moving averages.
VCewma: Variance-covariance approach with exponentially weighted moving averages.
HS250: Historical simulation with 250 days of historical data.
HS1250: Historical simulation with 1,250 days of historical data.
MNunw: Mixture of normal distributions approach with equally weighted moving averages.
MNewma: Mixture of normal distributions approach with EWMA.

A perfect model would, for instance, produce 1% and 5% tail events at the 99% and 95% confidence interval, respectively. The variance-covariance method with equally weighted moving averages and the historical simulation with 250 historical scenarios show the weakest performance at the 99% level. Both methods tend to produce the greatest fraction of outliers on average. Note that even the minima are above 1% in both cases. If we interpret the average percentages of tail events as tail probabilities, we see that for both methods the probability of losses exceeding the estimated VaR is 1.8% and not 1% as implied by a 99% confidence interval. The historical simulation with 1,250 days of data and the EWMA-based variance-covariance approach produce somewhat better results. Not unexpectedly, the Monte Carlo methods based on mixtures of normal distributions are the most accurate. Both methods come very close to the specified probability of 1%. The Monte Carlo simulation with the EWMA updating scheme matches the 99% confidence interval almost precisely. The results indicate that models that do not account for fat tails tend to underestimate VaR numbers at the 99% confidence interval. Five of the six methods generate somewhat too conservative VaR estimates at the 95% confidence interval. The Monte Carlo simulations based on the equal weighting scheme come closest to the 5% fraction implied by a 95% confidence interval. Note that the Monte Carlo approach based on the mixture distributions with EWMA produces the lowest fraction of tail events in this case.

6 Conclusions

This section of the paper analyzes the six different approaches used to estimate the value at risk. Two methods were based on the variance-covariance approach with equally and exponentially weighted moving averages, and two methods were based on historical simulation with different historical period lengths. Both types of models are commonly used by financial institutions to compute VaR. Furthermore, since many financial return distributions display excess kurtosis, a new method based on mixtures of normal distributions was applied to incorporate fat tails in the VaR estimates.

A comparison of the various methods revealed that the resulting VaR numbers may differ extremely for identical portfolios. With linear fx portfolios, differences sometimes exceeded 200% when the methods were compared with the EWMA-based variance-covariance approach as the benchmark. Even average differences fell into the 25 to 59% range. The results indicate that it may be highly misleading to compare VaR numbers across financial institutions if the reported numbers are based on different methods. However, it has to be pointed out that the Value at Risk concept itself is an extremely useful tool for financial institutions with regard to their in-house risk management. Provided VaR calculations are based on a single methodology, comparisons across trading desks, risk categories, etc. provide valuable information for risk management purposes.

Backtesting was used to investigate the performance of the various methods with respect to specified confidence intervals. The results are consistent with the conjecture that methods that do not incorporate excess kurtosis tend to underestimate VaR at the 99% confidence interval. On the other hand, the same methods tend to overestimate VaR at the 95% confidence interval. For both confidence intervals one particular version of the Monte Carlo simulations which is based on mixtures of normal distributions and incorporates fat tails performed best.

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1 Both authors are economist in the Financial Market Analysis Division of the Oesterreichische Nationalbank. They would like to thank Helmut Elsinger, University of Vienna, as well as Gerald Krenn and Diane Moore, Financial Market Analysis Division (Oesterreichische Nationalbank), for their helpful comments. The opinions expressed in the section "Studies" are those of the individual authors and may differ from the views of the Oesterreichische Nationalbank.

2 The risk factors r_i are typically measured as logarithmic returns $r_{it} = ln(p_{it}/p_{it-1})$ or as arithmetic returns $r_{it} = (p_{it}-p_{it-1})/p_{it-1}$. By using a Taylor series expansion it can be shown that for small r_i both expressions are approximately equal. All calculations in this paper are based on arithmetic returns.

3 Hendricks and Hirtle (1997), p. 1.

4 Hendricks and Hirtle (1997), p. 8.

5 For a comprehensive discussion of variance-covariance approaches and historical simulation methods, see, for example, Dowd (1998) or Jorion (1997).

6 The assumption of zero means is quite common since the means of most daily financial return series are very close to zero and are hard to estimate precisely. For more details and a comprehensive paper on this issue, see Figlewski (1994).

