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Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the OeNB.

ANALYSES

Slowdown in Global Economic Momentum

Asia and the U.S.A. To Remain Growth Drivers of World Economy in 2005

Johann Elsinger,
Gerhard Fenz,
Ingrid Haar-Stöhr,
Antje Hildebrandt,
Thomas Reininger,
Gerhard Reitschuler

In 2004, despite the sudden jump in oil prices and the ballooning trade deficit, the U.S. economy grew by 4.4%, or more robustly than ever since 1999. In the same year, growth in consumer prices peaked at 3.3% – the highest level in four years. In early February 2005, the U.S. Fed raised its key interest rates by 25 basis points for the sixth time since mid-2004. Whereas Japan slipped back into a period of recession, other Asian economies continued growing apace in 2004.

The second half of the year 2004 saw a slowdown in GDP growth momentum in the euro area. Despite positive stimuli from investments, growth rates declined, due to weaker net exports and still very subdued private consumption demand. Consumer restraint can partly be explained by the sluggish growth in real disposable income as a result of higher energy prices, which are also responsible for the rise in inflation.

In the first three quarters of 2004, most new Central European EU Member States expanded at a faster pace than in 2003 as a whole. The upward pressure on prices (partly induced by EU accession) was very strong in the new Member States in 2004. In Romania, an EU candidate country, growth rocketed to an outstanding 10.0% in the third quarter.

Following weak growth in the fourth quarter of 2004, Austria's economy is regaining steam, but is not immune to the current slowdown in growth in the euro area as a whole. The OeNB's short-term indicator forecasts 0.4% seasonally adjusted growth in Austria's real GDP for the first and 0.5% for the second quarter of 2005 (each compared with the previous quarter).

1 U.S.A. and Asia Remain Growth Drivers of World Economy

1.1 U.S.A.: Tightening of Monetary Policy Continues

For the last 18 months or so, the annualized gross domestic product (GDP) has been trending above the long-term average of 3.5% (quarter on quarter), with the exception of the second quarter of 2004 when the sudden jump in oil prices curbed the momentum of GDP growth to 3.3%. In the third quarter of 2004, real GDP growth accelerated to 4.0%, driven by the far greater pace of private consumption momentum (5.1%) and by unabated expansive growth in investment in plant and equipment (+13%). Marginally weaker GDP growth of 3.8% in the fourth quarter of 2004 is attributable primarily to a deterioration in net exports.

At 4.4%, real GDP growth in 2004 as a whole was the strongest ever since 1999. According to Consensus Forecasts, GDP growth is expected to slow to 3.5% in 2005 and 3.4% in 2006. Weaker private consumption,

in particular, is likely to be responsible for this since the rescheduling of mortgage loans at ever more favorable terms is coming to an end, with interest rates now on the rise. In view of the tight budget scenario, moreover, further fiscal stimuli in the form of tax cuts cannot be expected. Besides, increased household debt will narrow the financial leeway available to consumers.

At 4.1%, the vigorous productivity growth of the past few years (2003: +4.4%) continued in 2004, albeit at a slower tempo. Toward year-end, however, the pace of growth slowed markedly, which could indicate largely exhausted gains in economic efficiency.

Labor market conditions are starting to ease. In January 2005, the unemployment rate fell from 5.4% to 5.2%. As a result, the huge job losses triggered in 2001 by the recession were offset in early 2005. However, the risk remains that the robust growth in consumer demand will slacken if the labor market's recovery does not accelerate in the coming months. Sluggish growth in industrial

employment is responsible for the labor market's slow recovery. Some three million jobs have been lost since mid-2000. In early 2004, jobs stopped being axed.

In 2004, consumer prices rose at their fastest rate in four years. January 2005 saw a slight dip in inflation. Following a rise of 3.3% year on year in December 2004, the consumer price index edged down to 3% – owing, in particular, to the smaller increase in energy prices. In January 2005, core inflation rose by 2.3% year on year, or marginally (+0.1 percentage point) more steeply than in the previous two months (strongest growth since October 2002).

At its first meeting of 2005 (February, 1 and 2), the Federal Open Market Committee (FOMC) of the U.S. Federal Reserve System (Fed) raised its target for the federal funds rate by 25 basis points to 2.5%. This increase represented the sixth successive key rate hike since mid-2004 and confirmed the U.S. Fed's repeatedly expressed intention of removing policy accommodation at a measured pace. The statement accompanying this decision almost chimed with that issued at the previous meeting on December 14, 2004. The FOMC described U.S. GDP growth as robust, inflationary expectations as contained and the labor market as steadily improving, and deemed the current level of interest rates to be still stimulating the economy. The upside and downside risks to the attainment of sustainable growth and price stability in the near future were perceived to be roughly equal. As a result, the strategy of monetary policy tightening is likely to be pursued in a series of moderate measures.

Risks for the U.S. economy are the high energy prices, the deep deficits in

the external sector (2004 current account deficit: almost –6% of GDP) and the general government budget (2004 budget deficit: –3.6% of GDP), as well as high consumer debt and consumers' low saving propensity.

1.2 Asia Still Fueling Growth despite "Technical" Recession in Japan

"Technically" speaking, the Japanese economy is back in a recession. Hit by private consumption and the external sector, real GDP in the fourth quarter of 2004 (based on the new chain indices for data of Japan's System of National Accounts – SNA) contracted by 0.1% quarter on quarter after registering a revised –0.3% in the third quarter and –0.2% in the second quarter. However, real GDP in 2004 as a whole increased by 2.6% thanks to extremely healthy growth in the first quarter. Although consumer confidence remained relatively high, the households surveyed reduced their real spending by 0.3% quarter on quarter, which might partly reflect concerns about future tax increases. However, extraordinary factors such as cyclones and a major earthquake in north Japan toward the end of the year also adversely affected consumption. Trading data reveal that company exports performed poorly, posting their slowest growth in a year in December 2004. The labor market, by contrast, was not in the least affected by the cooling economy. Since early 2003 the unemployment rate has fallen from 5.5% to 4.4% (in December 2004), the lowest level since 1998. High commodity prices and the relative strength of the Japanese yen are currently clouding Japan's economic outlook. Although the government and the Bank of Japan (BoJ) have forecast a deceleration in GDP growth to 1.5% in the

fiscal year 2005 (ending March, 31, 2006), they believe the Japanese economy will continue to recover in the long term. Consensus Forecasts anticipate real GDP growth of 1.1% in calendar year 2005 and 1.8% in 2006.

At -0.2% year on year, core inflation for December 2004 (less fresh foods, including energy) remained slightly negative. In 2005, consumer prices are expected to largely stagnate. The BoJ is sticking to its zero interest rate policy. Choosing the right moment is key to an exit strategy. On the one hand, the BoJ should not tighten monetary policy too early if inflation rates are low, or Japan will return to the days of deflation. On the other, the BoJ should not maintain strong monetary growth for a protracted period, or the economy will be exposed to inflationary pressures.

In 2004, the emerging economies in non-Japan Asia (NJA) continued to recover thanks to strong external demand, China's investment boom and more robust domestic demand. Despite attempts to dampen the pace, China's economy grew by 9.5%.

Regional integration strengthened, as indicated by rapid growth in intra-regional trade and by flows of investment. Toward end-2004, growth momentum started to decelerate owing to continued high oil prices. In 2005, growth momentum is likely to slacken – in particular, due to flagging export demand induced by globally weaker economic expansion.

2 Euro Area: Slowdown in Economic Momentum Continues

2.1 GDP Growth Driven by Gross Fixed Capital Formation in Third Quarter of 2004

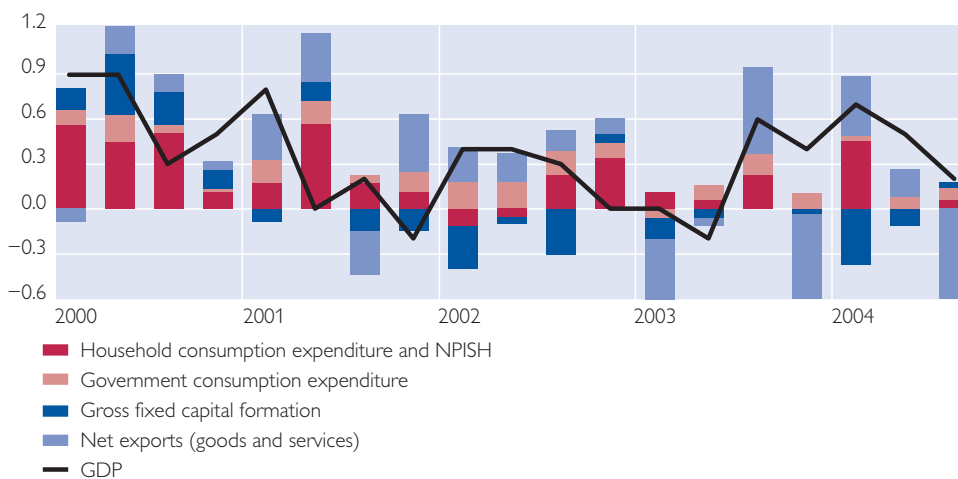
According to Eurostat's first estimate for the fourth quarter of 2004, growth continued to slow to 0.2% and 1.6% on a quarterly and annual basis, respectively. This is primarily due to negative quarterly GDP growth in Germany (-0.2%) and Italy (-0.3%). As early as the third quarter of 2004, growth slowed in the euro area: Real GDP climbed by 0.3% quarter on quarter and 1.8% year on year. This was primarily attributable to

Chart 1

Contribution of Real GDP Components to Growth in the Euro Area

(quarter on quarter)

percentage points



Source: Eurostat.

net exports, which were markedly negative owing to flagging export growth, with imports surging strongly at the same time. Real GDP growth in the third quarter was fueled by gross fixed capital formation, in particular.

Trends in gross fixed capital formation were positive. After this component dwindled by 0.2% in the first quarter of 2004, growth rates of 0.3% and 0.7% (quarter on quarter) were posted for the second and third quarters of 2004, respectively. The main reason for this is that gross fixed capital formation in the third quarter also generated positive growth in Germany. For instance, the decline in gross fixed capital formation in the first quarter was due primarily to the slump in construction investment in Germany. In countries such as Spain, France and Italy, by contrast, gross fixed capital formation already expanded in early 2004. At 0.9%, inventory build-up in the third quarter posted the highest growth in ten years, which meant that this component made by far the biggest contribution to GDP growth.

Following a relatively vigorous rate of 0.7% in the first quarter of 2004 (induced primarily by tax cuts in certain euro area countries), private consumption growth slowed significantly to 0.1% (quarter on quarter) in both the second and third quarter. This is likely to be due to the fact that real disposable income rose at a slower pace owing to the steep increase in energy prices. Other factors are the still unfavorable labor market conditions and the uncertainties about healthcare and pension system reforms. These uncertainties are also reflected in consumer confidence (as surveyed by the European Commission), which has been stagnating since February 2004. Overall, house-

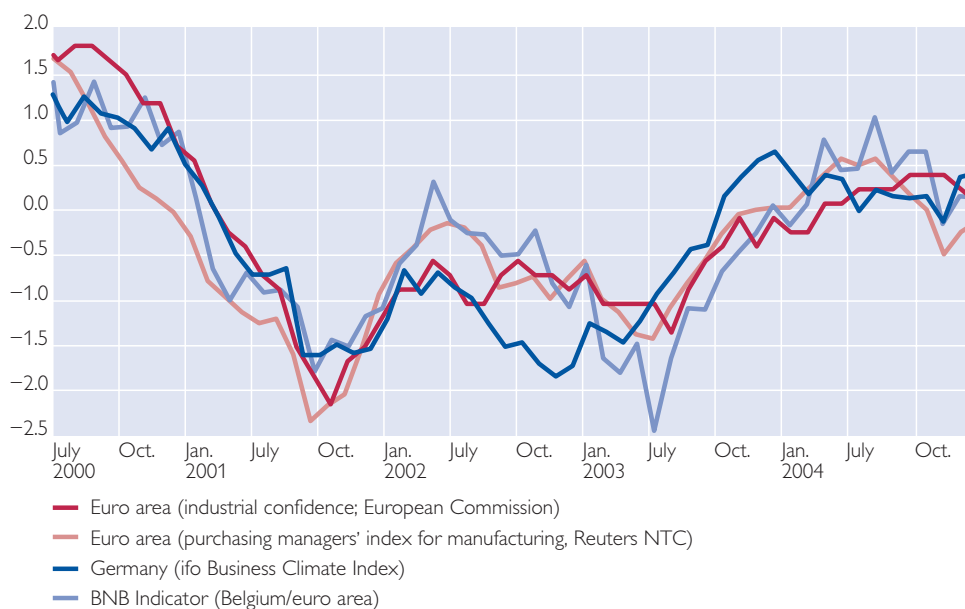
holds are therefore consuming far less and saving instead. A study released by the *Gesellschaft für Konsumforschung*, a consumer research body, shows that Germany's retail industry has been badly hit by current "precautionary saving." For instance, the retail industry's share of nominal household spending in 1993 still exceeded 49%. By 2003, however, this had fallen (with a commensurate rise in the saving rate) to 41%. However, the recent improvement in the monthly indicators for private consumption – retail sales and new car registrations – suggests the sluggish consumption observed in the previous two quarters may have been merely of a temporary nature.

As for exports, their growth momentum slowed in the third quarter of 2004 as imports bounced back strongly. The contribution of net exports to growth was therefore distinctly negative in the third quarter. A reason for this decline in exports is the slight downturn in the growth of the world economy from mid-2004. Furthermore, the negative impact of the euro's appreciation, adversely affecting the competitiveness of euro area exports, is only now likely to take full, albeit delayed, effect. In view of the modest domestic demand, the strong surge in imports was unexpected.

The pace of public consumption picked up recently. After posting growth of just 0.1% in the first quarter of 2004 – in this case, public consumption is likely to have been curbed by the bleak budget situation in some countries (with deficits close to or above the budget deficit ceiling of 3%) – this component rose more steeply in the second and third quarter of 2004, up 0.4% and 0.5% (quarter on quarter), respectively.

Business Climate Indicators

Deviation from mean value of indicator relative to standard deviation



The leading indicators for GDP growth have been presenting a relatively changeable picture in the last few months, which nonetheless confirms the impression that the economy might have recently lost some steam.

2.2 Industrial Production Down, Unemployment Still Flat

Following a steady, albeit volatile, uptrend in growth until mid-2003, industrial production has been in decline since summer 2004. The leading indicators for industrial production also confirm this picture. Both the industrial confidence and economic sentiment indicator of the European Commission signaled a slight downturn in economic momentum.

As in previous months, the seasonally adjusted unemployment rate was just below 9% in December 2004. The tight labor market conditions can also be seen in the steadily falling share of job vacancies (since early

2001) as a percentage of the total working population in the euro area. In the third quarter of 2004, employment posted its highest rise in two years (+0.4%). In addition to the service sector, employment also increased in the construction industry.

2.3 Energy Prices Still Fueling Inflation

After peaking at USD 52.07 on October 22, 2004, the price for a barrel (Brent) tumbled sharply by more than USD 12. In the previous few months, oil price trends have been marked by high volatility. For instance, oil prices initially rose in mid-January 2005 – according to traders, investor concerns about potential new attacks on oil installations in Iraq before the elections and the cold wave in the U.S.A. depressed market sentiment. After falling in early February 2005 on account of OPEC maintaining output – OPEC refrained from cutting quotas at its previous meeting in

January 2005 – and of the absence of terrorist acts in Iraq, oil prices latterly climbed back in mid-February 2005 on fears of supply constraints. The fact that OPEC has maintained output at tests to a certain willingness on its part to take currently high oil prices into account when controlling output.

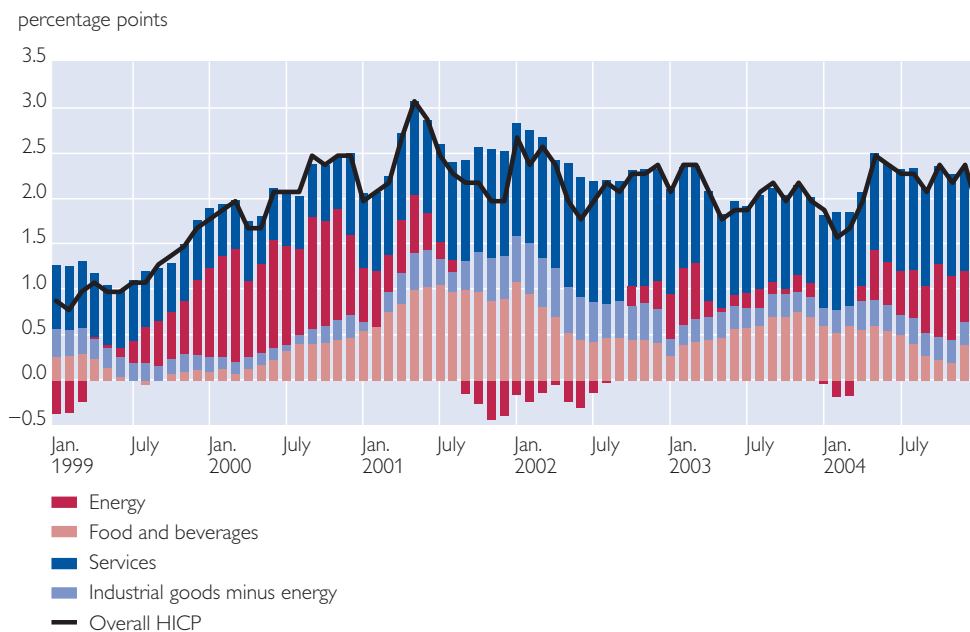
Crude oil price trends are also reflected in the HICP (Harmonised Index of Consumer Prices) inflation rate: since April 2004 inflation has increased primarily because of the energy component. In December 2004, inflation rose to 2.4% (energy component: + 6.9%), with the contribution to inflation of the energy component equaling 0.6 percentage point. In January 2005, the HICP slipped back to 1.9% and was forecast to rise to 2.0% in February. In the past few months, food price increases have

been very feeble, which has partly absorbed the energy price effect. For instance, the year-on-year rates of change for unprocessed food prices were negative from September to November 2004.

Since May 2004 core inflation (rise in the HICP excluding energy and unprocessed foods) has been fluctuating between 1.9% and 2.2% (January 2005: 1.8%). A sizeable proportion of core inflation comes from the “alcohol and tobacco” product group, which has been in excess of 7% since March 2004. Accordingly, the rise in the overall index excluding energy, food, alcohol and tobacco is a mere 1.7%. Furthermore, if the effects of health sector reforms in several countries are factored out of the core inflation rate, the latter is then likely to be only slightly more than 1.5%.

Chart 3

Components of HICP: Contributions to Inflation



Source: Eurostat.

2.4 Private Borrowing in Euro Area Continues to Expand

The upturn in total lending continued to show a positive trend. In particular, loans to the private sector have risen since mid-2003. Total lending growth stabilized due to flagging expansion in public sector lending. The upturn in private sector lending is basically attributable to an increase in home loans owing to low long-term interest rates. By contrast, consumer loans and loans to nonfinancial corporations continued to grow less dynamically, although recently a trend reversal might have occurred in an upward direction.

The three-month average of M3 growth rose to 6.3% for the period of November 2003 to January 2004, with a further resumption of the trend in accelerating growth since May 2004. This is due to the uptick in growth in other short-term deposits and in marketable financing instruments. Continued robust growth of currency in circulation and demand deposits is also attributable to strong foreign demand for euro banknotes and to low interest rates. Healthy

demand for saving vehicles included in M3 can be explained by two factors: first, households' continued high degree of risk aversion and, second, the relatively flat yield curve and historically low long-term interest rates.

2.5 Euro Exchange Rate Peaks at End-2004

Since peaking at USD/EUR 1.36 on December 31, 2004, the U.S. dollar has recently made up lost ground. The somewhat greater strength of the greenback is attributable to favorable U.S. economic data, where industrial order intake and the purchasing managers' survey point to further buoyant growth. Relative to pound sterling and other currencies – in particular, the Japanese yen – the euro exchange rate was comparatively stable. EUR/USD exchange rate trends are currently generally being interpreted as U.S. dollar weakness. Concerns about financing the high current account deficit and, in this context, the high budget deficit in the U.S.A. are cited as one reason for the soft dollar.

Chart 4

Interest Rate Trends in the Euro Area and the U.S.A.

from January 1, 2003, to February 24, 2005



Source: Thomson Financial.

Until early February 2005, long-term interest rates in the euro area fell to 3.5% before bouncing back slightly.

As a result, the downtrend in 10-year government bond yields since July 2004 has thus far continued. The

spread vis-à-vis long-term interest rates in the U.S.A. has also widened. Above all, somewhat bleaker growth prospects are likely to have generated a strong demand for bonds. In addition, healthy demand for safe investment vehicles such as bonds is likely to reflect continued marked risk aversion amid ample liquidity supply.

2.6 Muted Optimism about Economic Growth

The economic outlook for 2005 is no longer considered to be as optimistic as in the first half of 2004. In its short-term target range forecast for the first half of 2005, the European Commission anticipates quarterly growth of 0.2% to 0.6%, which implies that economic momentum is not set to accelerate significantly. The ECB's projections released in December 2004 show that real GDP should increase by 1.4% to 2.4% in 2005 and by 1.7% to 2.7% in 2006. The February 2005 Consensus Forecasts predicts growth of merely 1.7% in 2005, followed by 2% in 2006. In the current forecasts, downside risks, consisting primarily in lagged effects of the euro's appreciation and in increased crude oil prices, are mostly emphasized.

3 Economic Performance in the New Central European Member States and in EU Candidate Countries

3.1 Rapidly Accelerating Growth in Most Countries in 2004

In Poland, Slovakia, Slovenia, Hungary and the Czech Republic, the economy in the first three quarters of 2004 grew at a weighted average rate of 4.9% (year on year), which was still far more dynamic than in the euro area (1.9%). In this period, growth in the new Central European EU Member States ranged between 3.7% (Czech Republic) and 5.9% (Poland) and, in most cases, was thus exceeded by GDP growth in the EU candidate countries Bulgaria (5.8%) and Romania (8.1%). With a growth rate of 3.9%, Croatia, also a candidate country, lagged behind most of these countries.

Furthermore, most Central and Eastern European countries generated higher growth in the first nine months of 2004 than in 2003 as a whole. In the new Central European EU Member States, growth ticked up at the same rate as in the euro area (by 1.4 percentage points). In this group of countries, Poland and Slovenia posted the fastest acceleration, up by 2.2 and 2.0 percentage points, respectively.

Table 1

Real GDP Growth in Central and Eastern Europe

annual change in %

	2000	2001	2002	2003	Q1 04	Q2 04	Q3 04
Poland	4.0	1.0	1.4	3.8	6.9	6.1	4.8
Slovenia	3.9	2.7	3.3	2.5	3.9	4.7	4.9
Slovakia	2.0	3.8	4.6	4.0	5.4	5.5	5.3
Czech Republic	3.9	2.6	1.5	3.7	3.7	3.8	3.5
Hungary	5.2	3.0	3.5	3.0	4.3	4.2	3.7
Bulgaria	5.4	4.1	4.9	4.3	5.3	6.0	5.8
Croatia	2.9	4.4	5.2	4.3	4.2	4.0	3.9
Romania	2.1	5.7	5.0	4.9	6.1	7.0	10.0

Source: Eurostat, national statistical offices, WIW.

At 3.2 percentage points, Romania registered the strongest pick-up in growth among the entire group of countries.

The demand-side growth momentum in the countries under review has interesting features in common. These countries are broken down into groups in terms of changes in the first three quarters of 2004 (compared with 2003) in the contribution of domestic and net external demand to growth.

- In Croatia and the Czech Republic, both with slightly flagging GDP growth, the contribution of net exports to growth was less sharply negative compared with 2003. However, this positive development was more than offset by a weaker contribution of domestic demand. The change in these contributions has consequently resulted in a more balanced pattern of growth in both countries.
- In Bulgaria, Slovenia and Hungary, where GDP growth accelerated in the first three quarters of 2004 (compared with 2003 as a whole), the negative contribution of net exports to growth also proved to be smaller. These three countries were marked not only by accelerated GDP growth but also by a more balanced pattern of growth.
- In Poland, Slovakia and Romania, the positive contribution of domestic demand to growth increased, resulting in a concomitant rise in GDP growth. However, the contribution of net exports to growth developed less positively in these three countries.