7 The allowed range of lambda is between zero and one.

8 A variance-covariance approach in conjunction with variances (covariances) based on exponentially weighted moving averages assumes conditional normality.

9 For this and other issues concerning the estimation of variance-covariance matrices, see Alexander (1996) or Kroner (1996).

10 For other possible ways of implementing this methodology, see Hull and White (1998).

11 The data were retrieved from Datastream.

12 The return distributions (for various frequencies) of major exchange rates are studied in Müller, Dacorogna and Pictet (1996).

13 Fat-tailed distributions may, for example, arise from jump diffusion processes, stochastic volatility or Markov switching. For a discussion, see Duffie and Pan (1997).

14 This is obvious because this estimator produces the same variances and covariances, respectively, for every possible ranking of the observations contained in the time window.

15 For a discussion, see Campbell, Lo and MacKinlay (1997), chapter 12.

16 This is, of course, not the best lambda for each individual time series, since the lambdas may be estimated separately for each time series. For an empirical justification of choosing 0.94, see RiskMetrics™ Technical Document (1996).

17 It is shown that a mixture of normal distributions model such as equation (7) produces distributions with fatter tails than a normal distribution with the same variance. For a discussion, see for example Duffie and Pan (1997), Hull and White (1998), or Campbell, Lo and MacKinlay (1997).

18 The variance of the mixture of normal distributions is given by $pu^2\sigma^2 + (1-p)v^2\sigma^2$.

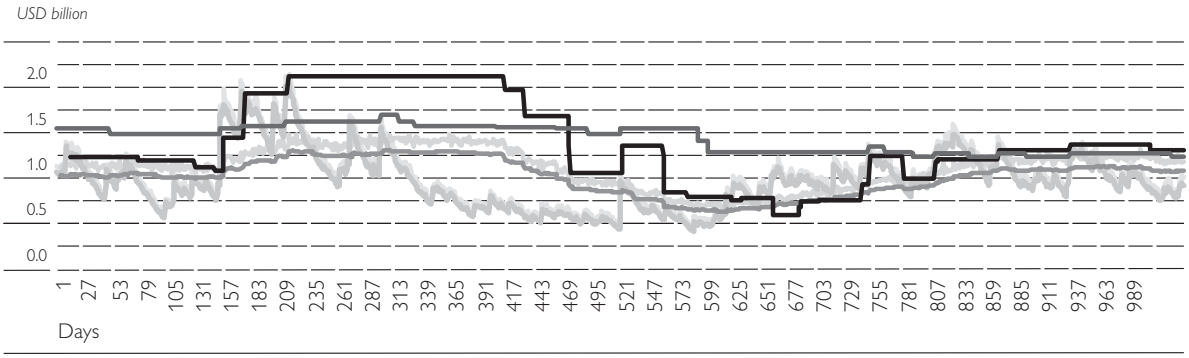
19 The plots for the other portfolios are quite similar and do not change the conclusions.

20 The results for the 95% level are quite similar and therefore not reported.

Annex

Chart 1

VaR Approaches over 1,000 Trading Days (99% Confidence Interval)