In each of the countries where the contribution of domestic demand to growth increased (i.e. in Poland, Slovakia and Romania) growth in gross

fixed capital formation accelerated faster than consumer growth. In Hungary and the Czech Republic, growth in gross fixed capital formation accelerated rapidly whereas consumer growth declined. Bulgaria witnessed a slowdown in both growth in gross fixed capital formation and consumer growth, with the latter falling more sharply. In 2004, a relative shift from consumer growth to investment growth was seen in most countries. There were two exceptions to this rule: first, Slovenia, where both consumer growth and investment growth rose slightly, and, second, Croatia, where growth in gross fixed capital formation fell sharply from a high level and consumer growth remained almost unchanged.

In general, net export levels fluctuated less wildly than in the previous period – with the exception of Romania, where the negative contribution of net exports to growth remained unchanged. In each country except for Croatia, change was based on accelerated export growth. By contrast, import growth increased less rapidly or, in some cases, even decelerated.

The above-mentioned changes in the contributions of net exports to growth in the first three quarters of 2004 (compared with 2003 as a whole) implied a positive contribution of net exports to growth only in Poland, whereas the most negative contributions were observed in Bulgaria (despite a significant reduction) and in Romania. As a result, Poland improved its real net exports (smaller deficit), while the deficits of Bulgaria and Romania widened. Interestingly, contributions of net exports to growth were the most negative in the countries with the highest GDP growth (i.e. in Bulgaria and Romania). The contribution of domestic demand to

growth was the highest in both these countries, indicating an unbalanced pattern of growth.

An analysis of the goods and services subaccounts shows that, in the first three quarters of 2004, Bulgaria and Romania (at 6.6% and 8.6% of GDP, respectively) had the deepest deficits. Slovenia is the sole Central and Eastern European country under review with a slightly positive, almost balanced goods and services subaccount. In Bulgaria and Romania, however, the results of the other subaccounts reduced the current account deficit, which the goods and services subaccount alone (4.0% and 5.9%, respectively) would have generated. In Hungary and the Czech Republic, by contrast, the negative income balance increased the goods and services subaccount deficit from 3.2% and 0.2% of GDP to a current account

deficit of 9.1% and 5.5%, respectively.

3.2 Accelerating Inflation in 2004 – Partly a Result of EU Accession

Price trends in the region were extremely variable. In the new Central European Member States, inflation rates (year-on-year change in consumer prices in the fourth quarter of 2004) ranged between 2.7% in the Czech Republic and 6.0% in Slovakia. In the group of Central and Eastern European countries under review, Croatia had the lowest rate of inflation (2.3%) whereas Romania was the only country with inflation in double digits (10.0%). In November 2004, however, Romania registered single-digit inflation of 9.9% for the first time since the start of the transformation process.

Table 2

Inflation Trends in Central and Eastern Europe

annual change in HICP in %

	2002	2003	2004	Q1 04	Q2 04	Q3 04	Q4 04
Poland	1.9	0.7	3.6	1.8	3.4	4.8	4.5
Slovenia	7.5	5.7	3.6	3.7	3.8	3.6	3.5
Slovakia	3.5	8.5	7.4	8.2	8.0	7.2	6.0
Czech Republic	1.4	-0.1	2.6	2.0	2.4	3.0	2.7
Hungary	5.2	4.7	6.8	6.8	7.4	7.0	5.9
Bulgaria	5.8	2.3	6.1	6.4	6.7	6.7	4.8
Croatia	1.7	1.8	..	1.9	2.3	1.9	2.3
Romania	22.5	15.3	11.9	13.6	12.3	11.9	10.0

Source: Eurostat, national statistical offices, WIIW.

In 2003, prices came under strong upward pressure. In addition to the rise in energy prices worldwide, increases in indirect taxes and agricultural producer price adjustments – both factors are attributed to EU accession – generated inflationary pressures in the new Member States. In Bulgaria, the rise in energy prices worldwide was further increased by regulated energy price adjustments. Food prices continued to climb

steeply in this country, partly as a result of a period of drought. The subindices of the HICP reveal that the inflationary pressures induced on the demand side in the new EU Member States merely played an insignificant role. In Bulgaria and Romania, demand-side factors (also in conjunction with a massive credit expansion) definitely contributed to inflation.

Compared with the average rate of inflation in 2003, prices in four of the

eight countries soared in 2004 (Bulgaria, Poland, the Czech Republic and Hungary), although annual inflation rates in the fourth quarter were lower than those posted in the second and third quarter. Despite strong pricing pressures, inflation fell in three countries (Slovakia, Slovenia and Romania). In Slovakia, relatively low core inflation (some 2%) depressed the overall inflation rate, which rising administered prices and tax cuts had accelerated. Furthermore, the positive base effect (due to sharp increases in administered prices in 2003) and fierce retail competition by foreign suppliers helped. In Slovenia, the relatively small degree in unit wage cost increases due to the gradual de-indexation of the economy led to a decline in inflation.

3.3 Improved Ratings in Second Half of 2004 for EU Candidate Countries and Slovakia

Both Moody's and Standard & Poor's continued to award Slovenia the best ratings for long-term foreign currency liabilities. The two agencies gave the Czech Republic and Hungary the second-best rating. In December 2004, Standard & Poor's upgraded Slovakia, which means that the country now has exactly the same rating from this agency as Hungary and the Czech Republic. Moody's continues to rank Poland third, followed closely by Slovakia (which has had a promising outlook since October). Since Standard & Poor's upgraded Croatia in December, both agencies rate the country just behind the new Member States (i.e. still ahead of Bulgaria and Romania). Bulgaria and Romania's ratings have also improved in the past few months. For instance, Moody's upgraded Bulgaria in November following Standard & Poor's upgrade of Romania in September.

Table 3

Ratings for Long-Term Foreign Currency Liabilities

Currency	Moody's			Standard & Poor's		
	Old rating	Latest change	Current rating	Old rating	Latest change	Current rating
PLN	Baa1	12. 11. 2002	A2	BBB	15. 05. 2000	BBB+
SIT	A2	12. 11. 2002	Aa3	A+	13. 05. 2004	AA-
SKK	Baa3	12. 11. 2002	A3	BBB+	13. 12. 2004	A-
CZK	Baa1	12. 11. 2002	A1	A	05. 11. 1998	A-
HUF	A3	12. 11. 2002	A1	BBB+	19. 12. 2000	A-
BGN	Ba2	17. 11. 2004	Ba1	BB+	24. 06. 2004	BBB-
HRK	..	27. 01. 1997	Baa3	BBB-	22. 12. 2004	BBB
ROL	B1	11. 12. 2003	Ba3	BB	14. 09. 2004	BB+

Source: Bloomberg.

Economic Outlook for Central and Eastern European Countries

The OeNB compiles on a biannual basis forecasts of economic developments in Poland, Hungary, the Czech Republic as well as in Russia. The above-mentioned three new EU countries together account for more than 75% of the GDP of the ten new EU Member States and are thus representative of trends in this region of the EU.¹

In 2004, the euro area's current economic recovery and, possibly, an EU accession effect helped annual GDP growth increase moderately in the Czech Republic and accelerate sharply in Hungary and Poland compared with 2003. In the Czech Republic the contribution of net exports to growth was significantly less negative than in 2003, and in Hungary this component even changed from negative to positive. This improvement in foreign trade more than offset sluggish growth in domestic demand. In Poland, despite accelerated growth in domestic demand, the contribution of net exports to growth was again positive, albeit to a lesser extent than in 2003.

Compared with the OeNB's fall outlook for 2004 GDP growth in these three countries, Poland's figure for 2004 is a tad lower, as the rapid acceleration of investment growth commenced somewhat later than anticipated. In Hungary GDP growth for 2004 is slightly higher than predicted, as private consumption growth slowed somewhat less than expected.

In 2005, the uptick in domestic demand is likely to continue in Poland. In the Czech Republic and Hungary domestic demand is anticipated to rise again. In all three countries, consumer price inflation can be expected to fall due to a base effect, among other factors. In addition, all three countries should see a modest increase in employment together with relatively high investment growth. In Hungary, furthermore, tax cuts and changes in the social transfer system, which are designed to favor low-income households, were implemented in early 2005. At the same time, however, a slowdown in growth of lending to households is anticipated in Hungary for several reasons.² Overall, these factors are likely to generate far stronger private consumption growth in all three countries. Whereas gross fixed capital formation in Poland is expected to expand far more vigorously in 2005 thanks to high corporate profits, relatively low real long-term interest rates in historical terms and effects arising from structural funds transfers from the EU, it is likely to contract (from the, in part, very high level of the previous year) moderately in the Czech Republic and significantly in Hungary. Nonetheless, relatively high investment growth will also be attained in these two countries, especially as transfers from the EU's structural funds will fully take effect in 2005.

In Poland the zloty's marked appreciation in the last twelve months as well as the anticipated rapid acceleration of growth in import-intensive gross capital formation may lead to imports growing more steeply than exports in real terms. This is likely to imply a deceleration in GDP growth in 2005. By contrast, weaker investment expansion in Hungary should dampen the rise in imports. Nevertheless the contribution of net exports to GDP growth is projected to be markedly less positive than in 2004, which is set to dampen GDP growth somewhat.

In 2006, Hungary and the Czech Republic could witness a slight acceleration in consumption growth in connection with their parliamentary elections. By contrast, in Poland higher indexed-based social transfers will buttress private consumption growth. Combined with stronger investment activity and main trading partners' improved growth prospects, this is likely to result in slightly higher GDP growth in all three countries.

In addition to euro area growth and oil prices diverging from built-in expectations to a greater extent, the risks for the outlook of these three new EU countries include unexpectedly sharp exchange rate movements and upcoming elections in all three countries.

In 2004, Russia posted GDP growth at almost the same high levels as in 2003, driven by the high price of oil and other commodities. In addition, prudent monetary and fiscal policies, domestic stability and, to a certain extent, previously implemented structural reforms fueled growth. However, the investment climate in the fourth quarter of 2004 deteriorated in conjunction with increased interventions by the tax and judicial authorities and the further aggravation of the Yukos affair.

In 2005 and 2006, however, GDP growth is likely to slacken. Private consumption growth will remain robust due to wage and pension increases and, to a lesser extent, to high corporate profits, and modest fiscal easing will take place (reduction of the budget surplus). However, uncertainty about future policies

of reform could dampen hitherto strong investment growth. Above all, however, Russia's persistently high inflation differential with the rest of the world and nominal upward pressure will result in the ruble's continued appreciation in real terms. Consequently, in addition to the demand for imports on the back of vigorously growing domestic demand, there will increasingly be cost-induced import competition, which, although also likely to accelerate restructuring, will very probably trigger a further decline in net exports initially.

The Russian economy's even greater dependency on sources of energy in the last few years remains a key risk factor for both growth and this forecast. In addition to a potential sharp drop in prices, capacity constraints (e.g. in oil pipelines) could also lead to a shrinkage in net exports over and above the volume predicted. Furthermore, there is the risk that the ruble will appreciate excessively rapidly in real terms, which would adversely affect the competitiveness of industrial goods. Finally, it is also currently difficult to assess the macroeconomic consequences of the continuing uncertainty about the course of reform and the respect for property rights by the authorities.

Table 4

Three New EU Member States and Russia: March 2005 Forecast

annual change at constant prices (%)

GDP	2001	2002	2003	2004	2005f	2006f
Poland	1.0	1.4	3.8	5.3	4.5	4.7
Czech Republic	2.6	1.5	3.7	4.0	4.4	4.6
Hungary	3.8	3.5	3.0	4.0	3.8	4.0
Russia	5.1	4.7	7.3	7.1	5.7	4.5

f = forecast

¹ These forecasts (Russia's, in particular, is compiled in collaboration with Suomen Pankki, Finland's central bank) are based on preliminary global growth projections and technical assumptions about oil prices and USD/EUR exchange rates, which are prepared by the ECB for the Eurosystem by means of broad macroeconomic projection exercises. These assumptions are central to the current outlook owing to two factors: first, the sizeable export links of these three new EU countries with the euro area and, second, the fact that Russia is one of the world's biggest oil-producing nations.

² For instance, subsidies for home loans were cut, which means households will require a higher share of self-financing for this purpose.

4 Austria: OeNB Revises Economic Outlook for First Half 2005 Slightly Downward – Austrian Economy Withstands Euro Area Slowdown Rather Well

Booming exports chiefly carried the economy in the first half of 2004. In the light of the decelerating global economy, the high oil prices and the strong euro, exports, however, started to slow in the remaining months of 2004. At the same time, economic growth was driven increasingly by domestic demand, in particular by the very lively investment activity. In the fourth quarter of 2004, real exports were down 0.6% quarter on quarter. For 2004 as a whole, exports nevertheless expanded by a solid 9%.

Yet businesses' assessment of order books implies that exports are unlikely to match the year-earlier expansion in the first half of 2005.

The years 2003 and 2004 saw exceptionally robust investment growth owing to brisk demand for replacement investment and to the stimulus provided by a subsidy granted for investment that exceeds the average investment level of the previous three years. Meanwhile, an investment share of GDP that has outperformed the figures posted in the record year 2000 points to a forthcoming slowdown in investment activity. The expiration of the above-mentioned investment growth subsidy at year-end 2004 and current survey data corroborate the assessment that investment activity has already peaked.

Table 5

Breakdown of Real GDP Growth in Austria

	Change from previous period (year; quarter) in %					Contributions to GDP growth in percentage points ¹⁾				
	Q1 04	Q2 04	Q3 04	Q4 04	2004	Q1 04	Q2 04	Q3 04	Q4 04	2004
GDP	0.6	0.8	0.8	0.3	2.0	0.6	0.8	0.8	0.3	2.0
Private consumption	0.4	0.3	0.2	0.3	1.5	0.2	0.2	0.1	0.2	0.8
Public consumption	0.2	0.3	0.3	0.2	1.1	0.0	0.1	0.1	0.0	0.2
Gross fixed capital formation	0.7	1.0	1.6	1.2	4.8	0.2	0.2	0.4	0.3	1.1
Exports	2.7	3.4	1.8	-0.6	9.0	1.4	1.8	1.0	-0.3	4.5
Imports	1.2	1.5	1.4	1.0	5.7	-0.6	-0.7	-0.7	-0.5	-2.7
Domestic demand	x	x	x	x	x	0.4	0.4	0.5	0.5	2.1
Net exports	x	x	x	x	x	0.8	1.1	0.3	-0.8	1.8
Statistical discrepancy ²⁾	x	x	x	x	x	-0.6	-0.8	-0.1	0.6	-1.8

Source: Eurostat.

¹⁾ Based on chain indices, for which contributions to growth can only be approximated.²⁾ Including changes in inventories.

Economic development in 2005 will depend essentially on the extent to which households step up their consumption expenditure. The second stage of the tax reform coupled with ongoing employment growth – irrespective of the moderate wage settlements – translate into a tangible increase in nominal household income. The higher inflation, however, is dampening purchasing power. At the same time, subdued consumer confidence suggests sustained consumer restraint. Overall, the OeNB nonetheless expects the positive momentum to carry the day and private

consumption growth to accelerate in 2005.

Labor market conditions – one of the reasons for the rather low consumer confidence – are marked by vigorous employment growth amid sustained high unemployment. The greater influx of foreign workers and the pension reforms of the previous few years are at the root of the exceptional rise in the labor supply. As the number of registered job vacancies is increasing further, robust employment growth is expected to continue in 2005 and subsequently to ease the situation on the labor market somewhat.

Results of the OeNB Economic Indicator of March 2005:**OeNB Revises Expectations for Economic Developments in the First Half of 2005 Slightly Downward¹**

The OeNB now assesses the growth prospects for the first half of 2005 somewhat more cautiously than indicated by the OeNB's economic indicator published in January 2005. The slowdown in economic growth is, however, expected to be of a temporary nature only; the economic outlook for the remainder of 2005 is more optimistic. The OeNB's economic indicator forecasts 0.4% seasonally adjusted growth in Austria's real GDP for the first and 0.5% for the second quarter of 2005 (each compared with the previous quarter). Compared with the most recent release of January 2005, the growth expectations for the first quarter 2005 were reduced by 0.2 percentage point. Year on year, this points to a slight contraction of economic growth in the first two quarters of 2005 from 2.2% to 2.0%.

Table 6

Short-Term Outlook for Austrian GDP in the First and Second Quarter of 2005 (Seasonally Adjusted)

2003				2004				2005	
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
change from same quarter a year ago in %									
0.6	0.5	0.8	1.1	1.4	1.9	2.5	2.4	2.2	2.0
change from previous quarter in %									
0.3	0.3	0.2	0.4	0.6	0.8	0.8	0.3	0.4	0.5
annual change in %									
0.8				2.0					

Source: OeNB – Results of the OeNB Economic Indicator of March 2005, WIFO.

¹ Since the first quarter of 2003, the economic indicator of the OeNB has been published four times a year. It forecasts real GDP growth for the current quarter and the next (in each case, on a quarterly basis, using seasonally adjusted data). The figures are based on the results of two econometric models: a stochastic state space model and a dynamic factor model. Further details on the models employed can be found at www.oenb.at in the Monetary Policy and Economics section. The next publication is scheduled for June 2005.

4.1 Slight Deterioration of Confidence Indicators

Current confidence indicators reflect the uncertainty over the future economic development in Austria. The European Commission's economic sentiment index, on a steady rise last year, posted its highest level to date in October 2004. Since then this confidence indicator retreated four times in a row, plummeting to the lowest level in 12 months in February 2005. This slide is likely to be ascribable to the worsened growth prospects for Italy and Germany, Austria's two main trading partners, the euro's appreciation and the continued high unemployment ratio.

The subcomponents of this economic sentiment index are only modestly indicative of the further devel-

opment of the expenditure-side GDP components in 2005. The weaker order book assessment for exports suggests a deceleration of shipments abroad over the course of this year. With capacity utilization in the fourth quarter of 2004 continuing to be at high levels, the demand for capacity-enhancing investment may safely be assumed to be still high irrespective of the sizeable investment share in GDP. This, however, conflicts with the results of the WIFO Investment Survey and the sliding industrial as well as service sector confidence. On balance, evidence of a slowdown in investment activity prevails. In addition, a sharp uptick in private consumption does not seem to be on the horizon. In early 2005, retail confidence stabilized at the low level

of the second half of 2004, whereas consumer confidence has remained unchanged for some time now.

4.2 Higher Inflation owing to Oil Price Surge

In 2004, average annual HICP inflation stood at 2.0% and thus markedly above the 2003 level of 1.3%. Inflation progressively rose over the course of 2004, climaxing at 2.5% in December. Subsequently, it edged down to 2.4% in January 2005 and to 2.3% in February. Price trends were basically determined by the increase in crude oil prices. An analysis of the HICP subcomponents shows that inflation was particularly high in energy and housing costs, but it also remained above average in the services sector, unchanged from the previous years. Conversely, the trend of below-average price growth of industrial goods likewise continued. Energy prices will determine the path of inflation in 2005. On the assumption that the oil price will more or less move in synch with the forward rates, the surge of the oil price over the past few months – sporadically to above USD 50 per barrel Brent – is likely to keep inflation high until mid-2005 or so. After that, the base effect of the previous oil price spike will dampen the inflation rate. Core inflation is expected to remain below the 2% mark.

In terms of the Negotiated Standard Wage Rate Index, wages augmented by 2.1% in 2004, basically mirroring the increase in consumer prices. In the second half of 2004, consumers suffered real income losses. This trend continued into 2005 but is likely to cease in the first half of this year.

4.3 2004 Current Account on Cash Basis almost Balanced

Austria's current account was virtually balanced in 2004, with the deficit (based on payment flows) coming to EUR 0.8 billion or 0.3% of GDP. Compared with 2003, the current account improved slightly by EUR 0.2 billion. This improvement is entirely ascribable to the vigorous export activity yielding, as expected, a pronouncedly higher surplus of the goods and services subaccount in 2004. The shortfall of the goods subaccount was reduced from 1.7% of GDP in 2003 to 1.1% in 2004, while the surplus of the services subaccount climbed from 2.4% to 2.5%. The deficits of the income and current transfer subaccounts, by contrast, widened to 0.6% and 1.1% of GDP, respectively.

The export boom of 2004 is also reflected in the foreign trade statistics compiled by Statistics Austria. The merchandise trade balance improved from –0.9% of GDP in 2003 to –0.1% in 2004. Goods exports expanded by 13% against 2003. An analysis of the intrayear trend of annual growth rates does not yet point to a perceptible slowdown in export activity. Seasonally adjusted monthly data, however, show that exports peaked in the second quarter of 2004 and noticeably decelerated in the second half of the same year, especially in the fourth quarter. Real export figures, taken from the national accounts, confirm this pattern. An analysis of the merchandise trade by geographic region reveals that the deficit vis-à-vis the EU-15 mounted to –2.8% of GDP (2003: –2.5%), while the surplus vis-à-vis the new Member States remained more or less unchanged at 0.6% of GDP. Merchandise trade with countries outside the EU was very robust, with the surplus

rising by 1 percentage point to 2.0% of GDP. In particular, the dynamic growth of shipments to the U.S.A. (+32% in the first 11 months of 2004) came as a surprise, not least because of the gradual appreciation of the euro against the U.S. dollar since mid-2001 and the concomitant

deterioration of price competitiveness. Part of this surge may, however, be explained by a statistical effect. Automobile industry exports, which used to be shipped via Germany, now increasingly go directly to the U.S.A.

Demographic Fluctuations, Sustainability Factors and Intergenerational Fairness – An Assessment of Austria’s New Pension System

Markus Knell¹

This study discusses important elements of Austria’s recently harmonized statutory pension system. In particular, the author investigates in how far the new system responds to the twofold demographic challenge of declining birth rates and increasing life expectancy and what this means in terms of fiscal sustainability and intergenerational redistribution.

Austria’s defined benefit system is found to have more in common with Germany’s system of earnings points than with Sweden’s notional account system – with the exception that the sustainability factor, the adjustment mechanism triggered by demographic changes, has been designed differently in Germany and in Austria. A critical analysis of the Austrian provisions identifies the following problems: First, the application of the sustainability factor is activated only by deviations from projections and not to demographic movements as such. Second, adjustments are not to be automatic. Third, the requirement of an “even adjustment” is not spelled out in detail. Fourth, it is doubtful whether evenness is a desired feature in the first place since generation-specific reproductive behavior is neglected in this scenario.

Overall, the basic structure of Austria’s new model gets a favorable rating, as it increases the degree of intergenerational fairness, supports individual, intersectoral and international flexibility and corrects some design flaws of the old pension regime. Conversely, weaknesses are identified with regard to the transitional arrangements, the contribution side and the sustainability factor.

1 Introduction

In early 2005, a new acronym – APG (Allgemeines Pensionsgesetz – General Pension Act) – was added to the Austrian legal framework. The APG lays down the fundamental structure of the new, harmonized statutory pension system in 16 articles, making specific reference to those sections – specifically transitional arrangements – where the provisions of the existing social security acts continue to apply. This study discusses important elements of the APG. Special emphasis is placed on the basic design principles of the new system. The main objective is to identify in how far the new system responds to demographic changes and what this means in terms of fiscal sustainability and intergenerational redistribution.

The basic structure of the APG is presented in chapter 2 and compared with the German and Swedish pension models. According to this comparative analysis, Austria’s new (defined benefit) pension system has more in

common with the (classical) German system than with the Swedish model, which is likewise structured as a notional account system, yet is of the defined contribution type.

Chapter 3 is dedicated to the question on how the demographic challenge is tackled under the new system. In addition, the Austrian sustainability factor is juxtaposed with its German counterpart and critically examined.

The study concludes with a summary assessment of Austria’s new statutory pension system in chapter 4.

2 A Comparison of the Austrian, German and Swedish Pension Systems

Let us start out by studying and comparing the central design principles underlying the Austrian, Swedish and German pension systems. The Swedish and German systems lend themselves as benchmark models as they are frequently discussed in the literature and represent two archetypes of

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a pay-as-you-go (PAYG) pension system.