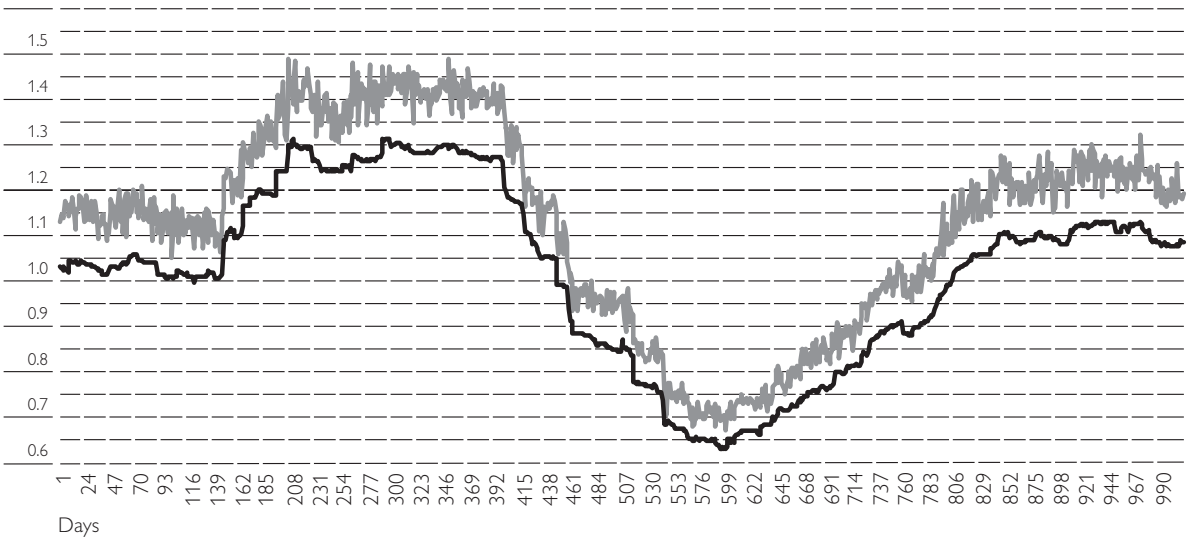
HS250: Historical simulation with 250 days of historical data.
HS1250: Historical simulation with 1,250 days of historical data.
VCunw: Variance-covariance approach with equally weighted moving averages.
VCewma: Variance-covariance approach with exponentially weighted moving averages.
MNunw: MIxture of normal distributions approach with equally weighted moving averages.
MNewma: Mixture of normal distributions approach with exponentially weighted moving averages.

Source: OeNB.

Chart 2

Mixture of Normal Distributions Approach vs. Variance-Covariance Approach

(Equally Weighted Moving Averages, 99% Conficence Interval)



VCunw: Variance-covanriance approach with equally weighted moving averages.
MNunw: Mixture of normal distributions approach with equally weighted moving averages.

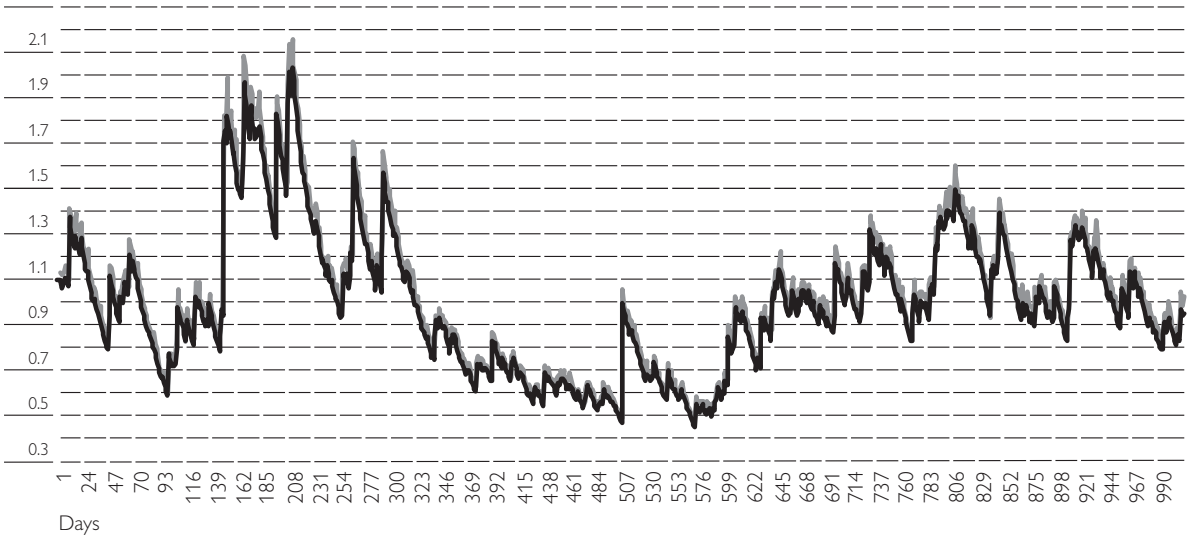
Source: OeNB.

Chart 3

Mixture of Normal Distributions Approach vs. Variance-Covariance Approach

(Exponentially weighted Moving Averages, 99% Confidence Interval)

USD billion



VCewma: Variance-covariiance approach with exponentially weighted moving averages.
MNewma: Mixture of normal distributions approach with exponentially weighted moving averages.

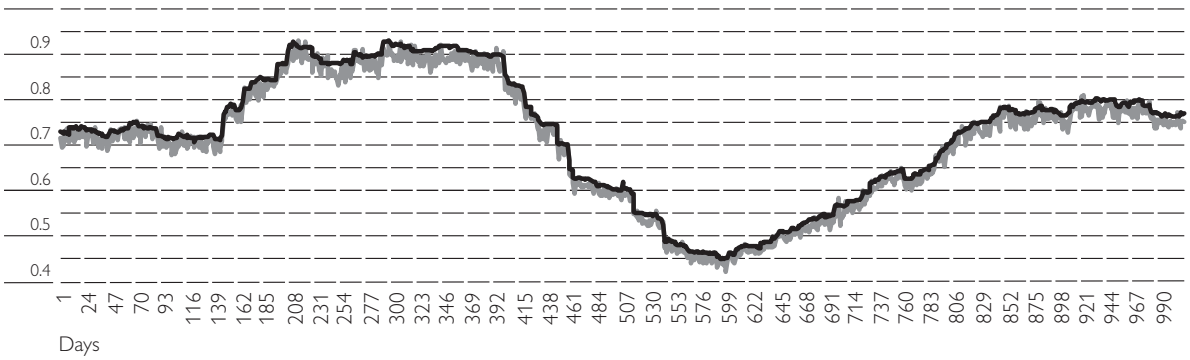
Source: OeNB.

Chart 4

Mixture of Normal Distributions Approach vs. Variance-Covariance Approach

(Equally Weighted Moving Averages, 95% Confidence Interval)

USD billion



VCunw: Variance-covariance approach with equally weighted moving averages.
MNunw: Mixture of normal distributions approach with equally weighted moving averages.

Source: OeNB.

Abbreviations

AMS	Arbeitsmarktservice Österreich (Austrian Public Employment Office)
ARTIS	Austrian Real Time Interbank Settlement
BWA	Bundes-Wertpapieraufsicht (Federal Securities Supervisory Authority)
BWG	Bankwesengesetz (amendments to the Banking Act)
CAD	Capital Adequacy Directive
CEECs	Central and Eastern European Countries
COICOP	Classification Of Individual Consumption by Purpose
CPI	Consumer Price Index
EC	European Community
EEA	European Economic Area
EEC	European Economic Community
EGVG	Einführungsgesetz der Verwaltungsverfahrensgesetze (Introductory Act to the Administrative Procedure Acts)
EMI	European Monetary Institute
EMU	Economic and Monetary Union
EQOS	Electronic Quote and Order Driven System
ERM	Exchange Rate Mechanism
ERP	European Recovery Program
ESNA	European System of National Accounts
EU	European Union
EUROSTAT	Statistical Office of the European Communities
GDP	Gross Domestic Product
GOMEX	Zinssatz für kurzfristige Geldmarkt-Offenmarktgeschäfte (interest rate for short-term open market operations)
HICP	Harmonized Index of Consumer Prices
IHS	Institut für Höhere Studien (Institute for Advanced Studies)
IIP	International Investment Position
IMF	International Monetary Fund
NACE	Nomenclature générale des Activités économiques dans les Communautés Européennes (Statistical Classification of Economic Activities)
ÖCPA	Austrian version of the Classification of Products by Activities
OECD	Organisation for Economic Co-operation and Development
OeKB	Oesterreichische Kontrollbank
OeNB	Oesterreichische Nationalbank
ÖNACE	Austrian version of the Statistical Classification of Economic Activities
ÖSTAT	Österreichisches Statistisches Zentralamt (Austrian Central Statistical Office)
REGOM	Liquiditätsabschöpfende Offenmarktgeschäfte (interest rate for contractionary short-term open market transactions)
RTGS	Real-Time Gross Settlement System
SDR	Special Drawing Right
SNA	System of National Accounts
TARGET	Trans-European Automated Real-Time Gross Settlement Express Transfer System
TEU	Treaty on European Union
VIBOR	Vienna Interbank Offered Rate
WAG	Wertpapieraufsichtsgesetz (Securities Supervision Act)
WIFO	Österreichisches Institut für Wirtschaftsforschung (Austrian Institute of Economic Research)

Legend

– = The numerical value is zero.
. = Data not available at the reporting date
× = For technical reasons no data can be indicated
0 = A quantity which is smaller than half of the unit indicated
_ = New series
Note: Apparent arithmetical discrepancies in the tables are due to rounding.