2.1 Austria’s New Pension Model – A Notional Defined Benefit System

Austria’s harmonized pension system revolves around a *personal notional defined benefit (NDC) account*. Such an account was already proposed by the Austrian pension reform commission as a possible design principle. The new pension system, indeed, broadly reflects the conclusions and recommendations of the commission’s report (PRK, 2002) in this respect and on a number of other points.

The *formula 45-65-80* encapsulates the target benefit that the contributions accrued on the notional account are designed to provide – namely on (average lifetime) earnings replacement rate of 80% at a retirement age of 65 after 45 years of contributory service. To this effect, 1.78% (*accrual rate*) of the attained earnings (i.e. of the contribution base unless this exceeds the maximum contribution base) are credited to the account per year and *accrue interest* at the growth rate of the *average contribution base*, which over a period of 45 years results in 80.1% ($= 1.78\% \times 45$). This rate can only be reached in case retirement becomes effective at the normal retirement age of 65. Retirement during a *pension corridor*, i.e. between the age of 62 and 68, results either in a benefit decrease (pre-65) or increase (post-65) of 4.2% p.a.; but only persons with at least 37.5 years of pen-

sionable service are eligible for such a “corridor pension.” The notional account captures all paid-in contributions and the accrued interest, and as from 2007, the pension insurance system must send an account statement on the insured person’s request.²

The uniformly applied *contribution rate* stands at 22.8% (with employees accounting for 10.25% and employers for 12.55%). Farmers and self-employed persons, by contrast, pay a rate of only 15% and 17.5%, respectively. Existing pensions are *indexed to the inflation rate*. For *substitute contribution periods*,³ statutory contributions are credited to the notional account. Special provisions apply to *heavy workers* (in particular regarding retirement eligibility age and benefit deductions). The *transition* from the existing to the harmonized pension system is based on a parallel calculation (for all persons under 50 years of age). In other words, at the time of retirement, pension benefits are calculated both according to the old and the new legal provisions (for the entire service period), and the definitive pension is then determined in line with the principle of *pro rata temporis*. A *cap* is to be applied to losses resulting from the 2003 pension reform, which is set to increase from 5% in 2004 to 10% by 2024. Last, but not least, the APG introduces a *sustainability factor*, which will be activated when central demographic (life expectancy) variables deviate from projections. The sustainability factor will be discussed in more detail further below.

² For examples of such account statements, see the explanatory notes to the APG (p. 55) or Stefanits et al. (2004, p. 429).

³ Periods during which a person subject to compulsory insurance does not pay contributions into the statutory pension scheme but which are counted towards the qualifying period necessary for benefits, including particularly childcare periods, periods of unemployment/welfare benefits, sick benefits, military and alternative civilian service as well as compassionate care leave.

2.2 Sweden’s Pension Model – A Notional Defined Contribution System

Sweden is beyond doubt the best-known example of a country switching from a traditional PAYG pension system to a notional account, i.e. a notional defined contribution system. Before comparing it with the Austrian system, let us take a brief look at its main characteristics.⁴

The total contribution rate on earnings amounts to 18.5% (split evenly between employer and employee), 16% of which is paid into the PAYG account and the remaining 2.5% is channeled into a mandatory funded component, i.e. a capital-market based pillar.⁵ Contributions paid into the personal notional account are revalued at the notional interest rate, which in Sweden equals the growth rate of average earnings. At the time of retirement, the capital accumulated in the notional account is converted into an annuity. In the most straightforward version of this model, the notional capital is simply divided by life expectancy, which is why increased longevity automatically translates into reduced pension benefits.⁶

2.3 Germany’s Pension Model – Earnings Points and Current Pension Value

The German pension system is designed as a point system.⁷ An insured person’s annual earnings points are determined by dividing his or her

annual income by the average earnings of all future pensioners. Hence, an annual income equivalent to the average earnings in a given year is worth one earnings point; two points are assigned for double, half a point for half the average income. The sum total of earnings points times the current pension value, which indicates the pension entitlement represented by one earnings point, equals the pension benefits. Like in Austria, deductions or supplements apply when retirement is taken before or after the normal retirement age of 65. The target benefit that the system is designed to provide thus broadly depends on the definition of the current pension value. In the past, the pension value was defined such that the “benchmark” pensioner (who takes retirement at the age of 65 after 45 years of contributory service) was assured a net replacement rate of around 70%. However, the recently introduced sustainability factor has considerably changed the way the pension value is determined. We will come back to this later.

2.4 Comparison of the Pension Systems in Austria, Germany and Sweden

The example presented in the box “Different Methodologies for Calculating Pension Benefits” highlights the similarities and differences between the Austrian, German and Swedish pension systems.

⁴ For a description, see Palmer (2000), Disney (1999) and Holzmann (2004). For in-depth, partly critical discussions of the NDC system, see Börsch-Supan (2003) as well as Williamson and Williams (2003).

⁵ For details on this second pillar, see Sundén (2004).

⁶ This mechanism is accompanied by “frontloading” in Sweden, which partly moves expected pension adjustments forward (Palmer, 2000, Appendix 1).

⁷ For a detailed description of the German pension system, see Börsch-Supan and Wilke (2003) as well as Börsch-Supan et al. (2003).

Table 1

Comparison of the Austrian, German and Swedish Pension Systems												
				Notional defined contribution account (Sweden) contribution rate: 25%			Notional defined benefit account (Austria) benefit target: 50% accrual rate: 12.5%			Point system (Germany) benefit target: 50% Pension value (period 5): 2,758.88		
1	2	3	4	5	6	7	8	9	10	11	12	13
Period	Individual earnings	Average earnings	Growth rate of average earnings in %	Annual contribution	Total capital	Pension benefits	Annual partial credit	Aggregate pension credit	Pension benefits	Earnings points	Total earnings points	Pension benefits
1	10,000.00	20,000.00	x	2,500.00	2,500.00		1,250.00	1,250.00		0.50	0.50	
2	15,600.00	20,800.00	4	3,900.00	6,500.00		1,950.00	3,250.00		0.75	1.25	
3	26,780.00	21,424.00	3	6,695.00	13,390.00		3,347.50	6,695.00		1.25	2.50	
4	32,457.36	21,638.24	1	8,114.34	21,638.24		4,057.17	10,819.12		1.50	4.00	
5		22,071.00	2		22,071.00	11,035.50		11,035.50	11,035.50			11,035.50
6		22,733.13	3			11,366.57			11,366.57			11,366.57

Source: OeNB calculations.

Different Methodologies for Calculating Pension Benefits

The workings of the three different systems are illustrated in table 1. This simple example does not reflect the exact parameterization of the existing pension systems but is mainly meant to capture the basic structures, using the example of a fictitious person who is employed for four periods and then spends two periods in retirement. Column 2 shows the individual earnings per period, while columns 3 and 4 display the level and the growth rate of average earnings, respectively. The contribution rate is assumed to stand at 25%.

Columns 5 and 6 reflect the entries in a notional defined contribution (NDC) account, which corresponds to the Swedish model.¹ The annual contributions are given by $2,500 = 0.25 \times 10,000$, $3,900 = 0.25 \times 15,600$, etc. The (notional) total capital comprises the current annual contribution and the account value of the previous period indexed to the rate of growth of covered average earnings (column 3), i.e. $6,500 = 3,900 + 2,500 \times 1.04$, $13,390 = 6,695 + 6,500 \times 1.3$, etc. Upon retirement in period 5, the total capital (reflecting also the revaluation from period 4 to 5, i.e. $22,071 = 21,638 \times 1.02$) is divided by life expectancy, which stands at two periods in this example. The initial pension benefit thus equals $11,035.5 = 22,071/2$. The determination of the pension benefit in period 6 will be discussed below.

Columns 8 and 9 reflect the development of pension benefits and entries in a notional defined benefit (NDB) account, which resembles the new Austrian system. This example has been construed such that the NDB account yields the same pension benefit as the Swedish NDC account, i.e. that the replacement rate of 50%, which implies that the accrual rate must be set at 12.5%. The yearly partial credit is calculated as follows: $1,250 = 0.125 \times 10,000$, $1,950 = 0.125 \times 15,600$, etc. The current aggregate credit consists of the annual credit amount and the aggregate credit of the previous period revalued at the average wage growth rate. The initial pension benefit in period 5 equals the (revalued) aggregate credit of the last working period, amounting to 11,035.50.

Germany's system of earnings points is illustrated in columns 11 and 12. The earnings points reflect a person's relative income in the individual periods; in our example, they amount to 0.5, 0.75, 1.25 and 1.5 for the four periods. The example has been construed such that the earnings points add up to 4, which corresponds to the amount of earnings points accumulated by a benchmark pensioner during his or her working life. Once again, the replacement rate is assumed to be 50%, which translates into a current pension value of 2,758.88 and adds up to pension benefits of 11,035.50 ($= 4 \times 2,758.88$).

All three systems evidently yield identical initial pension benefits, provided the parameters are set accordingly. If the pension benefits are adjusted synchronically under all three models, later pension payouts will not diverge, either. On the assumption of wage-based indexation, the pension benefits in period 6 reach 11,366.57 in all three cases (this is assumed in table 1). In line with the APG, existing

pensions are to be adjusted only for the inflation rate, i.e. they remain constant in real terms. This, however, does not alter the general conclusion that in a demographically stationary society the three systems may be designed such that they produce equivalent outcomes.

¹ For an in-depth illustration of an NDC account, see Palmer (2000, p. 7).

The following observations result from this comparative analysis:

– *Constant demographic structure.* In a demographically stationary society, the differences between the three systems are small. If the parameters are chosen in an appropriate way, all models produce identical contributions and pension benefits, as shown in table 1.⁸ This, in turn, ensures that the equivalence between contributions and benefits is the same in all three systems.⁹ What is more, the German and Austrian systems are also nearly identical in design. The definition of the benchmark pensioner under the German system (who receives the defined replacement rate at the age of 65 after 45 years of contributory service) corresponds to the 45-65-80 formula in Austria. Furthermore, calculating pension entitlements via earnings points is fully equivalent to the accrual rate method of the Austrian system, provided all income years are taken into account and revaluation is based on the growth rate of the average

wage and not of the wage bill.¹⁰

In contrast, a marked difference is evident in the way pension benefits are adjusted. In Austria, existing pension benefits are merely adjusted for the inflation rate, while in Germany – due to the earnings point method – indexation is based on wage growth. In conclusion, while designed as a notional account system, the Austrian pension system nevertheless has more in common with the German model than with Sweden’s NDC account system.¹¹

– *Increasing life expectancy.* In the defined contribution model, an increasing life span automatically reduces pension benefits.¹² In standard defined benefit systems, a targeted replacement rate (as opposed to annuitization) determines the pension payout, which is also why such systems as a rule do not feature an automatic adjustment mechanism. Of course, it would be possible to link the definition of the benchmark pensioner or the 45-65-80 formula to life expectancy, but this is at

⁸ “Notional accounts are, in effect, identical to a well designed defined benefit pay-as-you-go scheme with reasonable actuarial adjustments and benefits based on revalued average lifetime earnings.” (Disney, 1999, p. 36); see also Börsch-Supan (2003).

⁹ In the literature on PAYG pension systems, this type of equivalence is frequently called “actuarial fairness” or “quasi-actuarial fairness” (Lindbeck and Persson, 2003).

¹⁰ In a first stage, any demographic adjustment factors and mechanisms are not accounted for. Such factors may naturally lead to considerable differences between the systems and, in an extreme case, blur the lines between defined benefit and defined contribution systems.

¹¹ In the literature, differing definitions are used for “defined contribution”² and “defined benefit” systems. In this study, a defined contribution system refers to a system in which the pension benefits depend on the accrued contributions. In contrast, a defined benefit system denotes a system in which the effective pension benefits are not determined by total contributions.

¹² If life expectancy rose from 6 to 7 periods in the example given in table 1, the initial pension at the time of retirement in period 5 would amount to a reduced $7,357 = (22,071/3)$ and many subscribers would probably opt to prolong their working life to counter the decrease in pension benefits.

- present not planned, at least not in Austria.¹³
- *Variable cohort sizes.* None of the three models (according to the basic design principles) automatically responds to fluctuations in the cohort size. In the case of an ongoing trend (e.g. a sustained reduction in the birth rate), at one point or another adjustments will have to be made on the contribution and/or the benefit side. According to the Swedish model, a change in the contribution rate entails an increase in the funds to be paid into the notional account and thus also in the future pension claims. For this reason, adjusting to a demographic shock proves particularly difficult in a defined contribution system and an automatic budget balance can no longer be guaranteed in such case (Valdés-Prieto, 2000).¹⁴ As a matter of fact, the transparency and individual determinability of notional account systems might prove to be disadvantageous in this context, since for political reasons it is difficult to alter such “securitized pension claims.” In a typical defined benefit system, definitive pension benefits are determined only at the time of retirement, which makes it easier to implement changes in benefit calculation (Börsch-Supan, 2003).

3 The Implications of Demographic Fluctuations and the Role of Sustainability Factors

3.1 Empirical Developments in Austria

As mentioned earlier, two demographic processes pose a challenge to pension systems, potentially jeopardizing fiscal sustainability.

- *Fluctuations in the size of birth and work cohorts.* In Austria, the birth rate has been on a steady decline in the past decades, as reflected by chart 1. While migration and stepped-up labor force participation have helped to somewhat constrain the effects of this downward trend on the size of the work cohorts, fluctuations in the cohort size are nevertheless problematic for a pension system designed to be sustainable and intergenerationally fair.¹⁵
- *Life expectancy* has continuously risen over the past decades. The trend line in chart 1 indicates that life expectancy in Austria has been increasing incrementally by 0.24 years per calendar year since 1951.¹⁶ If this process persists while the retirement eligibility age remains constant, the ratio of the employment period to the pension period will continue to shift steadily.

The pension reform commission calculated that the aggregate impact of these demographically induced

¹³ The provisions on the sustainability factor in Austria and Germany will be discussed in detail later on.

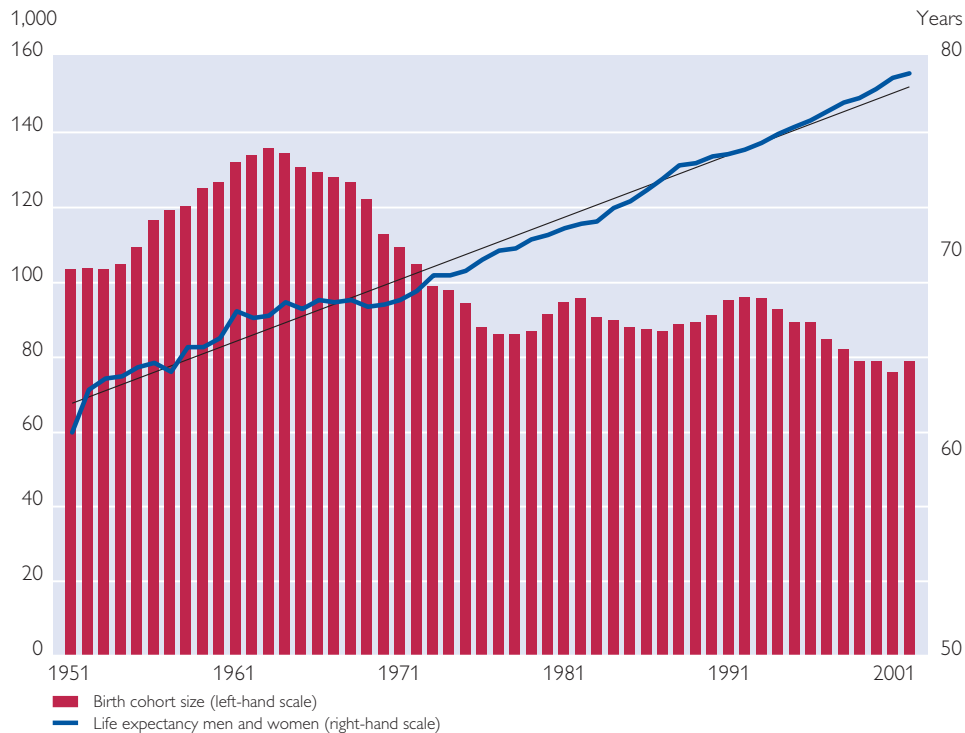
¹⁴ The Swedish system has a built-in automatic balance mechanism (Settergren, 2001), which fails, however, to achieve a complete balance.

¹⁵ This is a widespread phenomenon: “Given the underlying demographic ageing of the OECD population, it is striking as to how few countries have a fall in the support ratio. [...] Demographic ageing has largely been offset by rising participation rates, especially among married women. However, when the baby boom, with its historically high economic activity rates, retires from 2010 on it is likely that economic support ratios will start to fall sharply unless offset by later retirement.” (Disney, 2004, p. 308).

¹⁶ Looking at the increased life expectancy as at the age of 60, we see that the gain has been smaller (by an average 0.12 years since 1951), but still marked.

Chart 1

Twofold Demographic Challenge



Quelle: Statistics Austria.

The birth cohort size (left-hand scale) follows the “Live births” column (Statistics Austria 2003, Table 1.01), life expectancy equals the mean of men’s and women’s life expectancy (right-hand scale) at birth (Statistics Austria 2003, Table 4.20). The trend line is given as $y = 0.235x + 65.97$; $R^2 = 0.983$.

fluctuations might drive up the old-age dependency ratio (= persons aged over 64 divided by persons aged between 15 and 64) from 22.9% (2000) to 40.7% (2030) (PRK, 2002, p. 72).

The Swedish NDC account automatically reacts to extended longevity, but there is no mechanism in place for dealing with a continual decline in the cohort size. Some countries using defined benefit pension systems have chosen a different strategy, as will be discussed in the following sections for the examples of the German and Austrian models.

3.2 The Sustainability Factor in the German Pension System

The 2004 German pension reform incorporated a demographic adjustment factor (sustainability factor) into the pension system. Should the pensioner dependency ratio change over time, the sustainability factor stipulates that a share α of the necessary adjustment be brought about by reducing the relative pension level (or the replacement rate) and a share $(1-\alpha)$ by raising the contribution rate. The parameter α was set at 0.25.¹⁷ In the event of an increased old-age dependency ratio, pensions will rise to a lesser extent than gross earnings. By 2030

¹⁷ See Börsch-Supan et al. (2003); Sachverständigenrat (2004). These papers provide more information on the specificities of the German system (e.g. the phased increase in private supplementary pensions also referred to as “Riester ladder”), which will not be discussed in this study. In addition, the minimum retirement eligibility age was raised to 63 years in 2004.

the contribution rate is projected to have advanced from about 19.5% to 23% and the gross pension level is expected to have fallen from 52.5% to around 43% (Börsch-Supan et al., 2003).

The German sustainability factor (GSF) has a number of interesting characteristics, which will be described below to subsequently contrast it with its Austrian counterpart.

3.2.1 The GSF Reacts to an Increase in Life Expectancy as well as to Fluctuations in the Cohort Size

The pensioner dependency ratio may increase on account of various developments, namely higher life expectancy against an unchanged cohort size, decreased cohort size against unchanged life expectancy and (as is to be expected) a combination of these two scenarios. A rise in the pensioner dependency ratio will at any rate result in a reduced pension level and a higher contribution rate.¹⁸

3.2.2 The GSF Reacts Automatically to Demographic Change

Owing to the statutory provision, adjustments will be automatic and not triggered by discretionary measures.

3.2.3 The GSF Spells out Explicitly How to Respond to Demographic Fluctuations

It is stipulated by law which parameters – the contribution rate and

the pension level – are to be used to ensure sustainability. Furthermore, the relative weighting of these parameters is defined precisely given that $\alpha = 0.25$. Note that this specification blends elements of a defined contribution and a defined benefit system. At $\alpha = 0$, the sustainability factor would be inactivated and aging processes would result in an increase in the contribution rate only (defined benefit approach), while $\alpha = 1$ would correspond to a typical defined contribution approach entailing only an adjustment of the pension level. Setting $\alpha = 0.25$ is tantamount to blending these two pension formats, which the German government’s council of independent economic advisers labeled a “paradigm shift” (Sachverständigenrat, 2004, p. 299).

It is important to add that the chosen value of α seems to be traceable primarily to fiscal criteria.¹⁹ At the same time, it should not be overlooked that variations of α would entail disparate effects on intergenerational burden sharing. A chiefly defined benefit adjustment with a variable contribution rate (low α) places greater demands on today’s young generation than an adjustment of the pension level (high α). We will come back to this crucial issue later on. The following assessment will be based on a measure of intergenerational distribution (MID) described in the box below.

¹⁸ The Riirup commission proposed the GSF – and preferred it over other adjustment factors, such as a purely life expectancy-linked factor – exactly for the reason that it responds to both demographic processes (Börsch-Supan et al., 2003).

¹⁹ See Börsch-Supan et al. (2003). According to a statutory target, the contribution rate must not exceed 22% by 2030.

Measure of Intergenerational Distribution (MID)

Pension systems should be assessed not only in terms of sustainability, but also in terms of intergenerational burden sharing. Depending on whether demographic shocks are absorbed primarily through rising contributions or through pension cuts, different generations will have to bear the brunt. A number of procedures and indicators may be used to measure and illustrate intergenerational redistribution effects. Measures frequently used in this context include the internal rate of return, implicit tax rate and generational accounts (Geanakoplos et al., 1999; Fenge and Werding, 2003). The intergenerational redistributiveness of Germany’s pension system and various reform proposals has been examined in a number of studies using either the internal rate of return (Schnabel, 1998; Sachverständigenrat, 2004, p. 302f) or the implicit tax rate (Thum and von Weizsäcker, 2000; Fenge and Werding, 2003). To date, no such studies have been published for Austria.

Knell (2005a, 2005b) presents another method, which seems to lend itself particularly to the analysis of intergenerational redistribution aspects in theoretical pension models. This method, which is based on a proportionality measure, is also applied in this study to assess intergenerational redistribution. The MID for the average member of generation t is defined as follows:¹

$$MID_t = \frac{\text{sum of relative benefits}}{\text{sum of relative contributions}}$$

The denominator values denote the contribution rates prevailing in the respective years, the relative benefits correspond to the respective promised pension level (i.e. the pension amount relative to the prevalent average wage). In the example presented in table 1, the MID for the fictitious person cited in the example is given as

$$\frac{0.5 + 0.5}{0.25 + 0.25 + 0.25 + 0.25} = 1.$$

In general, a balanced pension system has a constant across-generational MID of 1 given a demographically stationary society. Section 3.3 presents cases with demographic nonstationarities, where the MID is no longer identical across all generations. For further details, examples and a discussion of this method, see Knell (2005a, 2005b).

¹ Generation t refers to that generation which enters the labor force at time t .

3.3 The Austrian Sustainability Factor as a Process

The new Austrian pension system also features a sustainability factor, which has, however, little in common with its German counterpart. Rather than having been explicitly defined with a formula, the Austrian sustainability factor (ASF) refers to a scenario process deviations from which will trigger adjustments. This process is defined in Article 108e paragraph 9 ASVG (General Social Security Act) and is summarized as follows in the explanatory notes: “A sustainability factor is introduced with a view to

securing long-term funding [of the pension system]. This factor is based on life expectancy figures for people aged 65 up to 2050 reflecting the medium scenario of Statistics Austria. Deviations from this ‘medium forecast’ automatically impact – in equal financial proportions – the contribution rate, growth rate, retirement eligibility age, pension adjustments and the government’s contribution in order to safeguard fiscal sustainability.”²⁰

The ASF differs from the GSF in all three characteristics mentioned in section 3.2, as will be discussed below.

²⁰ In the legal act, these five potential adjustment parameters are explicitly referred to as “sustainability factors.” Such usage of the term “sustainability factor”, however, may be misleading and cause confusion with the GSF.

3.3.1 The ASF Responds to Deviations from Forecasts and Refers Primarily to Life Expectancy Developments

While the pensioner dependency ratio and thus also the GSF react to changes in the cohort size and in life expectancy, under the Austrian system the focus is on the discrepancy of effective from projected life expectancy. It is even quantified by law when measures must be taken, namely if “for the period starting from the first deviation of the revised average period-linked life expectancy at the age of 65 from the reference life expectancy laid down in Appendix 12 of the APG a discrepancy of more than 3% on average is ascertained by the year 2050” (Article 108e paragraph 9 ASVG). Even though it stipulates that an analogous procedure is to be applied in case of “other demographic and economic assumptions [...], in particular with regard to the factors labor force participation and productivity” it is nevertheless noteworthy that for these factors no quantifiable trigger points are set forth, and interestingly enough, the law does not *explicitly* refer to population (and cohort) development projections, either.

It is in particular important to note that (unlike the GSF) the ASF does not respond to *demographic change* as such, but only to *deviations* of a projected value from the actual outcome (or revised forecast). The reference scenario, however, envisages fundamental shifts in both demographic dimensions, namely an increase in the reference life expectancy (at age 65) from 18.5 to 21 (2030) and 22.9 (2050) as well as a decrease

in the economically active population (persons aged between 15 and 64) from 5,499,360 to 5,217,195 (2030) and 4,748,987 (2050).²¹ Should actual developments correspond to this trend path, the parameters laid down in the APG are set to remain unchanged. In other words, the financing needs arising from the foreseeable demographic development will have to be met through higher government contributions to pension payments. This arrangement, however, implies intergenerational inequities, even for the trend path of the demographic development. The exact nature of the intergenerational sharing of this demographic burden will depend on which tool – taxation or debt – is used to fund the government’s pension transfers. The consequences of this provision are, however, in any case straightforward. First, the envisaged adjustment to the demographic development is limited to the revenue side and does not translate into any change on the benefit side (i.e. pension level and retirement eligibility age remain unchanged), and, second, the funding source will increasingly shift from contributions to taxes.

The wisdom of such an arrangement may be challenged. As will be discussed in section 3.3.4, an exclusively revenue-oriented adjustment may lead to an unwanted intergenerational redistribution, placing the main burden on the younger generations. Increased tax-based funding, by contrast, might lower the degree of “actuarial fairness,” which is generally regarded as a cornerstone and asset of Bismarckian social security systems.²²

²¹ However, the labor force participation rate is assumed to advance from 68.8% to 71.8% (2030) and 75.8% (2050), which would dampen the slide in the active population.

²² See Lindbeck and Persson (2003). Only the redistributive elements of the pension insurance system (e.g. means-tested top-up benefits, substitute contribution periods) should be tax-funded according to this rationale.

3.3.2 The ASF Does Not Include a Mechanism for Automatic Adjustments

While the GSF reacts even to minimal changes in the pensioner dependency ratio on a yearly basis, the ASF only provides for measures once a stated deviation is reached or the pension reform commission identifies a need for more funding. This may be tanta-

mount to “phasing in” intergenerational injustice, as illustrated by the example presented in the box “Intergenerational Distribution for Continuous and Abrupt Adjustment to Demographic Changes.” Normally, steady adjustment, as built into the GSF, is preferable to a policy of abrupt reform measures.

Intergenerational Distribution for Continuous and

Abrupt Adjustment to Demographic Changes

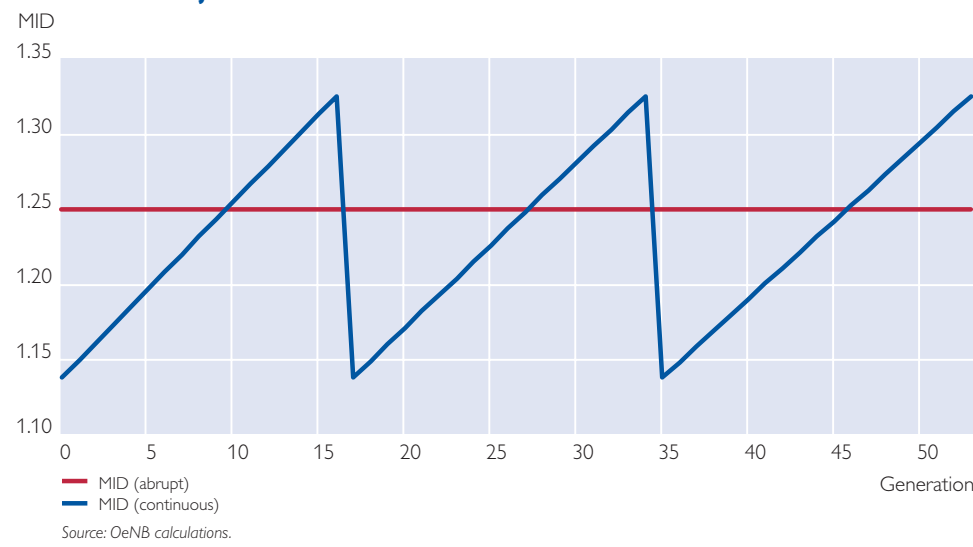
The following example is meant to illustrate the divergent consequences ensuing from continuous or abrupt adjustment. Let us assume that the cohort size remains constant, but life expectancy grows by an annual 0.2 years. The reference case rests on the assumption that the pension insurance system invariably has a balanced budget, which is exclusively attributable to a continuous increase in the retirement eligibility age. An in-depth discussion of this matter in Knell (2005b) reveals that the eligibility age has to be raised by an annual 0.15 years (given the target $\frac{\text{pension years}}{\text{work years}}$ equals 1/3). Such a continual adjustment means that all cohorts have an identical MID of $\frac{1}{1-0.2}$ (see chart 2).¹

Abrupt adjustment produces a different outcome, though. The underlying assumption in this scenario is that the eligibility age is changed only if the deficit of the pension system exceeds a specified limit (20%). Any adjustment of the eligibility age is aimed at restoring a balanced budget. Deficits of the years in between adjustments are funded from general tax receipts. Generations taking retirement during years of reform measures show a lower MID than those to which an unchanged retirement eligibility age applies regardless of higher life expectancy.

¹ A steadily rising life expectancy – similar to a growing population – may be regarded as an increase in the “biological interest rate” (Knell, 2005b), which explains why the MID is greater than 1 for all generations.

Chart 2

Measure of Intergenerational Distribution (MID) for Abrupt and Continuous Adjustment



3.3.3 The ASF Provides Only Broad Guidelines on How Adjustments Are to Be Made

As cited above, the law stipulates that any necessary adjustment be spread evenly among the parameters *contribution rate*, *accrual rate*, *eligibility age*, *pension adjustment* and *federal subsidy*. Unlike the GSF, for which adjustments are distributed according to $\alpha = 0.25$, the ASF is not based on any explicit weighting. Two questions arise in this context. First, how can the requirement of an even distribution be implemented, and, second, under which circumstances is such an even distribution meaningful or desirable in the first place? Let us deal with the first question right away, while we will consider the second issue in section 3.3.4.

Operationalizing the requirement of distributing the reform measures evenly among the five parameters is difficult for at least two reasons. First of all and as mentioned in the APG itself, the effects of these parameters manifest themselves with varying time lags. As a case in point, of the two parameters that are linked to the pension level the accrual rate impacts the level of *future* pension benefits, whereas the pension adjustment affects the *current* pension level.²³ Second, the adjustment parameters are measured in different units (e.g. percentages against years), which is why they are not directly comparable. A ten-percent increase in contributions (from 20% to 22%) cannot automatically be compared with a ten-percent reduction in benefits (with the replacement

rate falling from 60% to 54%) and even less so into a ten-percent hike of the retirement eligibility age (from 65 to 71.5 years).

To analyze this in more detail, let us draw on a model patterned on the German pension insurance system with only three adjustment parameters.²⁴ Under these conditions, it is possible to formulate a heuristic and feasible operationalization of the postulate of an even distribution. To this end, we first calculate to what extent a given parameter x would have to be adjusted for it to neutralize demographic change, while all other parameters remained constant. This “extreme value” (or “*ceteris paribus* value”) is denoted as x^* , the original value as x_0 . The value that must actually be chosen for the parameter x is set via a linear combination of the initial value x_0 and the extreme value x^* , with λ_x referring to the relative weight, i.e. $x = \lambda_x x^* + (1 - \lambda_x) x_0$. Even adjustment means that λ_x is identical for all parameters – contribution rate, pension level and eligibility age (i.e. $\lambda_x = \lambda, \forall x$). It can be shown that under these conditions the value for λ is uniquely determined.

The following simple example is meant to illustrate how this would work in practice. The initial state of a pension system is given as a contribution rate of 20%, a replacement rate of 60%, life expectancy of 80 years and a retirement eligibility age of 65 years (in addition, working life is assumed to commence at the age of 20, which results in a working life of 45 years). The cohort size is

²³ Here, the Austrian system differs significantly from the German system of earnings points, where – as has already been mentioned – all pensioners having accumulated a given number of earnings points draw identical pension benefits. By extension, a change in the pension value (or the pension level) affects all pensioners in the same fashion irrespective of their age. This is also why the earnings point system has only four adjustment parameters (and does not need to differentiate between the accrual rate and the pension adjustment factor).

²⁴ The federal subsidy is assumed to be constant; in other words, this scenario posits a balanced budget.

assumed to remain constant over time,²⁵ but life expectancy climbs from 80 to 84 years. In line with the proposed definition of evenness, the contribution rate would have to be raised from 20% to 21.67%, the replacement rate would have to be cut from 60% to 55.37% and working life would have to be extended from 45 to 46 years in order to keep the pension budget balanced.

3.3.4 Under Which Circumstances Is an Evenly Distributed Adjustment Meaningful and Intergenerationally Fair?

This question is, of course, complex and multi-faceted, touching on issues of welfare economics and on questions

of distributive and intergenerational justice. For lack of space, in this study we can only follow through on some of the implied aspects. To neglect this issue altogether, however, would not be expedient since the terms “fairness” and “intergenerational justice” are perennials in the public debate, even though the underlying ideas are hardly ever conceptualized.

The problems in this context are self-evident given declining or fluctuating reproduction rates. The box “Intergenerational Burden Sharing When Reproductive Behavior Changes” centers on such a scenario, which is again based on a model patterned on the German system and its GSF.

Intergenerational Burden Sharing When Reproductive

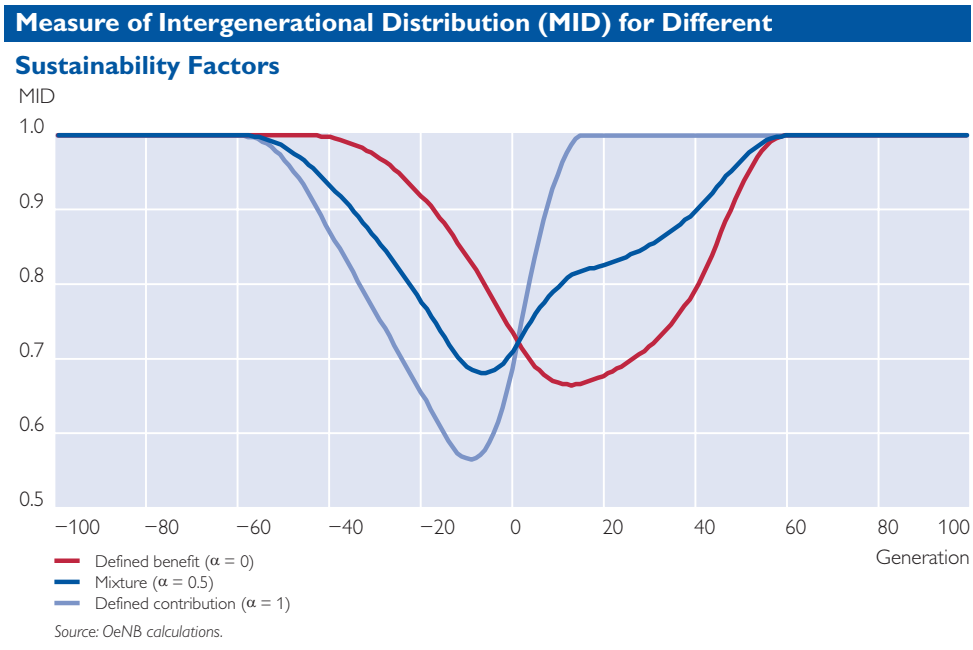
Behavior Changes

In analogy to section 3.3.3, the initial state of the pension system is again characterized by a contribution rate of 20%, a replacement rate of 60%, life expectancy of 80 years and a retirement eligibility age of 65 years. In this scenario, life expectancy is, however, assumed to remain constant, while the population is non-constant. In particular, a break is assumed to occur in the development of the cohort size at a given time $t = 0$, with the cohort size cut by half (e.g. from 100,000 to 50,000). Note that this example is by no means intended to be realistic, but rather to highlight the central features of the various adjustment methods.

Chart 3 shows the MID development by generation and sustainability factor (at a constant eligibility age). A value of $\alpha = 1$ again corresponds to a defined contribution system, $\alpha = 0$ to a defined benefit system and $\alpha = 0.5$ to a mixture of the two. In each of the three variants, some generations are faced with a deterioration of the MID, because the reduced cohort size will cause a decrease in the economically active population, which in turn lowers the sum total of contributions. For the budget of the pension system to remain balanced, the contribution rate must be raised and/or the pension level has to be reduced. Any one of these adjustment options affects a (different) set of generations. The paths of the curves will be discussed in the main text.

²⁵ This assumption serves to keep the example simple. The method proposed here is also applicable to variable cohort sizes.

Chart 3



Box 4 on “Intergenerational Burden Sharing When Reproductive Behavior Changes” and chart 3 illustrate the intergenerational redistribution effect for various sustainability factors, which is triggered by a plunge in the cohort size. Even though the example is stylized and unrealistic, the conclusions are applicable to the general development path of the cohort size and the birth rate (Knell, 2005a). Two observations are particularly noteworthy. For one thing, the MID fluctuations between the generations (measured e.g. by the variance) are smallest for a mixture of the defined benefit and defined contribution systems ($\alpha = 0.5$). For another, the share in the adjustment burden placed on generations born after the break in population developments ($t = 0$) is the lower, the more contribution-oriented (high α) the system. This is highly plausible, since a policy of contribution hikes (low α) places the highest burden on the cohorts born

shortly after the break. If, by contrast, the adjustment involves pension cuts, the older generations (including those with birth dates before $t = 0$) assume a greater share of the burden.

Various criteria can be used to evaluate the relative merits of different sustainability factors. Three of them will be discussed below: (i) even burden sharing among all generations; (ii) collective burden sharing according to the “causation principle”; (iii) individual burden sharing according to the “causation principle.”

If an even adjustment mechanism is preferable (i.e. one which causes the smallest MID variation among the generations), α should take on an intermediate value (somewhere around $\alpha = 0.5$).

On the other hand, one might also require those generations to carry the highest burden which are “responsible” for the declining birth rate. In fact, the potential parent generations, i.e. those born between 20 and

40 years before a given cohort, are accountable.²⁶ As of generation 0 a full reproduction rate is again reached, which is why, according to this criterion, the generations from -40 to -1 should bear the lion’s share of the adjustment burden. One could, naturally, also argue that – indirectly – all generations that are alive at a given point in time and thus shape the social and political life are at least partly responsible for the prevailing reproductive pattern. From this perspective, the adjustment burden (reduction in the MID) should be placed on all generations born before $t = 0$. In any event it is difficult to justify why the generations born at or after time $t = 0$ should be “penalized” for their parent generations’ reproductive behavior, as they themselves again account for an equally large number of births (and thus “equilibrium birth rates” of 2).

In the light of these arguments, it would be better to have pension systems in place that feature a more “backward looking” intergenerational burden sharing, i.e. are rather contribution-oriented with a largely constant contribution rate (high α). In some cases a sharp slide in the birth rate may well be attributable to extreme events (e.g. natural disasters and wars), which then calls for the application of a different set of criteria (e.g. levying contributions from all generations according to the ability-to-pay principle). At the same time, it should be stressed that here the focus is on the basic design principles of pension systems. It became evident that a contraction of the birth rate²⁷ results in a demographic extra burden, which *must* be borne by some

generations. Any decision for or against a certain setup of the pension system and sustainability factors inevitably implies a decision for or against a certain mode of intergenerational burden sharing. Therefore, it seems appropriate to explicitly consider such characteristics when designing a pension system or a sustainability factor.

The example given in box 4 “Intergenerational Burden Sharing When Reproductive Behavior Changes” and the discussion so far have revolved around a scenario marked by decreasing birth rates and constant life expectancy. Of course, one may also wonder whether an intergenerationally even adjustment is justified in the reverse case of increasing life expectancy and largely constant cohort sizes. This question largely depends on the projected path of life expectancy. If the linear increase, observed for many decades now, is considered to be just a one-off process set to discontinue once a biological maximum age is reached, evenly adjusting the contribution rate, eligibility age and benefit parameters may make a lot of sense. Since a rising life expectancy affects all generations, to identify the desirable parameter configuration is eventually a collective political decision. At present, it is, however, very difficult to predict the life expectancy development path. Against this backdrop, a slow (ideally, continuous, see section 3.3.2) increase of the eligibility age seems to be the most appropriate and primary adjustment measure. Otherwise, the contribution rate would at some point reach a level which would prove unsustainable either from a factual ($>100\%$) or an economic point of view (Knell,

²⁶ In Austria, 93.5% of all female and 87.5% of all male parents fall into this age bracket.

²⁷ If not balanced out by migration or in the absence of a sustained increase in the labor force participation rate.

2005b). To summarize, also in the presence of rising life expectancy the contribution rate should be increased only with care.

Up to now, we have only talked about a generation’s *collective* responsibility and *collective* reproductive behavior when referring to intergenerational redistribution in the face of declining birth rates. This generalizing approach does not account for the fact that behaviors differ greatly at the individual level. For instance, childless members of a cohort contrast with other members who have numerous children. A pension system which disregards such differences may be considered ill-designed and intergenerationally unfair. A pay-as-you-go pension system essentially represents a three-generation model, where the working generation not only has the obligation to fund the older generation’s pensions with their contributions, but is also responsible for generating offspring and providing for the livelihood of the next economically active generation. A pension system should thus reflect not only a generation’s aggregate, but also its individual behavior.

In recent years, Germans heatedly debated the idea of child-related pensions. In this context, some proposed that only childless persons should be asked to build up the funded pillar. “To receive pension benefits in old age, one must have accumulated either human or real capital. A generation having failed to do either must go hungry in old age, because nothing

comes from nothing. [...] Instead of placing a collective burden on an entire generation, pension cuts [...] should be exclusively directed at the childless” (Sinn, 2003, p. 362, 390f). It would be in line with both the causation principle and the ability-to-pay principle to call especially on the childless members of the society to fund additional pension plans. How and to what extent the number of children are factored into the calculation of pension benefits will, of course, depend on a set of other parameters, in particular on the amount of public expenditures that are related to child-care and to education. In the meantime, several economists have come to speak out in favor of considering the number of children in pension calculations. Not only did Hans-Werner Sinn promote the concept of a child-related pension in his bestseller “Ist Deutschland noch zu retten?” (Sinn, 2003),²⁸ but also Peter Bofinger’s (2004) antithesis “Wir sind besser als wir glauben” contains a proposal very much along these lines.²⁹

With a view to the Austrian pension system, two observations can be gleaned from this digression. First, in the light of these considerations, the demand for an even adjustment should be weighed carefully. Both the arguments presented here and in-depth studies by Knell (2005a, 2005b) make a case for moving away from the principle of an even distribution of the adjustment burden and for assigning lower weights to contribution hikes than to modifications in

²⁸ “The pension for the childless should not be reduced to zero [...] but it seems to be appropriate to cut the average pension [...] by half. [...] Those affected by cuts must be called upon to invest in a Riester pension to the extent to which the PAYG system can no longer give a guarantee for lack of contributors” (Sinn, 2003, p. 391).

²⁹ “As a generation that produces fewer children, one cannot demand the same pension level as the (post-war) parents of the baby boom generation” (Bofinger, 2004, p. 155). Further down (p. 218) Bofinger additionally proposes that women should be credited a third of the insurance cover of the pension insurance for each child (up to a total of three children per woman).

the eligibility age and the benefit parameters. Second, it should be noted that childcare periods are already accounted for under Austria’s current pension system, albeit only indirectly by treating such periods as contribution periods. In the new system, a woman’s notional account is credited with the median female earnings (in addition to any contributions resulting from employment) for each year dedicated to child rearing (up to a maximum of four years). Here, it would be interesting to examine whether this method does not underestimate the genuine contribution a child makes to maintaining the solidity of the PAYG system.³⁰ There is strong evidence in favor of more generous childcare-related credits, which are granted, for instance, in Sweden. Under the Swedish system, the parent with the lowest earnings is automatically accredited with childcare pension rights worth four years of contributory service, with the imputation based on the most favorable of the following three variants: (i) a supplementary payment equal to 75% of average earnings of all persons covered by the pension insurance scheme; (ii) a supplementary payment of up to the person’s own earnings the year prior to childbirth; (iii) a fixed-amount subsidy. Such subsidies are granted irrespective of the earnings record and are designed such that they offer reasonable credits for as many typical earnings histories as possible (Palmer, 2000, p. 16).

4 Summary Assessment

To summarize, the basic structure of Austria’s new, harmonized pension system is in many ways a considerable

improvement over its predecessor. Here, some positive aspects which we have not yet dealt with in detail in this study deserve to be briefly touched upon.

- The lifelong averaging period increases the degree of intergenerational and actuarial fairness. Preferred treatment of shorter working periods and steeper earnings profiles is eliminated, which also minimizes potential negative work incentives (Lindbeck and Persson, 2003).
- The presence of a pension corridor allows persons to choose when to retire in line with their individual preferences with regard to pension level and working life. Furthermore these decisions will have an actuarially neutral effect if the deductions and supplements are chosen appropriately. A prerequisite for this is, however, that retirement is truly voluntary and that the labor market situation does not “force” premature retirement.
- Previous contributions are revalued adequately. The old revaluation formula was not only unnecessarily complex, but also yielded undesired results in terms of inter- and intragenerational fairness (Kneil, 2004).
- The harmonization³¹ not only eliminates inequities among various occupational groups, but also boosts intersectoral flexibility and portability. A transparent design of the notional account may, by extension, facilitate a harmonization of Europe’s pension systems (Holzmann, 2004) and

³⁰ Calculations for Germany are indicative of this (Sinn, 2003, p. 376f; Werding, 1999).

³¹ Apart from the fact that some occupational groups (such as civil servants at the regional and local level) are not considered.

the incorporation of additional elements (e.g. life account model; see Orszag and Snower, 2002).

In total, all these improvements could help maintain confidence in the PAYG system and strengthen its acceptance as the centerpiece of the provision of old-age security.

From this perspective, some elements of the new pension system must, however, also be evaluated more critically as they partly conflict with the principles of simplicity, transparency and sustainability as well as inter- and intragenerational fairness.

– On the contribution side, harmonization is incomplete because farmers and self-employed persons are still subject to contribution rates that are lower than those applied to employees. In the explanatory notes to the legal act this is justified by referring to the “lack of matching partner contributions” for the self-employed and to the fact that the risk of becoming unemployed or sick is not cushioned in the same way as for employees (via substitute periods). This argumentation is, however, not entirely convincing. Studies on the incidence of social security contributions usually identify a high degree of pass-through and a negligible impact of the formal division of funding into employers’ and employees’ contributions.³² At any rate, consideration should be given to the issue of whether harmonizing the contribution side would not prove favorable, not least given the symbolic importance of such a move, while existing differences between

systems can be balanced out via other measures.³³

– The long parallel-calculation period and its complicated design are definitely flaws of the new system. Only in about 40 years’ time will the first pension exclusively computed according to APG rules be paid out. In the near future, pension calculations will therefore be governed by the rather complex and opaque transitional provisions, which basically undermines the increased transparency and determinability of the new notional account system.³⁴

– As spelled out in this study, the current provisions on the sustainability factor are grossly imprecise. While it is, on the one hand, understandable that the 45-65-80 formula is meant to provide a consensual anchor for the new system, it would, on the other hand, also be important to clarify – in particular with a view to facilitating calculations and planning – how this formula would be modified in the face of demographic change. The following aspects of the sustainability provision are considered to be problematic. First, the sustainability factor reacts only to deviations from projected values and not to demographic movements as such and it is, above all, geared toward life expectancy developments. Second, there is no automatic adjustment, which – already at the design level – produces intergenerational inequities. Third, the postulate of an even adjustment is not spelled out in detail. Fourth,

³² “Invariance of Incidence Proposition.” See Gruber (1997) and Ooghe et al. (2003).