Official Announcements of the Oesterreichische Nationalbank

		Authentic German text published in the Official Gazette (Amtsblatt zur Wiener Zeitung)	Translation published in "Reports and Summaries" issue no.
Official Announcements Regarding the Foreign Exchange Law			
DL 1/91	Promulgation of the new Official Announcements regarding the Foreign Exchange Law; general provisions 1. Issuance of new Official Announcements 2. Definitions 3. Fees	Sept. 24, 1991	4/1991
DL 2/91	Granting of general licenses 1. General license 2. Waiver of obligation to declare; release 3. Nonbanks 4. Banks not engaged in foreign business 5. Foreign exchange dealers 6. Exchange bureaus 7. Special banks and financial institutions 8. Provisions applying to both banks and financial institutions	Sept. 24, 1991	4/1991
DL 3/91	Reporting requirements 1. General provisions 2. Exemptions from the reporting obligation 3. General reports 4. Reports by banks 5. Reports by nonbanks and financial institutions 6. Special reports	Sept. 24, 1991	4/1991
DL 4/91	Assets of nonresidents with residence (domicile) in Iraq	Oct. 29, 1991	4/1991
DL 2/93	Modification of the Official Announcement DL 3/91	May 5, 1993	2/1993
DL 3/93	Modification of Official Announcement DL 2/91; Sanctions of the United Nations Against Libya (SC Resolution No. 883/1993)	Dec. 15, 1993	4/1993
DL 1/96	Modification of Official Announcement DL 3/91	Sept. 3, 1996	3/1996
DL 1/99	Modification of Official Announcements DL 2/91 and DL 3/91 to the Foreign Exchange Act	Dec. 21, 1998	4/1998
Official Announcements Regarding Minimum Reserve Requirements			
MR 4/95	Calculation of the minimum reserve	Aug. 3, 1995	3/1995
MR 5/95	Minimum reserve ratios and special interest	Aug. 3, 1995	3/1995
MR 6/95	Minimum reserve requirements for credit institutions in the customs exclaves	Aug. 3, 1995	3/1995
MR 1/96	Supplement to § 2 subparagraph 1 of Official Announcement MR 4/95 issued by the Oesterreichische Nationalbank	Dec. 20, 1996	12/1996
MR 1/98	Regulation for the last month to which national minimim reserve requirements applied	Nov. 3, 1998	4/1998

Please see the German-language publication "Berichte und Studien" for a list of all Official Announcements in German.

List of Reports, Summaries and Studies[1])

Please see the German-language publication "Berichte und Studien" for a list of all German-language reports, studies and special publications of the OeNB.

	Published in F = "Focus on Austria"
Oesterreichische Nationalbank and Selected Monetary Aggregates	
Official Announcements Regarding the Foreign Exchange Law and Minimum Reserve Requirements – see preceding page	
Implications of Cash Innovations for Monetary Policy	F 1/1997
Calendar of Monetary Highlights	F 3/1997
The Influence of the Oesterreichische Nationalbank on the Financing Conditions of Austrian Enterprises	F 3/1997
Calendar of Monetary Highlights	F 1/1998
EMU-Decisions on the Changeover to the Euro	F 2/1998
Calendar of Monetary Highlights	F 2/1998
Calendar of Monetary Highlights	F 3/1998
Calendar of Monetary Highlights	F 4/1998
The OeNB's Tasks and Duties in the ESCB	F 4/1998
Austrian Financial Institutions	
Austria's Major Loans Register – Functions, Classification of Major Loans by Sectors and 1996 Results	F 1/1997
The Second Major Amendment to the Banking Act	F 1/1997
Financial Flows in the Austrian Economy in 1996	F 3/1997
Austrian Bank Holidays in 1998	F 4/1997
Money and Credit in the First Three Quarters of 1997	F 4/1997
Money and Credit in 1997	F 1/1998
Austria's Major Loans Register in 1997	F 1/1998
Money and Credit in the First Quarter of 1998	F 2/1998
Money and Credit in the First Half of 1998	F 3/1998
Austrian Bank Holidays in 1999	F 4/1998
Money and Credit in the First Three Quarters of 1998	F 4/1998
Credit Risk Models and Credit Derivatives	F 4/1998
A Comparison of Value at Risk Approaches and Their Implications for Regulators	F 4/1998
Austrian Interest Rates	
The Information Content of the Term Structure – The Austrian Case	F 1/1998
Austrian Capital Market	
The Bond Market in 1997	F 2/1998
Austrian Public Finance	
Structural Budget Deficits in Austria	F 3/1997