³³ See Mayrhuber and Uri (2004).

³⁴ For an interesting proposal on how to remedy this (by also showing the claims as accrued according to the old system), see Stefanits et al. (2004), p. 436.

it is doubtful whether evenness is a desired feature in the first place because a contribution-based adjustment makes future generations pay for their parents' reproductive behavior. And last, but not least, there is the controversial proposal to place more weight on the number of children in calculating pension benefits.

A host of important aspects had to be disregarded in this study. A case in point is the question whether adjusting existing pensions for the inflation rate – as currently envisaged – is

the optimal approach (Knell, 2004). Furthermore, this study did not examine whether the level of the deductions and supplements applicable to the pension corridor are appropriate and along which lines an adequate occupation-specific individualization of the pension system (e.g. provision for heavy workers) should be constructed. These issues as well as the aspects covered in this study deserve further investigation to help guarantee that the PAYG system continues to play a pivotal role in Austria's pension scheme.

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The Research and Development System in Austria – Input and Output Indicators

Jürgen Janger

This paper analyzes the efficiency of research and development activities in Austria in comparison with other countries. Public and private R&D spending, which has been increasing steadily for years, is evaluated against a set of performance indicators, such as the number of scientific publications and patents. The efficiency of Austria's R&D system is currently rated "average." This may change in the future, given that productivity growth in the Austrian economy is declining despite the continually rising research and development ratio. In his conclusions, the author presents suggestions for increasing the efficiency of the system, particularly in the areas of university education and research, in the light of the strong interaction with the corporate sector.

Studies on research and development (R&D) systems often present input data separately from output data (e.g. comparison of R&D ratios or of the number of patents). This paper thus aims to compare both input and performance indicators of Austria's R&D/innovation system, which makes it possible to draw conclusions about the efficiency of the system. The first chapter describes R&D expenditure in Austria, which is then correlated with various output indicators in the second chapter. The third chapter proposes suggestions for increasing the efficiency of the R&D system.

In general, statistics on the input and output of a research system should be interpreted cautiously since they are subject to significant measurement uncertainties, which are further aggravated in data comparisons at an international or aggregate level, as is the case in this paper. For explanations and the general qualifications of the data, see, for instance, the Eurostat Internet database or the relevant OECD publications (e.g. 2003). At the time of writing, OECD and Eurostat were comparing and reconciling their R&D statistics, which will hopefully lead to improvements, or at least to a more standardized presentation of the data. The situation in Austria is

exacerbated by the five-year interval of R&D surveys; shorter intervals would be more effective in terms of innovation system management and control.

1 R&D Expenditure (Input Indicators)

1.1 Austria's R&D Ratio above EU-15 Average following Catching-up Process

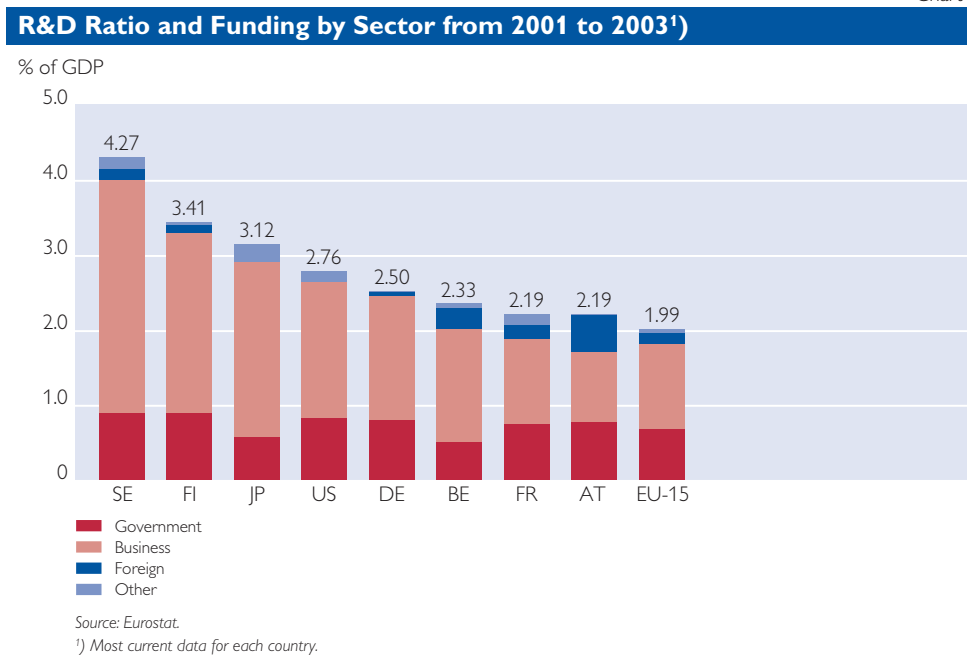
In 2003, for the first time since 1998, an R&D census in reference to 2002 was carried out among Austrian companies, which resulted in a significant upward revision in the estimated R&D ratio (Scholtze, 2004). According to that census, the R&D ratio for the year 2003 was 2.19%, and a ratio of 2.27% was projected for 2004,¹ which means that Austria exceeded the 2002 EU-15 average of 1.99%. Previously, the Austrian R&D ratio had been slightly below the European average. The increase in the Austrian R&D ratio from 1.47% in 1993 to 2.27% in 2004 represents one of the most dynamic growth rates among the EU-15.

A comparison of present R&D levels shows that Austria has now caught up with France, while Sweden, Finland and Germany are still well ahead of Austria (chart 1). Reaching the Lisbon and Barcelona targets of

¹ Statistics Austria does not disclose the methods used in the global estimation of R&D expenditure. As a result of censuses, both the 1998 and 2003 figures on estimated R&D expenditure were revised considerably. This gives some cause for doubt concerning the quality of the annual global estimates.

Refereed by
Gernot Hutschenreiter,
OECD.

Chart 1



a 3% R&D/GDP ratio will therefore require considerable effort (for model calculations, see e.g. Schibany and Streicher, 2003, or Hutschenreiter et al., 2001).

1.2 R&D Expenditure by Sector

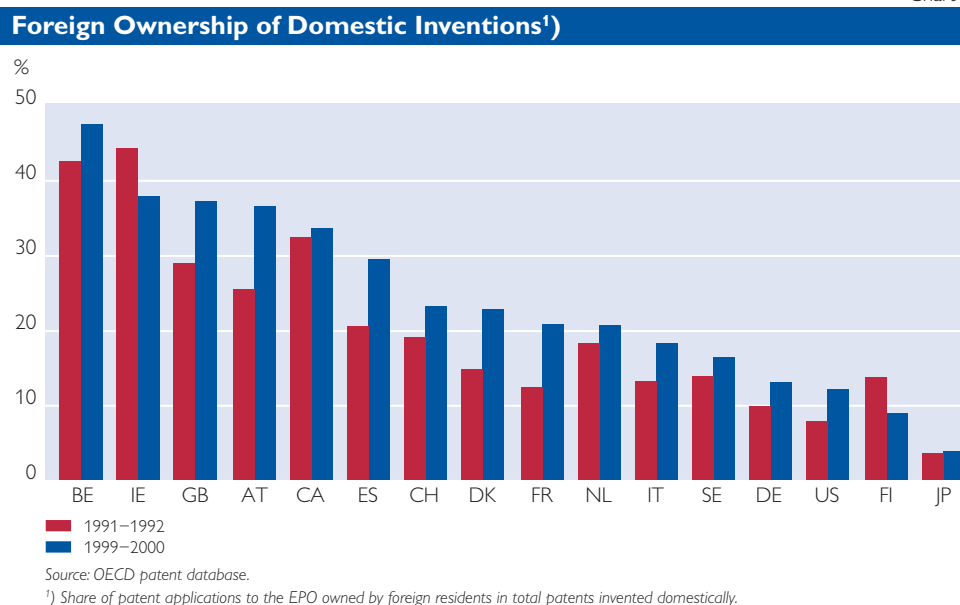
Corporate funding accounts for 64.7% of the total R&D expenditure in Austria, which is slightly above the EU-15 average of 63.7% but still below the Lisbon target of two-thirds of total R&D investment. At around 22%, the share of foreign funding in Austrian R&D expenditure ranks among the highest in the world, as shown in chart 1. Only Canada, the United Kingdom and Greece post similar levels.² In other words, Austria has become an international research location, as confirmed by the data presented in chart 2 (ÖFTB 2004, chapter 3).

This development, however, also implies a certain degree of vulnerability in Austria's R&D activity, especially since most of the foreign-funded R&D activities are concentrated in a small circle of major subsidiaries of multinational corporations (e.g. Siemens, Infineon, Magna Steyr). The withdrawal of only a few of the R&D departments of such corporations would severely reduce R&D expenditure. As a result of an increase in the level of the Austrian R&D tax credit, the general conditions for research activities have certainly not deteriorated.³ According to Schibany et al. (2004), there is no significant trend toward a migration of R&D activities; nevertheless the general conditions for research activities must be enhanced further, especially by maintaining and improving the quality of the national science system as a key determinant

² The domestic and foreign funding sources for Austrian R&D expenditure are indicated in separate statistics. For the most part, foreign funding is devoted to R&D projects in the business sector.

³ According to Knoll (2004), many companies are still unaware of the new tax incentives.

Chart 2



of Austria's attractiveness as a research site (Schibany et al., 2004).

The fact that Austria's corporate R&D expenditure is clearly below the EU average is attributable to structural factors rather than a lack of competitiveness or of understanding of the importance of innovation and research. Austria shows a comparatively higher degree of specialization in less R&D-intensive sectors (Peneder, 2003).

2 R&D Productivity – Output Indicators in Relation to R&D Expenditure

The output of R&D activities is more difficult to measure than their input. A number of R&D activities do not result in publications or patents, but rather in tacit knowledge, which may be as important for the national economy. Furthermore, even output evidenced in writing, e.g. publications or patents, may differ widely as to its

scientific and economic impact. Aggregated presentations should therefore always be interpreted with caution.

2.1 Productivity of the Public Research System Close to EU-15 Average, Below the U.S.A.

Direct output from universities and other public institutions can best be measured by publications. Judged by the number of publications per million population in relation to R&D expenditure, the productivity of public research institutions and the university sector in Austria is slightly below average. The trend line shown in chart 3 is a simple linear regression line across the country data. Countries with an above-average number of publications relative to R&D expenditure are situated above the regression line.⁴

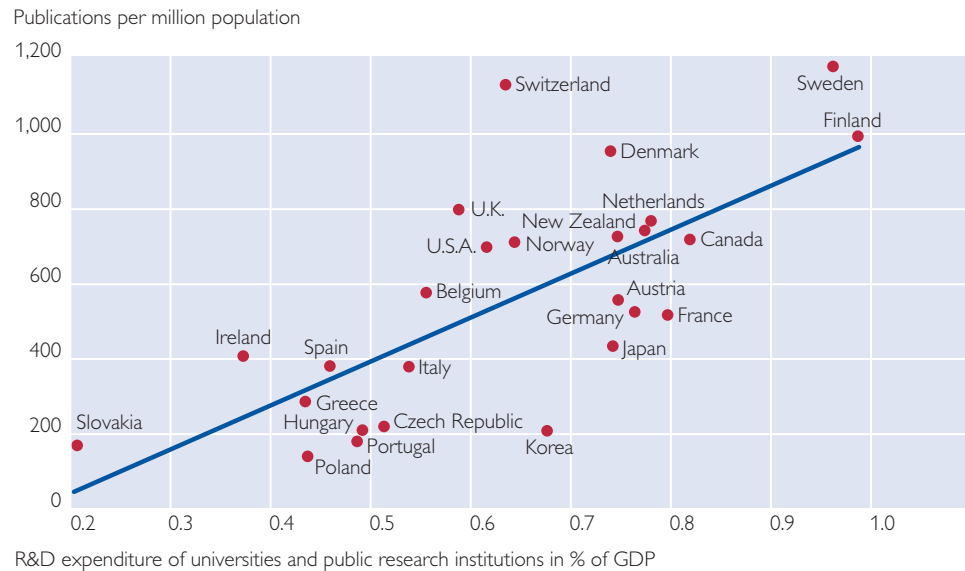
To factor in the quality or impact of publications, the Relative Citation Index (RCI) can be used as a measure

⁴ The information value of this indicator is reduced by the varying intensity of publication activity in different scientific disciplines and by divergent national scientific specializations. In addition, R&D expenditure especially in the U.S.A. is underestimated (OECD, 2003).

Chart 3

Correlation between R&D Expenditure of Universities as well as

Public Research Institutions and the Number of Scientific Publications in 2001



Source: Eurostat, NSF 2004, World Bank 2004.
In analogy to ÖFTB 2004, p. 51.

of R&D productivity. The RCI is the citation rate for national publications (the average frequency of citation of Austrian publications by other, non-Austrian publications) relative to the share of national publications in total publications. An index greater than 1.00 would imply, for example, that Austrian publications were cited more frequently than indicated by their share in total publications. Austria scores in the average range for industrialized nations. It must be noted, however, that the Science Citation Index (SCI) mostly covers English-language publications and is therefore biased toward English-speaking as well as smaller countries that do not share a common language with other countries (e.g. the Scandinavian countries). According to Leeuwen et al. (2001),

the scientific output of Germany and France, as measured by the SCI, is underrated by as much as 10%.⁵ In relation to R&D expenditure, the performance of the public scientific research system in Austria is slightly above average.⁶ The leader in Europe is Switzerland, whose citation index even outranks that of the U.S.A. by a substantial margin (chart 4).

Comparing changes, rather than levels, is, however, more significant. Austria managed to catch up in the 1990s; the improvement in the country's citation index exceeded the average impact of increased R&D expenditure (chart 5). Since the mid-1990s, however, the citation index has risen only slightly or, in the wake of a rapid catching-up process, has remained flat (Dachs et al., 2003).

⁵ Not only because the SCI might not take into account non-English language publications, but also because such publications are cited less frequently – a fact that does not depend on scientific quality but simply on the research community's language proficiency.

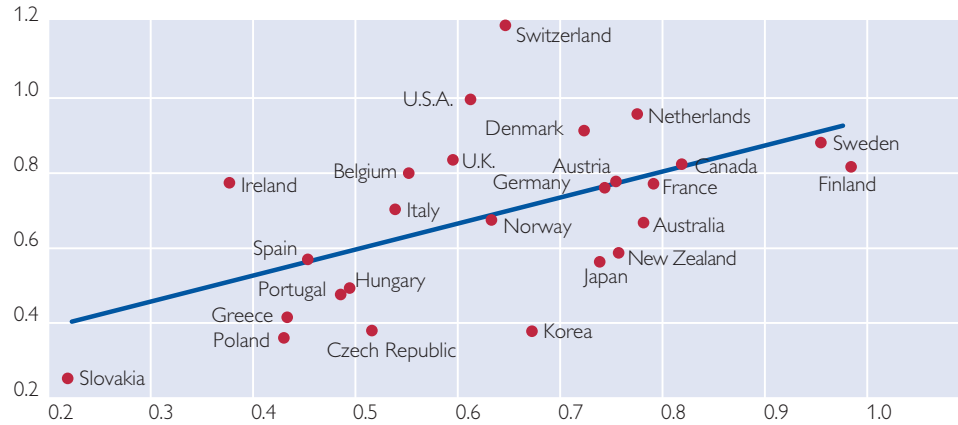
⁶ In this case, the RCI is presented unweighted, i.e. the fact that citation rates vary by scientific disciplines and that scientific specializations vary across countries is not taken into account.

Chart 4

Correlation between the Impact of Scientific Articles and Public

R&D Expenditure in 2001

Relative Citation Index



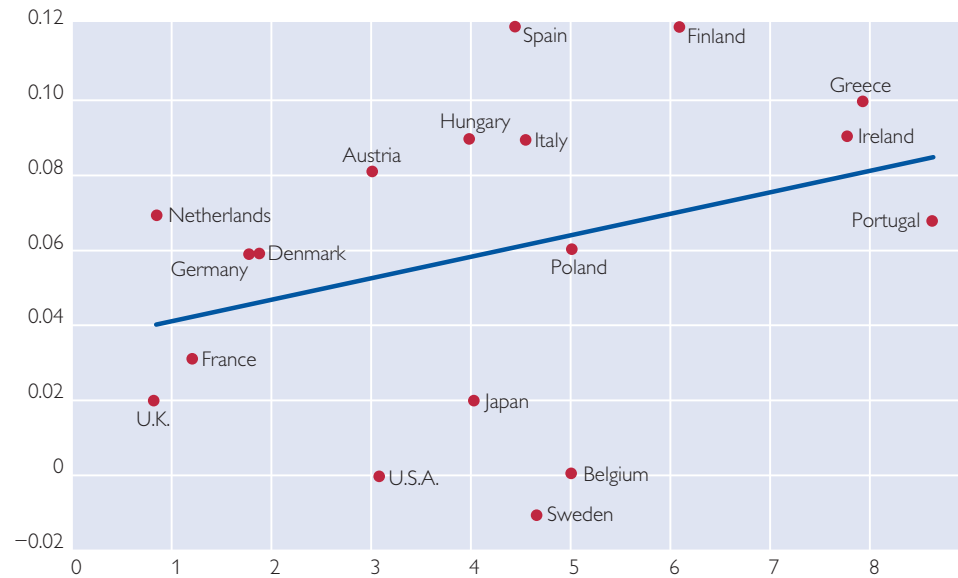
R&D expenditure of universities and public research institutions in % of GDP

Source: Eurostat, NSF 2004.
In analogy to ÖFTB 2004, p. 52.

Chart 5

**Public R&D Expenditure and Change in the Impact of Scientific Publications
from 1994 to 2001**

Change in Relative Citation Index between 1994 and 2001 in percentage points



Average growth in R&D expenditure of universities and public research institutions at constant prices between 1994 and 2001 in %

Source: OECD 2004, Eurostat, NSF 2004.
In analogy to ÖFTB 2004, p. 53. R&D expenditure for Austria between 1993 and 1998.

2.2 Productivity of Corporate Innovation Efforts Close to EU-15 Average

Based on the findings of the Community Innovation Survey (CIS II and III), the direct research output in relation to R&D funding of Austrian companies can be analyzed and compared across EU countries (Falk and Leo, 2004). It should be noted, however, that this survey used the more broadly defined term “innovation,” which also includes, for example, minor improvements in existing products. According to the CIS, Austria’s innovation ratio ranks fifth within the EU: 43% of the Austrian companies included in the survey stated that they had launched innovations in the past three years. At 54%, Germany takes the lead, followed by Belgium, Luxembourg and Portugal. In terms of innovation output, i.e. the proportion of innovations relative to total sales, Austria came in third at 21%, behind Germany (37%) and Finland (27%). As Austria’s corporate innovation expenditure is in the average range, a positive picture of the “innovation productivity” in Austrian companies emerges. The R&D and innovation activities of foreign subsidiaries in Austria are more productive, however, due to various advantages of companies that have the resources to operate internationally (Bellak and Pfaffermayr, 2002).

2.3 Patent Activity of Public Institutions and Private Firms Close to EU-15 Average

In an EU-15 comparison, the number of inventions patented by Austrian institutions per million population is average in terms of filings with the

United States Patent and Trademark Office (USPTO) and slightly above average for filings with the European Patent Office (EPO), as shown in table 1. The growth rate of the number of applications filed with both patent offices is below average.⁷ Geographical proximity has a relatively strong effect on the number of filings with national and regional patent offices: U.S. inventors submit more patent applications to the USPTO than to the EPO, while EU inventors similarly tend to favor the EPO. Triadic patents, i.e. patents registered at all three major patent offices (EPO, USPTO and the Japanese Patent Office), suggest a particularly strong market potential warranting the higher expenditures on application fees. In this category, Austria is slightly below average but shows somewhat higher growth rates. Given Austria’s above-average GDP, the number of patents relative to GDP would be below average in all three categories.

In this context, it is also important to take into account the varying degrees of “patent intensity” in different economic sectors. In some industries, filing large numbers of patents is more important than in others (e.g. the pharmaceutical industry versus the electronics industry). Empirical evidence also indicates that a company’s size correlates positively with its propensity to file patents (Scholz and Schmalholz, 1984). Another contributory factor is that new products are easier to patent than new processes. In all three aspects, Austria’s economic structure has a limiting effect on patent intensity: a low percentage of technology-intensive sectors, a lim-

⁷ For an analysis of the information value of patent statistics, see e.g. Dachs and Schibany, 2003, and OECD, 2001.

Table 1

European, U.S. and Triadic Patents (TP)

per million population, growth rate (GR) in %

	EPO 2000	GR 1991–2000		USPTO 2001	GR 1992–2001		TP 2000	GR 1991–2000
Switzerland	365	5.2	U.S.A.	307	5.9	Switzerland	105	-0.1
Germany	262	7.1	Japan	262	4.7	Finland	95	12.8
Finland	261	13.6	Switzerland	198	1.8	Japan	93	2.9
Sweden	251	9.9	Sweden	196	11.9	Sweden	91	8.1
Netherlands	210	9.2	Finland	143	8.4	Germany	70	4.8
Denmark	166	9.9	Germany	137	4.9	Netherlands	54	4.0
Japan	161	6.0	Canada	116	6.9	U.S.A.	53	3.1
Austria	144	6.1	Denmark	91	10.8	Denmark	48	9.9
EU-15	131	6.7	Netherlands	83	4.9	EU-15	36	4.3
Belgium	121	8.2	Austria	72	5.2	Belgium	35	4.4
France	118	3.8	EU-15	72	5.4	France	35	1.6
U.S.A.	104	4.6	Belgium	72	9.5	Austria	34	4.9
U.K.	97	5.4	France	69	3.3	U.K.	31	3.9
Italy	68	5.9	U.K.	66	5.7	Canada	17	6.2
Ireland	52	12.3	Ireland	37	11.8	Italy	13	1.5
Canada	50	10.8	Italy	30	3.5	Ireland	12	5.1

Source: OECD patent database, Eurostat.

Patent statistics: breakdown by inventor's country of residence; European Patent Office (EPO): by date of application; U.S. Patent and Trademark Office (USPTO): by date of grant; triadic patents (TP): by date of application.

ited number of large companies and a focus on process innovation lead to a structurally lower number of patents.⁸

In relation to R&D expenditure, the innovation productivity of Austrian companies is below the EU-15 average (table 2). The relatively small

proportion of U.S.-owned triadic patents and U.S. patents registered with the EPO is particularly significant. The American domestic market obviously offers sufficient marketing opportunities to make research efforts profitable. The EU's improvement is

Table 2

Number of Patents Relative to Corporate R&D Expenditure from 1992 to 2000

	EPO			USPTO			Triadic Patents	
	1992–1996	1997–2000		1992–1996	1997–2000		1992–1996	1997–2000
Netherlands	0.57	0.75	Japan	0.56	0.62	Netherlands	0.23	0.23
Germany	0.55	0.73	U.S.A.	0.62	0.61	Finland	0.26	0.22
Finland	0.59	0.60	Finland	0.54	0.45	Germany	0.19	0.22
Italy	0.41	0.60	Germany	0.38	0.44	Japan	0.18	0.20
EU-15	0.41	0.54	Netherlands	0.38	0.38	Sweden	0.17	0.17
Austria	0.54	0.54	Denmark	0.36	0.34	EU-15	0.15	0.16
Denmark	0.45	0.49	EU-15	0.30	0.34	Denmark	0.16	0.16
France	0.34	0.44	Sweden	0.33	0.33	France	0.12	0.14
Sweden	0.36	0.41	Italy	0.24	0.31	Austria	0.15	0.14
Belgium	0.34	0.41	Austria	0.33	0.30	Belgium	0.14	0.13
U.K.	0.28	0.38	U.K.	0.25	0.29	U.K.	0.11	0.13
Japan	0.24	0.29	France	0.24	0.27	Italy	0.10	0.13
Ireland	0.19	0.26	Belgium	0.27	0.25	U.S.A.	0.10	0.10
Spain	0.17	0.24	Ireland	0.19	0.22	Ireland	0.06	0.07
U.S.A.	0.17	0.18	Spain	0.10	0.11	Spain	0.04	0.04

Source: OECD patent database, Eurostat.

R&D expenditure by economic sector; constant prices based on 1995 data by purchasing power standard.

⁸ Moreover, the propensity to file patents is positively correlated with GDP growth (Dachs and Schibany, 2003). The sluggish economy between 2001 and 2004 could therefore result in the U.S.A. outperforming the EU.

attributable to subdued R&D expenditure growth coupled with average growth in the number of patents; the decline in Austria – especially in the period between 1997 and 2000 – was caused by a sharp increase in R&D expenditure in the business sector.

2.4 Indirect Output – A New Paradox?

Indirect output can be described as the contribution of R&D activities to economic and productivity growth. It should therefore be considered the most important indicator of a research system's productivity.

At the aggregate level, R&D and innovation activities, along with the accumulation of human capital, are generally recognized to be the most important engines of economic growth (Temple, 1999). Empirical growth literature reports that R&D activities result in a total economic return of more than 50% (Jones and Williams, 1998). In the medium term, the 0.3 percentage point increase in the R&D ratio from an average of 1.85% between 1995 and 1999 to an average of 2.14% between 2000 and 2004 would thus entail an increase of 0.15 percentage point in the long-term growth rate.

As demonstrated by Coe and Helpman (1995), international R&D spillovers are especially important for small, open economies. According to their estimates, Austria's total factor productivity (TFP) is highly responsive to the development of Germany's R&D capital stock. In the same period as indicated above for Austria, the German R&D ratio rose from 2.31% to 2.51%. In this context, it must be taken into account

that a country's R&D activities not only increase productivity through innovations, but are also an essential prerequisite for absorbing international research findings in the first place (Griffith et al., 2004a). In addition, corporate R&D expenditure influences productivity growth more directly than university R&D expenditure, since companies tend to concentrate on applied research while universities primarily engage in basic research. According to these studies, the increase in national and international R&D expenditure can be expected to boost productivity growth in Austria.

At the national level, however, there are no findings on whether Austria's R&D activities lead to comparatively more or less productivity growth than those of other countries.⁹ The combination of low R&D ratios and high productivity growth rates in Austria was dubbed a "structure-performance paradox" (Peneder, 2001) in the past. At least, this did not indicate a low-efficiency research system. A new paradox – not so much in comparison with other countries, but rather in comparison with the empirical findings mentioned above – would be presented by the opposite situation, i.e. a sustained decline in productivity growth combined with a steadily rising R&D ratio (chart 6). In Austria, total factor productivity – a measure of efficiency that is significantly influenced by R&D activities – is dropping rather sharply.¹⁰

Given that TFP is very difficult to calculate and that short-term movements in TFP growth are not particularly significant, it would be advisable

⁹ A study by Pottelsberghe (1998), although not related to Austria, concludes that the total economic return from R&D expenditure in Japan is much higher than in the U.S.A.

¹⁰ For an overview of the empirically confirmed determinants of total factor productivity, see Gnan, Janger and Scharler (2004).

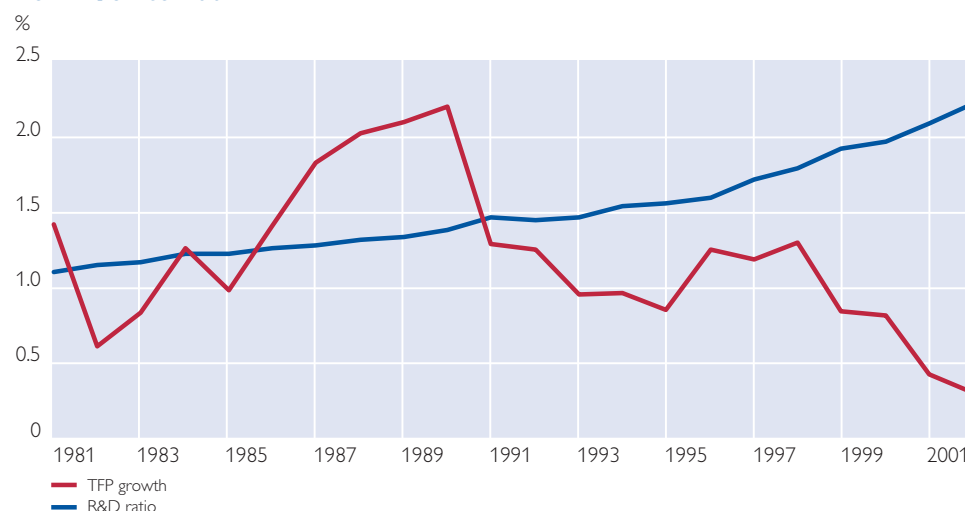
to wait and see how the trend evolves over the next few years before making a final assessment. In addition, structural TFP determinants such as R&D expenditure have a delayed effect, even though the R&D ratio has been uptrending rather clearly for more than ten years. If this trend continues

and is confirmed by new figures, the question arises of whether the additional research funding is being used inefficiently or whether the deterioration in productivity growth is the result of contrary developments affecting other TFP determinants.¹¹

Chart 6

Growth in Total Factor Productivity (TFP) in Austria versus R&D Ratio

from 1981 to 2002



Source: AMECO database (European Commission), Eurostat, OeNB (moving averages).

3 Means to Improve the Productivity of the R&D System

In terms of patent activity, the productivity of Austria's R&D system is equivalent to that of the U.S.A. and lags behind that of the EU-15. In the field of scientific publications, the U.S.A. and Switzerland set the standards for the quality of the scientific research system as measured by the citation count; Austria scores in the average range within the EU-15.¹² As regards innovations, there is no survey in the U.S.A. comparable with

the Community Innovation Survey; benchmarked against the rest of Europe, Austria ranks above average. Assessing the relative impact of R&D activities on productivity growth, i.e. indirect output, will require a longer observation period and in-depth studies. All in all, the productivity of the Austrian research system – or rather innovation system – may be characterized as “average.”

So what are the possible starting points to enhance the efficiency of the system, i.e. where can we find potential for quality improvements?

¹¹ See Pottelsberghe (1998, p. 234): “. . . although R&D activities seem to be a necessary (but not sufficient) condition for productivity growth, they might be a sufficient condition against a productivity deterioration.”

¹² It should be noted that these figures do not, or only to a very limited extent, reflect the impact of the 2002 university reform and the *Dienstrechtsgesetz* (Employment Act) of 2001. As has already been pointed out, the disadvantage of German as a publication language should not be underestimated.

In the following sections, we will address government-funded research, corporate R&D, and university research and education.

In the past, criticism was leveled against the Austrian system of research promotion because of the excessive number of underfunded programs and the resulting high administrative costs, which were out of proportion to the net value of the funds distributed (Aiginger and Kramer, 2003). This situation, which is partially caused by the division of technology policy responsibilities among several different ministries, has improved significantly following the creation of the Austrian Research Promotion Agency (FFG), which is dedicated to business R&D promotion. It now remains to be seen whether or not the new structures will prove effective.

In Austria (Austrian Science Fund, FFF), as in the U.S.A. (National Science Foundation), the system of promoting research for scientific or university projects is based on the peer review principle, i.e. the assessment of research quality by scientists of equivalent standing. At the EU level, the distribution of funds by the R&D Framework Programmes is not yet subject to such strict evaluation criteria. A corresponding reorganization of structures and procedures (the report by Sapir et al., 2003, calls for a European Agency for Science and Research) might also provide a positive impetus for Austria.

To determine the optimal mix of higher education and government research and research institutes, the Council for Research and Technological Development currently pursues a

strategy of promoting the government sector. According to the estimation of Guellec and Pottelsberghe (2004), however, research performed by the higher education sector has a higher impact on productivity – a phenomenon which may be attributable to a number of causes, for instance, the different funding systems employed (global funding versus project funding). More in-depth studies are necessary to validate this interpretation.

The research productivity of companies domiciled in Austria can be described as average because of the relatively sharp hike in R&D expenditure and the above-mentioned structural disadvantages of the Austrian economy. As has already been discussed elsewhere in this paper, the R&D performance of foreign subsidiaries is higher, owing to the advantages inherent in major companies. Technology and economic policy is limited, therefore, to a small set of direct measures; instead, an effort can be made to optimize the conditions necessary to strengthen corporate technology absorption capacities.¹³

Considering that reforms in the research promotion system have already been implemented and that corporate research productivity is difficult to influence directly, reorganization efforts should focus on the potential for change in tertiary education and university research, which strongly interact with corporate research productivity in a number of ways.

First, analyses of the Community Innovation Surveys (Falk and Leo, 2004) show that companies with a higher percentage of university-educated employees initiate product or

¹³ To quote Griffith et al. (2004b, p. 56): “The best policy towards spreading technology is more likely to be improving the environment for firms through better skills and greater competition rather than in an R&D policy per se.”

process innovations more frequently, not least because such employees remain in contact with their former schools or can easily get back in touch, which in turn facilitates the transfer of knowledge between science and industry. A company's own research activities become more productive because they entail lower search costs.

The capacity of Austrian companies for technological absorption and innovation could soon peak out because of the relatively small number of tertiary-level graduates with science and technology degrees. According to Eurostat, in 2003, there were only 8.3 graduates with science and technology degrees per 1,000 population between 20 and 29 years of age in Austria, versus an EU-15 average (in 2001) of 11.9 (U.S.A.: 10.9).¹⁴ By contrast, graduates with science and technology degrees account for a large share of total graduates, which means that the low figure of 8.3 results from the small number of total graduates (OECD, 2004b). Accordingly, the cause of the problem seems not to be a lack of enthusiasm for science and technology, but rather the structurally small number of university graduates overall. In Austria, the number of women graduating from such fields is particularly low (3.5 versus an EU-15 average of 7.3).

Second, the quality of the scientific research system is a basic factor

influencing a company's choice of location for its R&D activities (see also chapter 1). Knowledge transfer between research institutes, universities and companies is favored by geographical proximity (local R&D spillovers, see Keller, 2002).¹⁵ Research by Schibany et al. (2004) shows that according to multinational corporations specific advantages in certain scientific disciplines in Austria are not the reason for choosing Austria as a location for sizable subsidiaries with a high degree of R&D activities. As the integration of foreign R&D activities into the Austrian innovation system works relatively well (Schibany et al., 2004), improvements in the quality of the scientific research system can be expected to stimulate the entire national economy.¹⁶ The promotion of new generations of scientists and the accumulation of knowledge attracts more companies, which in turn boosts productivity growth and employment. Structural change toward more technology-intensive sectors is accelerated by the formation of new technology-oriented companies, and the potential for starting up such companies is likewise increased by improvements in the system of tertiary education and research.¹⁷

So what are the possible starting points to improve university education and research?

¹⁴ The EU average would be reached if the graduates of secondary technical and vocational colleges (HTLs) were taken into account.

¹⁵ Jaffe (1989, p. 968) summarizes the results of his estimates as follows: ". . . it appears that university research causes industry R&D and not vice versa. Thus, a state that improves its university research system will increase local innovation both by attracting industrial R&D and augmenting its productivity." Acs et al. (1992) confirm his findings.

¹⁶ To facilitate the transfer of knowledge between industry and universities, the Uni:Invent program was established last year. Experts referred to as "innovation scouts" assist universities in optimally utilizing patenting and licensing potentials.

¹⁷ See, for example, the study by Zucker et al. (1998), which describes the relationship between scientists, the proximity to universities and startups (limited, however, to the biotechnology sector, which is known to be closely related to science).

Scheibelhofer (2003) investigates the motivation of Austrian scientists now working in the U.S.A. In the course of her qualitative interviews with the respondents it became apparent that the working conditions at U.S. universities constituted a major reason for the scientists' decision to emigrate, with an emphasis on employment law and the broad research latitude (as confirmed by Allmendinger and Eickmeier, 2003). Another decisive factor was the lack of basic research in Austria, while salary levels or the reputation of American universities played only a secondary role. One reason that these scientists do not return to Austria is that the qualifications they have acquired in the U.S.A. are often insufficiently recognized in Austria.

Universities in the U.S.A. offer researchers a long-term career plan through the tenure track system: after a probationary period of several years, there is the possibility of obtaining a fixed contract if the candidate meets the eligibility criteria. Research and teaching continue to be evaluated even after tenure is granted. There are no such prospects of a research career at Austrian universities. The position of an assistant professor in the U.S.A. differs considerably from that of a *Universitätsassistent* in Austria; in the U.S.A., there is significantly more leeway to develop one's own research program. The department head acts only in the capacity of a coordinator or facilitator, which means that (research) hierarchies are flatter. The Austrian Universitätsgesetz (University Act) of 2002 and the Dienstrechtsgesetz (Employ-

ment Act) of 2001 contain no such tenure provisions. The collective agreements currently under negotiation may offer an opportunity for improvement for academic personnel (Pechar, 2004).

Other studies (Allmendinger and Eickmeier, 2003; Mayr, 2003) focusing on Germany stress the importance of structured (postgraduate) education for scientific research. In Austria, it is left to the individual school to decide what kind of support doctoral students should get or whether they should be employed in other activities. Establishing graduate schools or structured, more directive doctoral programs could be an important step toward improving the quality of future generations of scientists.

Based on the figures mentioned above, one way to increase the number of graduates from scientific and technological programs could be to expand the total number of university graduates (i.e. by making systemic changes that would encourage taking advantage of the tertiary education system), while at the same time increasing the number of female students in scientific and technological disciplines. Both approaches require more in-depth studies and evaluations of existing promotional projects.¹⁸ Schneeberger (2004) addresses the need for expanding and diversifying the choice of accelerated degree programs, which would reduce university drop-out rates and at the same time effectively prepare students for the job market. Another alternative would be to expand the range of institutionalized options for working students at universities, as offered in other

¹⁸ See, for example, Leuthold (2000) for an investigation of the possible strategies for motivating women to take up scientific and technological subjects and an overview of the existing measures for promoting female development. The Austrian Report on Research and Technology (ÖFTB) for 2005 will also address the issue of women in science and technology.

countries. It might also prove effective to think about ways to improve the percentage of students qualifying for university entrance, which is relatively low in Austria (36%) as compared to other countries (e.g. Sweden: 71%).

Finally, in the light of its international success, it seems advisable to examine the functional structures of the Swiss university research system in greater detail. Austria's research institutions are probably more closely aligned with the Swiss structures and procedures than with the U.S. system.

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Databases

Eurostat Internet database:

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European Innovation Scoreboard 2004 database.

AMECO database of the European Commission.

OECD: Patent Database.

OECD: Research and Development Statistics.

Fundamental and Nonfundamental Factors in the Euro/U.S. Dollar Market in 2002 and 2003

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Gabriel Moser,
Franz Schardax,
Renate Unger

The goal of this study is to identify factors which can explain the substantial appreciation of the EUR/USD exchange rate in the period from 2002 to 2003. Our analysis has shown that both fundamental and nonfundamental factors seem to have played a role. Regarding fundamental factors, an accommodating U.S. monetary policy in light of a weak labor market as well as the rising U.S. current account deficit contributed to weakening the U.S. dollar and thus strengthening the euro. The Bank of Japan's large intervention purchases of U.S. dollars, which have been widely considered important in the economic policy debate, do not appear to have had a significant impact on the EUR/USD exchange rate; however, they seem to have weakened the Japanese yen both vis-à-vis the U.S. dollar and the euro. In addition to these factors, the accounting scandals in the U.S. stock markets as well as fears of war and terrorism had a dampening effect on market sentiment, thus adding to the strain on the U.S. dollar. Measurement problems render it difficult to assess the role of euro area monetary policy and of European economic data. With a view to nonfundamental factors, we discuss the role of the trend-following behavior of agents in the foreign exchange market on the basis of a technical foreign exchange trading system used in practice. The buy and sell recommendations of such systems may also help explain the appreciation of the euro in the period in question. All in all, these fundamental and nonfundamental factors may explain the direction to which the EUR/USD exchange rate moved, but not the extent of this movement or the relative significance of these factors in determining the EUR/USD exchange rate in the period in question.

1 Introduction

The EUR/USD exchange rate is one of the most important relative prices in the global economy and in the global monetary system. Fluctuations of this rate have an effect on the competitiveness and purchasing power as well as on the value of accumulated assets of internationally diversified investors. Under the current regime of flexible exchange rates, the USD/EUR exchange rate fluctuates freely and is therefore determined by demand and supply in the foreign exchange market.

The EUR/USD exchange rate has been fluctuating considerably since the beginning of Economic and Monetary Union (EMU) in early 1999. Thus, the euro went down by around 26% against the U.S. dollar in the period up to the fourth quarter of 2000, which eventually led to coordinated interventions of the G-7 central banks and to unilateral interventions of the Eurosystem in the EUR/USD market.

This case study focuses on the period from early 2002 to end-2003, when the euro fully regained its losses vis-à-vis the U.S. dollar and appreciated up to a value of USD 1.26, which corresponds to a nominal appreciation of some 36%. By historical standards, this has been the second sharpest exchange rate increase over a two-year period since 1970.¹ This movement surprised many observers, since after the global downturn in 2001 the economy had been recovering notably faster in the U.S.A. than in the EU-12 and productivity growth in the U.S.A. continued to clearly surpass EU-12 figures.

This study aims to identify factors that influenced the EUR/USD market in 2002 and 2003 and which may therefore serve to explain at least the direction of these exchange rate movements. A differentiation is made between fundamental and nonfundamental factors that determine the exchange rate.

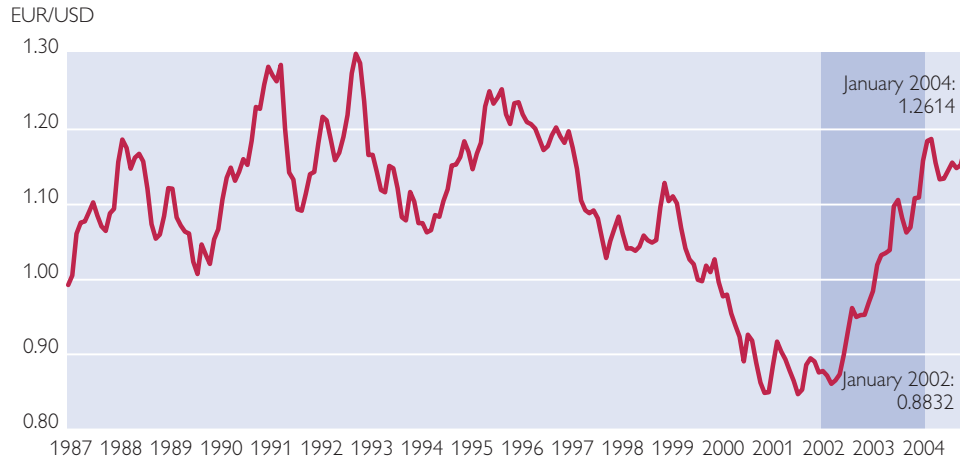
Refereed by
Michael Ehrmann, ECB.

¹ The sharpest EUR/USD (synthetic) exchange rate increase occurred between 1985 and 1987.

Chart 1

Historic Euro Exchange Rate

Development of the (synthetic) euro against the U.S. dollar since 1987



Source: Eurostat.

Chapter 2 examines the role of fundamentals such as the monetary policy of the Federal Reserve System (Fed), the Bank of Japan's interventions in the USD/JPY market as well as macroeconomic data in the U.S.A. and the EU-12. Furthermore, it provides an overview of important one-time events and other general factors market participants deemed significant in the period under review.

Chapter 3 examines nonfundamental factors, which exclusively result from market-inherent dynamics, using a concrete example of a technical foreign exchange trading system.

2 Fundamental Factors

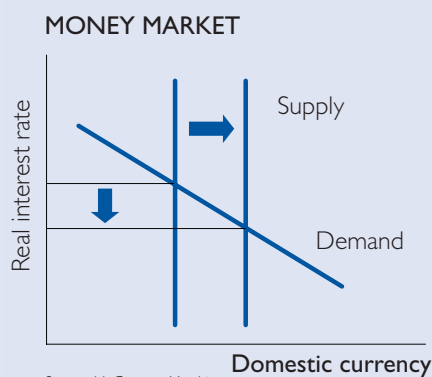
It is a particular challenge to empirically illustrate the correlation between exchange rates and economic fundamentals such as economic growth, productivity, inflation rates, the current account or monetary and fiscal policy measures. In their frequently quoted paper, Meese and Rogoff (1983) find that fundamental variables, which are considered relevant by simple macroeconomic theories

on exchange rate determination, usually cannot explain exchange rate movements. Another example that shows how difficult it is to explain exchange rate movements is the repeated rejection of the theory of uncovered interest parity in empirical studies (Froot and Thaler, 1990). Only fairly recent works, e.g. Chinn and Meredith (2002), find an empirical correlation between exchange rates and long-term interest rates which is consistent with uncovered interest parity.

In the past few years, however, a new kind of literature has emerged which makes use of a new, more market-based approach and has found a number of interesting empirical correlations between fundamentals and exchange rates. Before presenting this approach, we provide a simple macroeconomic theoretical model that explains the role demand and supply play in the foreign exchange market when it comes to exchange rate determination (see box "A Simple Model of Exchange Rate Determination").

A Simple Model of Exchange Rate Determination

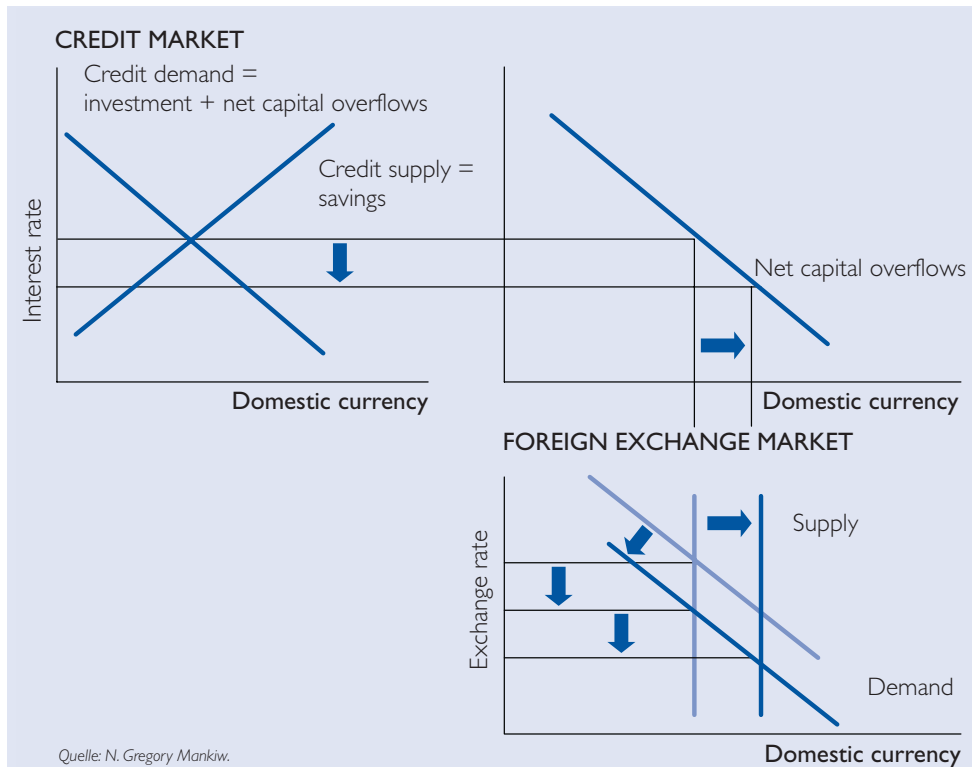
How do fundamental factors determine nominal exchange rates? Our rationale is based on a simple macroeconomic textbook model of an open economy according to Mankiw (2004). This model focuses on the money, credit and foreign exchange markets. Important macroeconomic factors influencing the nominal exchange rate are domestic and foreign interest rate and employment levels (reflecting differences in business cycles) in the short run and domestic and foreign price levels in the long run. In the short run, the central bank is capable of controlling the interest rate level vis-à-vis other countries by changing the money supply or the money market interest rate. The “Money Market” chart shows that, for example, an expansion of money supply creates a money supply surplus versus money demand. With interest rates still on a high level, this surplus reflects higher opportunity costs for holding money. In this situation, economic agents tend to shift their financial assets out of money balances to less liquid, higher-yielding financial instruments. Banks and security issuers respond to the higher demand for higher-yielding financial instruments by reducing interest rates. This, in turn, gives rise to an increased demand for holding money in the nonbank sector, because the holding of (non-interest bearing) money balances becomes less costly again. This process lasts until a new, lower equilibrium interest rate is established in the money market. The “Credit Market” chart, which explains how interest rate movements influence saving and investment decisions, shows that a decrease in interest rate causes a short-term increase in the employment level by pushing up consumption (which means savings go down) and investment. The higher employment level also corresponds to a business cycle acceleration vis-à-vis other countries, which triggers a virtuous circle of imports; as a result, net exports decline.¹ Depending on the starting point, this either causes a decline in the current account surplus or a rise in the current account deficit.