1 *For a comprehensive list of reports, summaries and studies hitherto published please refer to issue no. 4/1997 of "Focus on Austria."*

Publications of the Oesterreichische Nationalbank

	Published
Periodical Publications	
Statistisches Monatsheft	monthly
Statistische Daten der inländischen Kreditinstitute (advance excerpts from "Statistisches Monatsheft")	monthly
Leistungsbilanz Österreichs, revidierte Jahresdaten gegliedert nach Regionen und Währungen	annually
Berichte und Studien	quarterly
Focus on Austria (selected chapters from "Berichte und Studien")	quarterly
Focus on Transition	semiannually
Geschäftsbericht	annually
Annual Report (English translation of "Geschäftsbericht")	annually
Volkswirtschaftliche Tagung (for a list of the topics discussed at the conferences see below)	annually
The Austrian Financial Markets – A Survey of Austria's Capital Markets – Facts and Figures	annually
Other Publications	
National Bank Act 1984 (as of September 1990)	1990
New Developments in Banking and Finance in East and West (Kranichberg 1989)	1990
Erfahrungen Österreichs beim Übergang von administrativer Regulierung zur Marktwirtschaft (Moscow 1990)	1990
Challenges for European Bank Managers in the 1990s (Badgastein 1990)	1991
From Control to Market – Austria's Experiences in the Post-War Period (Warsaw 1990)	1991
The Economic Opening of Eastern Europe (Bergsten Conference Vienna 1991)	1991[1])
Erneuerung durch Integration – 175 Jahre Oesterreichische Nationalbank	1991
Striking a Balance – 175 Years of Austrian National Bank	1991
Transparente Dispositionen – Liberalisierter Devisenverkehr unter Beachtung internationaler Publizitätsverpflichtungen	1991
Ausgeglichene Position – Die neue Präsentation der österreichischen Zahlungsbilanz	1992
Aktive Bilanz – Ein Jahr vollständig liberalisierter Devisenverkehr in Österreich	1992
Nationalbankgesetz 1984 (as of January 1993)	1993
Economic Consequences of Soviet Disintegration (Bergsten Conference Vienna 1992)	1993
Neuorientierung – Internationale Vermögensposition und Außenwirtschaftliche Investitionsbilanz Österreichs	1993[1])
Bankwesengesetz 1993	1994[1])

1 Out of print.

	Published
Other Publications (cont.)	
Internationale Vermögensposition 1992 – Die grenzüberschreitenden Forderungen und Verpflichtungen Österreichs	1994[1])
International Investment Position for 1992 – Austria's cross-border assets and liabilities	1994
Western Europe in Transition: The Impact of the Opening up of Eastern Europe and the former Soviet Union	1995
Die Oesterreichische Nationalbank als Unternehmen	1996
Monetary Policy in Central and Eastern Europe: Challenges of EU Integration 1996	1996[1])
Monetary Policy in Transition in East and West	1997
Die Auswirkungen des Euro auf den Finanzmarkt Österreich	1997[1])
Die Bank der Banken	1997
Die Zukunft des Geldes: Auf dem Weg zum Euro Grundlagen – Strukturen – Termine	1997
Geld und Währung	1997
Kompendium von Texten zur Wirtschafts- und Währungsunion	1997
Information literature on banknote security	recurrently
Working Papers (for a list of the topics discussed in the papers, see below)	occasionally
Videos	
Wie Mozart entsteht (banknote security)	1990
The Evolution of W. A. Mozart (English version of "Wie Mozart entsteht")	1995
Bank der Banken (tasks and functions of the OeNB)	1991
The Banks' Bank (English version of "Bank der Banken")	1991

1 Out of print.

List of the Topics Discussed at the Volkswirtschaftliche Tagungen

1975	Die ökonomischen, politischen und sozialen Konsequenzen der Wachstumsverlangsamung
1976	Störungsanfällige Bereiche in unserem ökonomischen und sozialen System
1977	Fiskalismus kontra Monetarismus
1978	Wirtschaftsprognose und Wirtschaftspolitik
1979	Technik-, Wirtschaftswachstums-, Wissenschaftsverdrossenheit: Die neue Romantik – Analyse einer Zeitströmung
1980	Probleme der Leistungsbilanz in den achtziger Jahren
1981	Systemkrisen in Ost und West
1982	Forschung und Wirtschaftswachstum
1983	Ausweg aus der Krise – Wege der Wirtschaftstheorie und Wirtschaftspolitik
1984	Der Weg zur Welthandelsnation
1985	Weltanschauung und Wirtschaft
1986	Vollbeschäftigung, ein erreichbares Ziel?
1987	Vollendung des Binnenmarktes in der Europäischen Gemeinschaft – Folgen und Folgerungen für Österreich
1988	Sand im Getriebe – Ursachen und Auswirkungen der Wachstumsverlangsamung in Österreich
1989	Banken und Finanzmärkte – Herausforderung der neunziger Jahre
1990	Wettbewerb und Kooperation im Finanzbereich
1991	Wirtschaftliche und politische Neugestaltung Europas – Rückblick und Perspektiven
1992	Zukunft regionaler Finanzmärkte in einem integrierten Europa
1993	Europäische Währungspolitik und internationaler Konjunkturverlauf
1994	Neue internationale Arbeitsteilung – Die Rolle der Währungspolitik
1995[1])	Die Zukunft des Geldes – das Geld der Zukunft
1996[1])	Auf dem Weg zur Wirtschafts- und Währungsunion – Bedingungen für Stabilität und Systemsicherheit
1997	Die Bedeutung der Unabhängigkeit der Notenbank für die Glaubwürdigkeit der europäischen Geldpolitik
1998	Wirtschaftspolitik 2000 – Die Rolle der Wirtschaftspolitik und nationaler Notenbanken in der WWU

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List of the Topics Discussed in the Working Papers

		Published
No. 1[1])	Hat Böhm-Bawerk recht gehabt? Zum Zusammenhang zwischen Handelsbilanzpassivum und Budgetdefizit in den USA[2])	1990
No. 2[1])	Ost- und Mitteleuropa auf dem Weg zur Marktwirtschaft – Anpassungskrise 1990	1991
No. 3[1])	Die Wirtschaft Österreichs im Vergleich zu den EG-Staaten – eine makroökonomische Analyse für die achtziger Jahre	1991
No. 4[1])	The Soviet Banking Reform	1991
No. 5[1])	Die Auswirkungen der Finanzmarkt- und Kapitalverkehrs-liberalisierung auf die Wirtschaftsentwicklung und Wirtschafts-politik in Norwegen, Schweden, Finnland und Großbritannien – mögliche Konsequenzen für Österreich[2])	1991
No. 6[1])	Zwei Jahre G-24-Prozeß: Bestandsaufnahme und Perspektiven unter besonderer Berücksichtigung makroökonomischer Unterstützungsleistungen[2])	1991
No. 7[1])	Die Finanzoperationen der öffentlichen Haushalte der Reformländer ČSFR, Polen und Ungarn: Eine erste quantitative Analyse	1991
No. 8[1])	Erfüllung der Konvergenzkriterien durch die EG-Staaten und die EG-Mitgliedswerber Schweden und Österreich[2])	1992
No. 9[1])	Alternative Strategies For Overcoming the Current Output Decline of Economies in Transition	1992
No. 10[1])	Signaling a Hard Currency Strategy: The Case of Austria	1992
No. 11[1])	The Impact of the Opening-up of the East on the Austrian Economy – A First Quantitative Assessment	1993
No. 12[1])	The Scope for Regional Autonomy in Russia	1993
No. 13[1])	EMU and the International Monetary System: A Transatlantic Perspective	1993
No. 14[1])	Austria's Role as a Bridgehead Between East and West	1993
No. 15[1])	Prospects for Growth in Eastern Europe – Some questions raised in the course of a macroeconomic forecasting exercise	1994
No. 16	A Survey of the Austrian Capital Market	1994
No. 17	Trade and Employment: Can We Afford Better Market Access for Eastern Europe?	1994
No. 18	Interdependence of Politics and Economic Development: Financial Stabilization in Russia	1994
No. 19[1])	Austrian Exchange Rate Policy and European Monetary Integration	1995
No. 20[1])	Monetary Spill-over Effects in the ERM: The Case of Austria, A Former Shadow Member	1995
No. 21	Investing in Insider-dominated Firms: A Study of Voucher Privatization Funds in Russia	1995
No. 22	Pessimism Confounded? Economic Recovery in Eastern Europe	1996
No. 23	Will Asymmetric Shocks Pose a Serious Problem in EMU?	1996
No. 24	Exchange Rates and Monetary Policy in Central Europe – a Survey of Some Issues	1997

1 Out of print.
2 Published in a modified form in "Berichte und Studien".

List of the Topics Discussed in the Working Papers (cont.)