Source: N. Gregory Mankiw.

The following chart shows how the above-mentioned interest rate reduction directly affects credit market behavior and indirectly affects foreign exchange market behavior. Credit market: A lower interest rate first leads to a decline in savings deposits and thus in credit supply. Savings that were used to provide loans go down, as their yields fall. Given the higher interest rates abroad, savers rather opt for transferring part of their funds abroad; as a consequence, net capital outflows rise. Furthermore, the demand for loans to finance domestic investment goes up. The employment level rises, resulting in the above-mentioned virtuous circle of imports. Net exports decline.

¹ In the short term, it is not relevant to differentiate between nominal and real interest and/or exchange rates, as price levels adjust only very slowly. In the long run, however, price levels developments do have an effect. Therefore, from a long-term perspective, the effect of monetary policy has to be assessed differently: The domestic price level rises in comparison to that of foreign countries. The money supply curve moves back to its original position. The impact on the interest rate level is neutralized, i.e. in the long run, monetary policy has no effect on interest rates.



This brief illustration already defines the two principal determinants of the exchange rate. The supply of domestic currency in the foreign exchange market corresponds to the net capital outflow, which increases after a domestic interest rate cut. This capital outflow is part of the domestic currency savings used for foreign portfolio investment and direct investment and is thus supplied for exchange into foreign currency. At first this supply does not depend on the exchange rate but on the interest rate (i.e. on the interest rate differential vis-à-vis the foreign economy). If the net capital outflow increases, the exchange rate for the domestic currency will go down.

The second determinant for the exchange rate is the demand for domestic currency in the foreign exchange market, i.e. the domestic money foreign entities need to finance net exports. Net exports have to be financed in domestic currency. In exchange for domestic currency, foreign investors supply foreign currency; in other words: they demand the currency of the export country.

In this example, therefore, the exchange rate drops for two reasons: first, because higher net capital outflows raise the supply of domestic currency on the foreign exchange market (the supply curve shifts to the right) and second, because a stronger virtuous circle of imports causes a decline in net exports. This, in turn, corresponds to a lower demand for domestic currency on the foreign exchange market.

A method which has increasingly been used – especially over the past few years – to empirically illustrate the correlation between fundamental data and financial market prices is the event study approach.² It investigates the response of the exchange

rate to an event the market participants did not anticipate (the so-called surprise event). In this context, surveys among market participants or futures prices may be used as indicators for expectations regarding possible events. The following univariate

² As alternatives to an empirical description of the correlation between exchange rates and economic fundamentals, structural macroeconomic models or structural VaR models can be used. VaR models are often used to describe the empirical correlation between monetary policy and exchange rates (Faust and Rogers, 2003).

linear regression is then used to estimate the reaction of the exchange rate:

$$\Delta y_t = \alpha + \beta x_t + \varepsilon_t.$$

Δy_t indicates the percentage change of the EUR/USD exchange rate in a narrow observation window around the time market participants learn about the surprise event x_t . Many event studies estimate the correlation with daily data, which allow for a 24-hour observation interval. More recent works increasingly use intraday data with observation intervals of around 30 minutes. Depending on the type of event, this study uses both daily data and intraday data. The parameter β , estimated by applying the ordinary least squares (OLS) method, measures the reaction of the exchange rate.³ The error term ε_t represents other factors which determine the price but do not correlate with the exogenous variables.

Furthermore, this equation is also estimated for interest rates in the money and capital markets, which enables the determination of the *simultaneous* reaction of interest and exchange rates to an event. By measuring these simultaneous reactions we arrive at a more accurate picture of the way in which financial market participants interpret an event and, consequently, which exchange rate determination model they use for orientation (Hardouvelis, 1988). Faust et al. (2003) also emphasize this role of interpretation and/or the subjective element contained in market reactions. Event studies measure not only the correlation between an event and the subsequent price changes, but also the way in which financial market agents interpret an event.

The selection of events for this analysis was based on the literature, which quotes a number of macroeconomic data releases as well as the monetary policy of the U.S. Fed as relevant factors for the EUR/USD exchange rate. With regard to macroeconomic data releases, this study focuses mainly on the role of employment figures (nonfarm payrolls) and the U.S. trade balance (as an indicator for the current account). The limited focus on these factors was chosen, among other things, because market participants deemed them particularly significant for the period under review. In addition, this study investigates the significance of a number of European data releases. Another factor which was considered relevant especially by European economic policy makers was the exchange rate policy of a number of Asian countries. Given the limited availability of intervention data, this study only analyzes interventions by the Bank of Japan (BoJ) on the USD/JPY market which may have had an indirect influence on the EUR/USD exchange rate in the period under observation. The table in the annex shows the events and the observation interval used to measure the exchange and interest rate changes.

2.1 The Monetary Policy of the Federal Reserve System

To investigate the market reaction to the Fed's interest rate moves we apply Kuttner's (2001) approach to measuring the surprise component of a change in the Fed's monetary instrument, the Fed funds target. This approach uses federal funds futures to determine the expectations of

³ If only the event is regressed on the exchange rate and its surprise component is not, this leads to an attenuation bias in estimating the coefficient and subsequently to an underestimation of the impact of the event.

changes in the Fed funds target. It uses the unanticipated change or maintenance of the Fed funds target on days of Federal Open Market Committee (FOMC) meetings, computed by Gürkaynak et al. (2004), as an exogenous variable.⁴ The estimate includes the reaction of both the EUR/USD

exchange rate and the U.S. and euro area yield curves in the period after the start of Monetary Union in 1999. A Chow test is carried out to determine the structural stability of correlations for the period from 2002 to 2003, which is of particular interest for this study.

Table 1

Reaction of the EUR/USD Exchange Rate and U.S. and Euro Area

Interest Rates to an Unanticipated 100 Basis-Point Change in the Fed Funds Target from 1999 to 2003

	Reaction		Standard deviation		R ²		Chow test	
	U.S.A.	EU-12	U.S.A.	EU-12	U.S.A.	EU-12	U.S.A.	EU-12
Basis points								
3 months	94.1**	20.8**	6.5	5.2	0.82	0.26	0.84	0.53
2 years	41.2**	26.7**	10.7	11.5	0.20	0.12	0.78	0.33
10 years	18.7**	18.2	8.8	15.8	0.06	0.08	0.46	0.05
Real yield	18.2**	4.9	5.3	10.5	0.13	0.02	0.89	0.01
%								
EUR/USD	-3.10**		0.84		0.13		0.92	

Source: OeNB.

** indicates significance at the 5% level. R² indicates the coefficient of determination. The columns for the Chow test indicate the p-value of the null hypothesis of structural stability. The real yield is the yield on inflation-indexed government bonds with a residual maturity of 10 years.

Table 1 shows that the Fed's interest rate moves have a significant simultaneous effect on the EUR/USD exchange rate and on interest rates in the U.S.A. and the euro area. In order to illustrate this assertion we discuss the relevant case of an interest rate cut in the period from 2002 to 2003.

If the Fed cuts interest rates by 100 basis points, the EUR/USD exchange rate goes up 3.1% according to this estimate, i.e. the euro appreciates. At 1.6%, Ehrmann and Frantzsch (2004) find a less strong reaction of the EUR/USD exchange rate.⁵

The Fed's interest rate cut causes U.S. interest rates to drop across the entire maturity spectrum, with the effect on the money market, where interest rates fall by 94 basis points, being clearly stronger than at the long end of the bond market, where rates decline by a mere 19 basis points. The response of yields of inflation-protected bonds suggests that in the U.S.A. both nominal and real interest rates reacted to the Fed's rate cut.

Furthermore, the effect spills over to interest rates in the euro area, causing them to drop as well. The extent to which euro area interest

⁴ The interest rate cut of January 3, 2001, which started the cycle of interest rate cuts in 2001, was removed from the sample because it is an observation atypical of the period in question, as U.S. bond markets responded to this key interest rate cut with rising nominal interest rates and real yields and inflation risk premiums. If this observation is taken into account, the effect on the exchange rate is weaker, but still significant.

⁵ The result of Ehrmann and Frantzsch's (2004) estimate for the period from January 1993 to February 2003 falls within the 95% confidence interval of this estimate.

rates react does not seem to depend on maturities; therefore, the yield curve reaction in the euro area may be described as a downward parallel shift. The effect at the long end (10 years), however, is significant neither for nominal nor for real interest rates.

All in all, these estimates suggest that a relaxation of monetary policy in the U.S.A. *ceteris paribus* causes short- and long-term nominal and real interest rates in the U.S.A. to drop faster than those in the EU-12, with this effect being most obvious in the money market. The structural stability test of the correlation shows that the Fed's monetary policy affected the EUR/USD exchange rate and the interest rates in the years 2002 to 2003 as well.

Within the scope of our simple model, this effect of monetary policy can be interpreted as triggering a change in investment incentives for international investors, thus causing net capital flows, which in turn lead to a change in the exchange rate.

These estimates serve to prove the simultaneous effects of the Fed's monetary policy measures (i.e. decisions to change the Fed funds target or to keep it unchanged) on exchange rates and interest rates. Fatum and Scholnik (2003), however, have shown that revised expectations of *future* monetary policy measures also influence the EUR/USD exchange rate. Such revisions can be triggered by the release of certain new economic data informing the financial markets about the current state and the expected future developments of the U.S. economy. As the Fed reacts to economic developments in its monetary policy decisions, such data releases act as leading indicators for future monetary policy decisions. This, however, is not

necessarily true for all economic data. Some economic data may have an effect on the exchange rate without at the same time causing a change in the expectations of future monetary policy decisions.

2.2 U.S. Macroeconomic Data: Labor Market and Current Account Deficit

From the literature on the correlation of unanticipated releases of U.S. macroeconomic indicators and on the EUR/USD exchange rate, a number of systematic correlations have been documented. In this context, the U.S. dollar is strengthened by better-than-expected economic data such as for industrial output, retail trade, orders for durable goods and consumer confidence but also by better-than-expected labor market statistics and U.S. trade balance data. Interestingly, unexpectedly high, or low, U.S. inflation rates often have no significant impact on the EUR/USD exchange rate (Faust et al., 2003, and Andersen et al., 2002).

In general, such estimates presuppose that the structural relationship between certain economic data and the exchange rate remain constant over time. This assumption, however, is not justified in all instances. In a survey among foreign exchange traders Cheung and Chin (1999) found that the relevance of specific economic data for the market may change considerably over time, i.e. that economic data that drive the market at one point may be irrelevant at a different point in time. As the markets' focus is continuously shifting between various aspects of the set of economic data, the obvious course of action is to narrow any detailed analysis down to the effect of those macroeconomic indicators that are considered particu-

larly important in the market debate in the period under observation. In 2003 in particular, these were new data on the U.S. labor market and current account.

In the following, we estimate the correlation between nonfarm payrolls (as the prime indicator for the U.S.

labor market situation) and the U.S. balance of trade (as an indicator for the current account) on the one hand and the EUR/USD exchange rate and U.S. and euro area yield curves on the other hand (sample period: 2002 to 2003). Table 2 shows the results of this estimation:⁶

Table 2

Reaction of Prices in the Money, Bond and Foreign Exchange Markets to Unanticipated U.S. Employment and Trade Balance Data from 2002 to 2003

	Reaction		Standard deviation		R ²	
	U.S.A.	EU-12	U.S.A.	EU-12	U.S.A.	EU-12
Employment						
3 months	-0.0128**	-0.0034	0.0029	0.0021	0.24	0.09
2 years	-0.0487**	-0.0181**	0.0205	0.0078	0.30	0.21
5 years	-0.1190**	-0.0411**	0.0503	0.0200	0.30	0.18
EUR/USD	-0.132**		0.0553		0.34	
Trade balance						
3 months	-0.0011	0.0001	0.0017	0.0028	0.01	0.00
2 years	-0.0067	0.0065	0.0080	0.0077	0.03	0.03
5 years	-0.0268	0.0145	0.0201	0.0209	0.04	0.02
EUR/USD	-0.0786*		0.0441		0.12	

Source: OeNB.

* and ** indicate significance at the 10% and 5% level. R² indicates the coefficient of determination.

To illustrate the results pertaining to the reaction to U.S. employment data we use the case of an unexpectedly low number of newly created jobs, or an unexpectedly strong decline in jobs, respectively, which was relevant in the observation period. It becomes evident that such negative news about the U.S. labor market weakens the U.S. dollar while at the same time driving up the price of money market papers and bonds, with the impact on the bond market being stronger. As there is an inverse relationship between prices and interest rates, this means that bad news from the U.S. labor market drives down interest rates in the U.S.A. Spillover effects then cause interest rates in

the euro area to drop as well, but less than in the U.S.A. (the effect on the euro money market is insignificant). As a result, the relative prices of U.S. bonds, or money market papers, respectively, go up, thus causing U.S. interest rates to decline more sharply. These results are in line with those in Faust et al. (2003).

The reaction in U.S. money and bond markets can be interpreted as a “policy anticipation effect.” The markets are aware of the Fed’s monetary policy reaction function, where changes in the employment level play a prominent role because of their importance for price stability and sustainable economic growth. Consequently, a worse-than-expected labor

⁶ Other than in the sections dealing with the Fed’s monetary policy, the euro area economic data and the Bank of Japan’s exchange rate policy, in this section we use the price change of front-end foreign exchange or interest rate futures contracts as an endogenous variable. These data are available in intraday frequency, which allows for narrower observation intervals and thus more precise estimates.

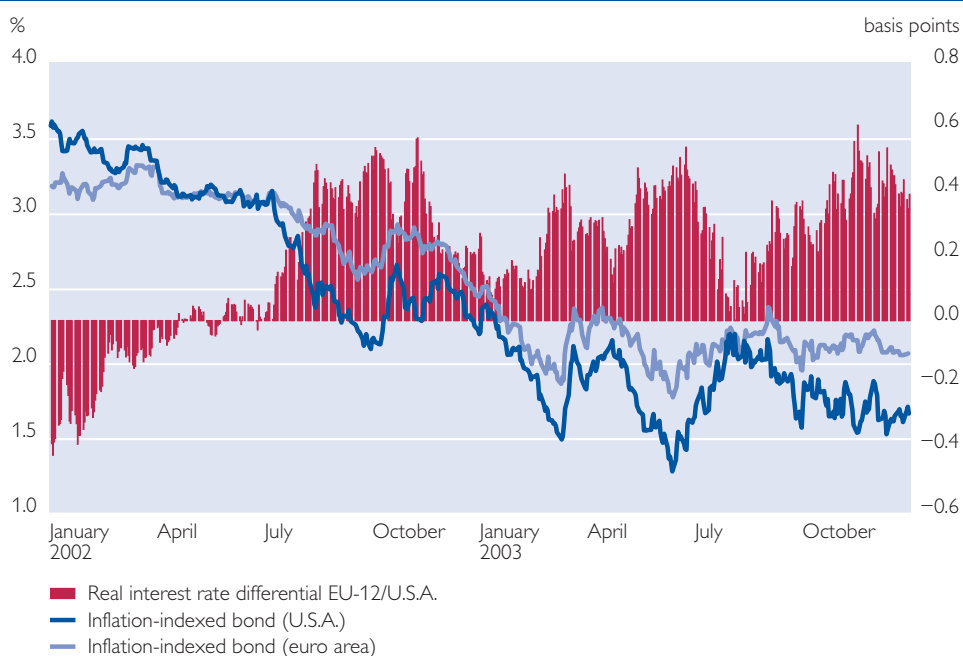
market report leads to a revision of expectations of future monetary policy; i.e. key interest rates are expected to fall or remain unchanged for longer than previously expected.

Expectations regarding the Fed's future monetary policy played an important role especially in the second half of 2003, as the Fed signaled during that period that, given the risk of an undesired further decline in infla-

tion, it would keep its key interest rates low "for a considerable period." This move aimed to counter this risk and, at the same time, close the output gap more quickly. Anderson and Thornton (2004) assume that this "unconventional policy" was responsible for the decline in long-term real interest rates in this period (see chart 2).⁷

Chart 2

Long-Term Real Interest Rates and Real Interest Differential U.S.A./Euro Area



Source: Datastream.
 A positive real interest rate differential means that real interest rates in the euro area are higher.

The estimates of the effects of negative labor market data and of the Fed's monetary policy suggest that these two factors together contributed to a decrease in short- and long-term real interest rates in the U.S.A. The simple model of exchange rate determination presented in this study showed that ceteris paribus this decline of interest rates leads to increased net capital outflows and

subsequently to a weaker exchange rate.

The second factor we investigated more closely was the U.S. current account deficit. Market debates have regularly pointed out that the existing deficit reflects an imbalance that can only be evened out if U.S. imports go down or exports go up. This, in turn, requires a weaker U.S. dollar as a prerequisite. The estimates indi-

⁷ Measured by the break-even inflation rates computed from inflation-indexed bonds, inflation expectations in the U.S.A. also went up (more strongly than in the euro area), which generally also indicates a weaker U.S. dollar.

Table 3

Bilateral Trade Balances of the EU-12, Japan and the U.S.A.

USD billion					
U.S.A./EU-12		U.S.A./Japan		EU-12/Japan	
2002	2003	2002	2003	2002	2003
-13.1	-17.9	-35.4	-37.7	-12.9	-17.7

Source: Eurostat, IMF (Directions of trade).

Values for 2002 and 2003 are the total of Q4 01 and Q1 02 data, and of Q4 03 and Q1 04 data, respectively.

cate that in fact, in the period in question the U.S. dollar regularly reacted to unexpectedly high deficits in the U.S. trade balance by depreciating against the euro (see table 2). Table 3 shows the bilateral trade balances as the most important subaccount of the current account balance.

In the period from 2002 to 2003, the U.S. trade balance deteriorated both vis-à-vis the euro area and Japan (as well as against many other countries, including China), with the absolute increase of USD 9.6 billion and USD 4.6 billion, respectively, at an annualized basis being relatively small.⁸ Based on the model described in the box “A Simple Model of Exchange Rate Determination,” the change in the U.S. net trade balance can be interpreted as additional demand for foreign goods, which results in additional demand for foreign currency by U.S. residents. This, in turn, weakens the U.S. dollar. According to this model, in such a case there should be no simultaneous reaction of U.S. interest rates – an assumption which is in line with our estimates.

In this context, it is important to note that this study measures the market reaction to the release of new trade balance data rather than the reaction of the exchange rate to the

trade balance and/or the subsequent demand for foreign currency. Using a theoretical model, Bachetta and Van Wincoop (2004) demonstrate that markets use fundamentals that are not directly observable and which show large imbalances as a “scapegoat” for exchange rate movements, which means that not only the effect of the fundamentals themselves, but also their subjective perception by the economic agents has an impact on the market.

By way of a summary, two fundamental factors are identified as being responsible for the weak U.S. dollar: the supportive U.S. monetary policy in conjunction with slow employment growth, and the high current account deficit, which triggers market concern. These two factors are complementary when explaining exchange rate developments by using fundamentals. Depending on the perspective, in the period under review the U.S. current account deficit was either too high or U.S. interest rates were too low for the U.S. dollar to be more stable. These results, however, do not allow for a relative or absolute weighting of these two factors when it comes to explaining the exchange rate changes in the period under observation.

⁸ The U.S. net investment position (foreign claims against the U.S.A. less U.S. claims against the rest of the world) came to USD -2,430 billion or some 24% of GDP at purchasing power parities in 2003.

2.3 Monetary Policy and Macroeconomic Data Releases in the Euro Area

In sections 2.1 and 2.2 we used the event study approach to analyze specific fundamental factors in the U.S.A. which are relevant for price dynamics. The effects we found may help explain the direction of exchange rate changes and are consistent with those of the simple model of exchange rate determination we introduced. Basically, this empirical approach may also be used to measure market reactions to monetary policy measures and to the release of macroeconomic data in the euro area, which would also help demonstrate the significance of euro area factors in determining the EUR/USD exchange rate. However, a number of measurement problems exist in this context.

Up to now, relatively few empirical studies have been available for the euro area. Galati and Ho (2001) and Ehrmann and Fratzscher (2004) find that individual economic data from the euro area or from Germany (with the exception of the ifo business climate index) exert no significant influence on the EUR/USD exchange rate. These results are in line with the widely shared view in the foreign exchange market that the release of individual economic data from the U.S.A. plays a much more substantial role than that of euro area data. Table 4 shows the results of the estimates regarding the effects of certain macroeconomic data from the euro area (inflation rates of consumer and producer prices), from France (INSEE business climate) from Germany (ifo business climate index).

Table 4

Reaction of the EUR/USD Exchange Rate to Unanticipated Euro Area

Economic Data from 2002 to 2003

%	Reaction	Standard deviation	R ²
HICP (EU-12)	0.1371	0.0877	0.02
PPI (EU-12)	0.4509	0.4996	0.08
INSEE-BC	0.0424	0.0986	0.01
ifo index	-0.2857	0.1874	0.04

Source: OeNB.

* and ** indicate significance at the 10% and 5% level. R² indicates the coefficient of determination.

These results confirm earlier studies, in part, as well as the market opinion, which says that European economic data, as a rule, have no significant influence on the exchange rate. The ifo business climate index, which other studies estimate as being significant, could not be estimated as being significant in the present study. A possible explanation for the minor significance of European economic data for the foreign exchange market may be the fact that they are released later than U.S. economic data. Since a lot of U.S. economic data act as lead-

ing indicators for European economic data, agents in the foreign exchange market might increasingly turn to U.S. figures for guidance, which would reduce the news value and thus the exchange rate relevance of European economic data.

Concerning the monetary policy of the European Central Bank (ECB), one option would be to proceed along the lines of the analysis presented in section 2.2, i.e. by measuring the effects of unanticipated interest rate moves on U.S. and euro area interest rates as well as on the EUR/USD

exchange rate. However, in the period from 2002 to 2003, markets for the most part anticipated the monetary policy decisions of the Governing Council of the ECB, i.e. they anticipated whether the Governing Council would change the main refinancing rate or leave it unchanged. Therefore, within the scope of this study it is not possible to determine unanticipated monetary policy events and to assign them to a specific point in time. Consequently, this analysis of the relatively short period from 2002 to 2003, which focuses on the event study approach, cannot make any statement on the effects of the ECB's monetary policy on the EUR/USD exchange rate.

Ehrmann and Fratzscher (2004) estimate the correlation between the USD/DEM exchange rate (and EUR/USD exchange rate, respectively) and interest rate moves of the Deutsche Bundesbank and the ECB in the period from 1993 to February 2003 and find that interest rate hikes have a nonsignificant, positive effect on the exchange rate, i.e. higher key interest rates of the Deutsche Bundesbank or the ECB strengthened the Deutsche mark (and the euro, respectively) against the U.S. dollar.

2.4 Interventions by the Bank of Japan

The large-scale purchases of U.S. dollars in the course of interventions on the foreign exchange market by a number of Asian central banks were another possible determinant for the

external value of the euro that was discussed by in particular by European economic policy makers (see e.g. the interview with W. Duisenberg, *Handelsblatt*, September 22, 2003).