		Published
No. 25	Sources of Currency Crises: An Empirical Analysis	1998
No. 26	Structural Budget Deficits and Sustainability of Fiscal Positions in the European Union	1998
No. 27[1])	Trends in European Productivity: Implications for Real Exchange Rates, Real Interest Rates and Inflation Differentials	1998
No. 28	What Do We Really Know About Real Exchange Rates?	1998
No. 29	Goods Arbitrage and Real Exchange Rate Stationarity	1998
No. 30	The Great Appreciation, the Great Depreciation, and the Purchasing Power Parity Hypothesis	1998
No. 31	The Usual Suspects? Productivity and Demand Shocks and Asian Pacific Real Exchange Rates	1998
No. 32	Price Level Convergence Among United States Cities: Lessons for the European Central Bank	1998
No. 33	Core Inflation in selected European Union Countries	1998
No. 34	The impact of EMU on European unemployment	1998
No. 35	Room for Manoeuvre of Economic Policy in the EU Countrries – Are there Costs of Joining EMU?	1998
No. 36	Heterogeneities within Industries and Structure-Performance Models	1998

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Addresses of the Oesterreichische Nationalbank

	Postal address	Telephone	Telex
Head Office			
Vienna 9, Otto-Wagner-Platz 3	P. O. Box 61 A-1011Vienna Austria	(1) 404 20, ext. Fax: (1) 404 20 2399	(1) 114669 natbk (1) 114778 natbk
Internet e-mail: http://www.oenb.co.at			
Branch Offices			
Bregenz Anton-Schneider-Straße 12	P. O. Box 340 A-6901 Bregenz Austria	(55 74) 49 61, ext. Fax: (55 74) 49 61 99	
Eisenstadt Esterhazyplatz 2	P. O. Box 60 A-7001 Eisenstadt Austria	(26 82) 627 18, ext. Fax: (26 82) 627 18 99	
Graz Joanneumring 7	P. O. Box 451 A-8011 Graz Austria	(31 6) 81 81 81, ext. Fax: (31 6) 81 81 81 99	
Innsbruck Adamgasse 2	P. O. Box 505 A-6021 Innsbruck Austria	(51 2) 594 73, ext. Fax: (51 2) 594 73 99	
Klagenfurt 10.-Oktober-Straße 13	P. O. Box 526 A-9010 Klagenfurt Austria	(46 3) 576 88, ext. Fax: (46 3) 576 88 99	
Linz Coulinstraße 28	P. O. Box 346 A-4021 Linz Austria	(73 2) 65 26 11, ext. Fax: (73 2) 65 26 11 99	
Salzburg Franz-Josef-Straße 18	P. O. Box 18 A-5027 Salzburg Austria	(66 2) 87 12 01, ext. Fax: (66 2) 87 12 01 99	
St. Pölten Julius-Raab-Promenade 1	P. O. Box 5 A-3100 St. Pölten Austria	(27 42) 313 483, ext. Fax: (27 42) 313 483 99	
Representative Offices			
Oesterreichische Nationalbank New York Representative Office General Motors Building 5th floor 767 Fifth Avenue **New York, N.Y. 10153** **U.S.A.**		(212) 888 2334 (212) 888 2335 Fax: (212) 888 2515	(212) 422509 natb ny
Permanent Mission of Austria to the EU Avenue de Cortenbergh 30 **B-1040 Brussels** **Belgium**		(2) 285 48 41, 42, 43 Fax: (2) 285 48 48	
Permanent Mission to the OECD 3, rue Albéric-Magnard **F-75116 Paris** **France**		(1) 53 92 23 39 Fax: (1) 45 24 42 49	(1) 842/61 19 46