In this context, the unilateral interventions by the Bank of Japan (BoJ) stood out in particular. On behalf of the Japanese Ministry of Finance, the BoJ sold a total amount of around JPY 24,000 billion for U.S. dollars in the period under review.⁹ Interventions on the foreign exchange market, inter alia, have been recommended as an effective instrument to combat deflation in Japan against the background of a zero-interest environment on the money market (Coenen and Wieland, 2004).¹⁰ Given the availability of intervention data at a daily frequency, the effects of these interventions on the USD/JPY and the EUR/JPY exchange rates – and thus on the EUR/USD exchange rate – can be estimated using the event study approach (Ito, 2002). Table 5 presents the results of a regression of BoJ interventions on the three exchange rates as well as on bond yields in Japan and the U.S.A.

As table 5 shows, the sale of JPY 1,000 billion for U.S. dollars causes a depreciation of the Japanese yen against the U.S. dollar *and* the euro by 0.84% and 0.75%, respectively. The estimate of the effect on the USD/JPY exchange rate confirms Spiegel's (2003) assessment that the interventions successfully countered an appreciation of the Japanese yen

⁹ *In the period from 2002 to 2003, neither the Eurosystem nor the Fed intervened on the foreign exchange market by purchasing or selling foreign exchange. However, there were a number of statements, most notably by individual members of the Governing Council of the ECB, that had an effect on the markets. Fratzscher (2004) provides an econometric analysis of such "verbal interventions."*

¹⁰ *The accumulation of reserves by the Chinese central bank was also a relevant factor. A higher preference for U.S. dollar-denominated reserves, prompted by the Asian crisis, seems to have been one of the factors to play a role for the other Asian central banks (Aizenman and Marion, 2002).*

Table 5

Reaction of Exchange Rates and Bond Yields to U.S. Dollar Purchases

within the Scope of BoJ Interventions to the Amount of JPY 1,000 Billion from 2002 to 2003

	Reaction		Standard deviation		R ²	
	%					
EUR/USD	-0.09		0.26		0.00	
EUR/JPY	0.75**		0.23		0.09	
USD/JPY	0.84**		0.15		0.25	
	U.S.A.		Japan		U.S.A.	
	Basis points					
2 years	0.1	-0.8	3.1	0.5	0.00	0.03
5 years	-0.1	-1.0	4.4	1.3	0.00	0.00
10 years	0.5	-1.9	3.5	1.7	0.00	0.01

Source: OeNB.

** indicates significance at the 5% level. R² is the coefficient of determination.

against the U.S. dollar (“leaning against the wind”).¹¹ Bond yields in Japan did not react to the interventions.

A crucial finding with regard to the main focus of this study is the fact that the BoJ intervention purchases of U.S. dollars hardly supported the U.S. dollar against the euro, if at all. The measured effect has the right sign

but is not significant, which means that the interventions do not seem to have had a substantial influence on the EUR/USD exchange rate. This fact may be attributable to the depth and/or elasticity of U.S. money and bond markets (Bernanke, 2004). The results for U.S. bond yields, which did not react to the interventions, suggest the same.

One-Time Events and Market Sentiment

Regardless of the factors analyzed so far, such as monetary policy decisions or the release of the latest economic indicators, there are other factors which are more difficult to quantify and less easily explicable in economic terms and which may also influence the foreign exchange market at least in the short term. These are one-time events that may drive the market. The political arena provides most of the examples for such events, which include elections or military conflicts. In addition, foreign exchange traders feel that the market is also driven by a wide range of general economic expectations and by less specific assessments and moods, the so-called market sentiment. These general assessments often create the backdrop for events analyzed in sections 2.1 and 2.4. To shed some light on these background characteristics as well as on certain relevant one-time events, we evaluated a number of sources which reflect the full spectrum of foreign exchange market activities in real time. For this purpose, reports of various investment banks were used which provide a comprehensive picture of those factors that were particularly important for the market in certain periods.

In 2001, the market increasingly began to doubt in the sustainability of the New Economy in the U.S.A. The value of the U.S. dollar clearly dropped not only against the euro but also against a number of other important currencies. In the second half of the 1990s, high productivity growth and the expectations of higher profitability and better earnings prospects in the U.S.A. were considered

¹¹ The effect on the USD/JPY exchange rate is very close to Ito’s estimate for the period from 1995 to 2001 and slightly stronger than the effects Castren (2004) found for the period from 1999 to 2003 for the JPY/USD, JPY/EUR and USD/EUR exchange rates. As endogenous variables, Castren uses the first four moments of the risk-neutral density derived from foreign currency options. In general, the effects of interventions might tend to be stronger because the market reaction to interventions rather than to the surprise component of interventions is estimated.

major pillars for the expansion of investment activities and the extraordinarily bullish stock markets. According to market estimates, this positive environment caused foreign capital inflows and thus raised the value of the U.S. dollar. In the course of 2001, the U.S. investment boom started to stagnate, corporate profits declined considerably and the economy slowed down. The terrorist attacks on the World Trade Center as well as the bankruptcy of the U.S. energy corporation Enron increased investors' risk aversion, causing them to resort to lower-risk assets.

In early 2002, markets were particularly focusing on the investigations of U.S. supervisory authorities into further cases of accounting irregularities in U.S. corporations. After the telecommunications company WorldCom had filed for bankruptcy and numerous other bankruptcies and accounting scandals had occurred in the U.S. telecom industry, many shareholders and investors suffered considerable losses. Investors increasingly lost confidence, uncertainty grew; and for the first time in two years the U.S. dollar tested parity with the euro, which markets considered an important barrier. In spite of sound economic prospects in the U.S.A., the U.S. dollar failed to recover.

Another political factor which increasingly became the center of market participants' attention was the ever clearer indication that a military conflict in Iraq was looming. In November 2002, the UN adopted a resolution to send weapon inspectors to Iraq, and in December it was reported that there was "solid" information that Iraq had weapons of mass destruction. In that period, the EUR/USD exchange rate climbed to 1.05.

In late 2002/early 2003, the war with Iraq became the markets' dominant issue. In the weeks prior to the release of the first preliminary report of the UN weapons inspectors on January 27, 2003, the value of the euro climbed by the day and reached a three-year high of 1.09, as the situation became more aggravated. U.S. military action influenced the mood in the financial markets throughout the period from March 20 to May 2, 2003.

Statements by U.S. Secretary of the Treasury John Snow, who succeeded Robert Rubin in January 2003, also stirred up the foreign exchange market. He had announced to the public that the market was to decide on the exchange rate level. A weak U.S. dollar was favorable for exports and thus also for the economy, he said. By the end of May 2003, the exchange rate of the U.S. dollar dropped to approximately 1.20 against the euro. Accordingly, the announced continuation of the strong dollar policy became less and less credible.

A factor that kept coming up in the discussion was the risk of new terrorist attacks in the wake of September 11, 2001. This risk was considered negative for the U.S. dollar, as negative repercussions on the U.S. economy were to be expected.

In the second half of 2003, the market focus shifted to international imbalances, and in particular to the U.S. current account deficit. In this context, markets considered the G-7 statement on the importance of exchange rate flexibility as a signal for a further decline of the U.S. dollar. Until the end of the fourth quarter 2003, the euro continued to strengthen and reached levels above 1.25.

When evaluating the various documents describing market opinion and market sentiment, it is remarkable that information about the euro area or about individual euro area countries was of very limited significance. For example, developments in connection with the Stability and Growth Pact hardly played a role in the markets in the period under observation. By contrast, the general perception was rather that the European economy was merely following the lead of the U.S. economy, and that therefore information on U.S. developments was more significant.

3 Nonfundamental Factors

In addition to the fundamental factors identified in chapter 2, evidence suggests that other factors which are related more closely to market dynamics may also influence the EUR/USD exchange rate. The majority of exchange

rate changes, for example, occur at points in time when there are no observable market events. The coefficients of determination of the regressions presented in chapter 2 also suggest that, next to fundamentals, there are other factors that come into play. Ehrmann and Fratzscher (2004) find

that fundamentals may be used to explain the direction of a change of the EUR/USD exchange rate, but not its extent.

An alternative approach to explaining exchange rate fluctuations is to look at the role of market participants who use so-called technical trading and trend-following systems.¹² In the 1970s and 1980s, economics literature widely agreed (Fama, 1970) that financial markets (and thus also foreign exchange markets) were efficient and that price developments followed a random walk. Therefore, analyzing the history of a financial time series would not provide any useful information on future developments. For this reason, the use of technical trading systems – when taking transaction costs properly into account – would not be able to generate profits and were therefore useless. In the early 1990s, however, empirical studies raised sustained doubts about this conclusion. Brock et al. (1992) found that trading strategies that followed relatively simple rules generated profits which exceeded those of a buy and hold strategy.

From the theoretical literature on nonfundamental exchange rate determinants, two approaches should be mentioned in particular, namely the microstructure approach (Lyons, 2001) and the dynamic equilibrium approach (Brock and Hommes, 1997) with heterogeneous foreign exchange market participants.

The first approach explains short-term exchange rate developments mainly by analyzing the way participants in the foreign exchange market aggregate information. Osler (2001) found that foreign exchange limit

orders concentrated around certain points (points of support or points of resistance), which reinforced ongoing exchange rate movements. De Grauwe and Grimaldi's (2004) provide an example for the second approach. They define a dynamic equilibrium model with a group of foreign exchange traders acting on the basis of fundamentals and a second group acting on the basis of technical trading systems. Depending on their success (as measured by the generated risk-adjusted trading profits), the two groups' share in the foreign exchange market changes. The success of the technically oriented traders attracts more traders who work along the according to this pattern, which results in the reinforcement of existing trends in the foreign exchange markets. In this model, however, the "chartists" never completely dominate the exchange rate developments. Outside the tolerance band for the fundamental exchange rate, which depends on the transaction costs in the international commodity markets, "fundamentalists" prevail. Furthermore, the growing number of technically oriented traders leads to higher exchange rate volatility, which – via a risk-adjustment of trading profits – limits the number of new "chartists."

De Grauwe and Grimaldi's (2004) model arrives at a number of statements which seem to apply to the analyzed currency pair (EUR/USD) in the period from 2002 to 2003: First, the model presupposes that the volatility of the exchange rate increases as the volatility of the fundamentals declines. Although, as demonstrated above, the development of fundamentals may help explain a stronger euro,

¹² This study examines the role of automated foreign exchange trading systems. The classic technical analysis (chart analysis) operates on the same principle: the price history is used to produce a forecast.

a 36% change of the nominal EUR/USD exchange rate in the period under review seems very difficult to comprehend, given the high stability of the two economies (U.S.A. and EU-12) concerned.

Second, technically oriented traders play a major role in this model if the exchange rate fluctuates around a fundamentally justified value within a tolerance band determined by transaction costs in commodity markets. Conversely, the importance of fundamentally oriented traders increases if the exchange rate is outside the limits of the tolerance band: The trend of the EUR/USD exchange rate reversed in 2001–02, when the exchange rate clearly deviated from the purchasing power parity (PPP) of 1.11¹³ computed by the OECD (2004), and when the G-7 central banks (and the Eurosystem, respectively) – in view of an exchange rate level of around 0.85 EUR/USD in 2001 – signaled that the euro was undervalued by performing coordinated and unilateral foreign exchange market interventions. Accordingly, the ensuing exchange rate development in 2002 could be interpreted as the euro approaching its equilibrium exchange rate, where, according to De Grauwe and Grimaldi's (2004) model, the technically oriented traders were supposed to play a major role. The results of this analysis do not clearly say whether, at a rate of 1.26, the valuation of the euro exceeded the transaction cost band at the end of 2003. If we assume, however, that the exchange rate is based

on purchasing power parity as a fundamentally justified value, it should be noted that the upward deviation of the EUR/USD exchange rate from the PPP exchange rate at 13.5% was significantly lower than the downward deviation of 23% in early 2002. Accordingly, starting from a significantly undervalued position, the EUR/USD exchange rate in 2002–03 may have fluctuated within a band determined by the transaction costs in the commodity markets.

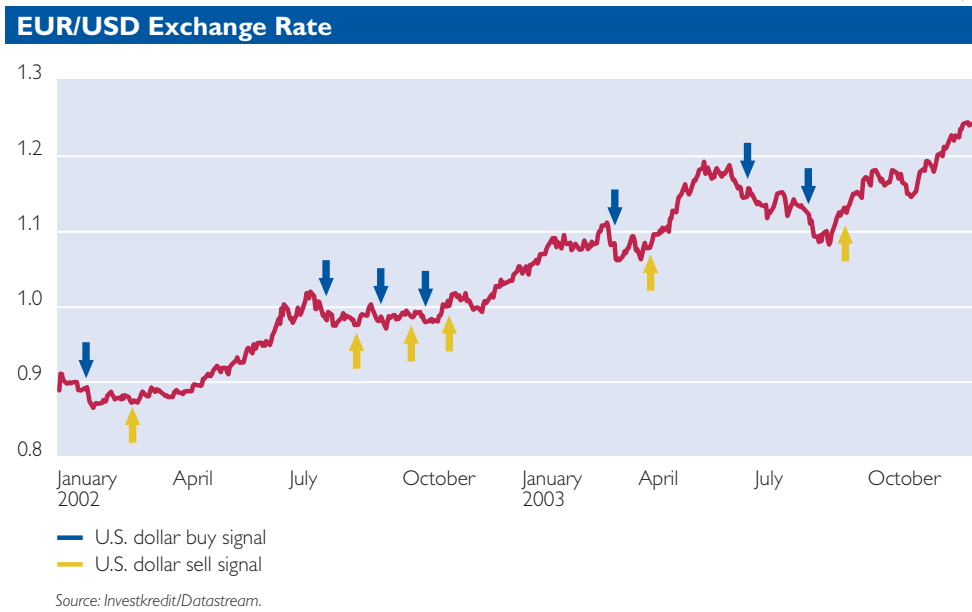
A technical foreign exchange trading system that is used in practice exemplifies the functioning of such a system in the period analyzed (Capital Invest, 2004). The present trading system is a trend-following system, which uses certain indicators (e.g. moving averages, price break-outs out of trading ranges, etc.) to identify upward and downward trends of the underlying exchange rate time series. In addition to price history, the system also takes exchange rate volatility into account. For example, if a price persistently lingers above or below a moving average, the system generates a buy or sell signal. Usually, several technical indicators are used after their profitability and reliability has been backtested for long price histories.

Chart 3 shows that the system presented in this study was very successful in the observation period from 2002 to 2003. Almost all positions closed with a profit (which becomes apparent when comparing buy and sell signals).¹⁴

¹³ The PPP rates determined by the OECD (2004) for the relation between euro and U.S. dollar are USD 1.12 per euro for 2002 and USD 1.11 per euro for 2003.

¹⁴ For an exact analysis, transaction costs and the interest rate differential would have to be taken into account. The EUR/USD market is a very liquid market and therefore the transaction costs are very low. Even if the interest rate differential is taken into account, the quality of the result will not change. In part, U.S. dollar interest rates were even below euro interest rates, which would have increased profits given the fact that the U.S. dollar was falling most of the time.

Chart 3



A large number of other market participants might have applied these or similar strategies. Based on this assumption, the behavior of market agents who rely solely on the history of the EUR/USD time series may have become a major factor in the market, which means that consequently, this nonfundamental factor may also have contributed to the appreciation of the euro.

4 Summary

This study examines the significance of fundamental and nonfundamental factors for the determination of the EUR/USD exchange rate in the period from 2002 to 2003 – a period in which the euro appreciated by some 36%. Using an event study approach, we examine the significance of specific U.S.-specific factors such as the Fed’s monetary policy, data on newly created jobs in the U.S.A. and the U.S. balance of trade as well as the interventions by the BoJ on the USD/JPY market. As regards U.S.-specific factors, negative employment and trade balance data as well as the Fed’s mon-

etary decisions had a weakening effect on the U.S. dollar. The analyzed economic data on the EU-12 had no significant influence on the EUR/USD exchange rate. The BoJ’s interventions on the foreign exchange market in favor of the U.S. dollar had no significant impact on the EUR/USD exchange rate, either, but they did serve to strengthen the euro against the Japanese yen. Important one-time events, which market participants estimated to be extremely significant for the decline of the U.S. dollar, are the war in Iraq and the U.S. accounting scandals, which influenced market sentiment to the disadvantage of the U.S. dollar.

With respect to nonfundamental factors, which solely originate from market dynamics, this study presents an example of a technical foreign exchange trading system which provided mostly accurate short-term exchange rate forecasts – and thus trading profits – in the period under review. If such profitable trading strategies were employed by a large enough number of market participants, this might ex-

plain the weaker U.S. dollar and the stronger euro.

Altogether, both fundamental and nonfundamental factors can be used to explain the direction of the EUR/

USD exchange rate movement. This analysis, however, does not allow for a weighing of the relative significance of these factors.

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Annex: Data Used for the Event Study

Overview of Times of Events and Observation Intervals (GMT)							
Event	Source	Usual time of event	Observation interval		Observations	Instrument	Source/Market
			From	To			
FOMC meeting	Gürkaynak et al. (2004)	19:00	23:00(t-1) 17:00	23:00 10:30(t+1)	41	Bonds EUR/USD	Bloomberg BIS, Fed h10
Nonfarm payrolls	Bloomberg	13:30	10:30 13:20	10:30(t+1) 13:40	24	Money market portfolios EUR/USD – future	BIS Tickdata/CME
Trade balance	Bloomberg	13:30	13:20	13:40	24	EURIBOR, treasury, BOBL – futures Eurodollar, TRN 2-year, 5-year – futures EUR/USD – future	Tickdata/EUX, LIF Tickdata/CME, CBT Tickdata/CME
HICP (EU-12)	Bloomberg	10:00	23:00(t-1)	10:30	24	EUR/USD	BIS, Bloomberg
PPI (EU-12)	Bloomberg	10:00	23:00(t-1)	10:30	22	EUR/USD	BIS, Bloomberg
Insee index	Bloomberg	06:45	23:00(t-1)	10:30	20	EUR/USD	BIS, Bloomberg
ifo index	Bloomberg	08:00	23:00(t-1)	10:30	23	EUR/USD	BIS, Bloomberg
Boj intervention	www.mof.go.jp	23:00–23:00	23:00(t-1)	23:00	88	USD/JPY, EUR/USD, bonds	Bloomberg

Source: OeNB.

The International Monetary Fund's Balance Sheet Approach to Financial Crisis Prevention and Resolution

Andrea Hofer

In 2002, the International Monetary Fund added the Balance Sheet Approach to its set of instruments for monitoring member countries as well as the international financial system and for preventing and resolving financial crises.

In this approach, which was predominantly conceived for emerging market economies, the IMF assumes that a country's vulnerability to financial crises depends in part on the financial structure of its sectoral balance sheets. With this instrument, the IMF analyzes the size and the composition of financial assets and liabilities in a country's aggregate balance sheet and its most important sectoral balance sheets (government, banks, corporations and households as well as the rest of the world). The IMF finds indicators of a country's vulnerability to crises by detecting imbalances in its maturity and currency matching, capital structure and solvency. This makes a valuable contribution to crisis prevention and helps to determine the necessary economic policy measures and external financing needs once a financial crisis has emerged.

The IMF already employs this approach in its analyses and also plans to use it routinely in future Article IV consultations.¹

1 Introduction

The tasks of the International Monetary Fund (IMF) include promoting and securing economic growth and international trade as well as monitoring the world monetary system. In this context, the IMF is responsible, on the one hand, for the *surveillance* of its member countries and the international financial system in order to prevent financial crises and, on the other hand, for *crisis resolution* by providing finance subject to economic policy requirements.

In order to perform its functions more effectively, the IMF has at its disposal a wide array of instruments for monitoring its members and resolving financial crises (Table 1). In December 2002, the IMF expanded this set of surveillance instruments to include the Balance Sheet Approach (BSA).

The BSA provides early warning signs which allow for the prevention and resolution of financial crises and is among the new developments arising from the IMF's *Surveillance and Crisis Prevention* and *Crisis Resolution* strategies. The IMF already uses this approach in its analyses and also plans

to use it routinely in future Article IV consultations.

This instrument is particularly helpful in the case of *emerging market economies* (e.g. Brazil, Turkey, Mexico), especially as such countries have become increasingly active in international capital markets and have been issuing international bonds denominated in foreign currency since the early 1980s. The corporate sector in these countries has also taken on external debt in foreign currency. Similarly, banks in emerging market countries have refinanced themselves externally in foreign currency, while their revenues have largely remained in local currency.

As a result, financial markets have become increasingly integrated over the last 20 years. In many countries, foreign borrowing made it possible to finance higher investment volumes than would have been possible with domestic savings capital alone. However, especially in emerging markets, this opening of capital markets and the high volatility of private capital flows have led to major financial crises in a number of emerging market economies (Allen et al., 2002, p. 4).²

¹ Annual review of a country's economy.

² See the Mexican crises of 1982 and 1994–95 as well as the Asian crisis of 1997–98.

Refereed by:
Aurel Schubert.

Table 1

IMF Instruments for Monitoring Member Countries and Resolving Financial Crises		
Surveillance and Crisis Prevention		
Instrument	Abbreviation	Explanation
Financial Sector Assessment Program	FSAP	Assessment of a country's financial system (including banks, insurance companies, pension funds, financial market supervision).
Country surveillance: Article IV consultations	Art. IV	Annual review of a country's economy as a whole (including the government, financial sector; corporations, private households), especially monetary policy; fiscal policy, economic policy; international trade, retail demand, investment activity; short-term forecasts.
Regional surveillance		Assessment of monetary unions in particular (e.g. euro area, East Caribbean Currency Union, West African Currency Union, East African Currency Union).
Multilateral surveillance, especially: World Economic Outlook Global Financial Stability Report	WEO GFSR	Assessment of economic development and risks to the world economy. Outlook and risks for the worldwide financial system.
Report on the Observance of Standards and Codes	ROSC	Review of whether countries are adhering to best practices in the development of standards and codes (mainly for fiscal policy).
Special Data Dissemination Standard	SDDS	Worldwide collection and preparation of national economic indicators.
Debt Sustainability Analysis	DSA	Analysis of the potential effects of a GDP, currency or interest rate shock on debt sustainability, that is whether debts can still be serviced.
Balance Sheet Approach	BSA	Assessment of a country's vulnerability to crises and crisis prevention through the detection of currency and maturity mismatches on the country's aggregate and sectoral balance sheets.
Technical Assistance and Regional Institutes	TA and Regional Institutes	Technical assistance in the establishment of systems relevant to economic and monetary policy (e.g. central bank, payment system, statistics). Regional institutions such as the Joint Vienna Institute (JVI) in Vienna serve as educational facilities for experts from emerging and developing economies.
Crisis Resolution		
IMF loans Includes special IMF facilities (e.g. Poverty Reduction and Growth Facility) Principle: IMF has preferred creditor status	PRGF	Capital inflows under an IMF program to mitigate balance of payments crises. Special facility for developing countries. The funds made available by the IMF are to be repaid first (even before national loans); currently common practice.
Rollovers¹		Banks do not demand repayment of loans but extend their terms.
General bond exchange¹		One or more bonds are exchanged for a new bond, usually with a longer maturity.
Capital outflow controls¹		Capital outflows are stopped or subjected to restrictions.
Payment suspension or debt moratorium¹		Temporary suspension of payment obligations. Payment suspension: unilateral. Debt moratorium: multilateral agreement.
Heavily Indebted Poor Countries Initiative	HIPC Initiative	Debt relief for the poorest developing countries.
Collective Action Clauses	CACs	Clauses in foreign currency bonds (usually in U.S. dollars) which facilitate debt restructuring by changing issuing terms (e.g. interest rates, maturities). Initiated after the failure of SDRMs. Available to emerging market economies since 2002.
Balance Sheet Approach	BSA	Assessment of the necessary economic policy measures and external financing needs after the eruption of a crisis due to currency and maturity mismatches on the country's aggregate and sectoral balance sheets.
Sovereign Debt Restructuring Mechanism	SDRM	Bankruptcy procedure for sovereigns. Discussed from 2001 to April 2003, not currently under active discussion.
Principles for Stable Capital Flows and Fair Debt Restructuring in Emerging Markets (formerly: Code of Good Conduct)	Principles	Agreement between private industry and emerging market economies regarding rules of conduct for information, consultation and adherence to agreements, and that are expected of the lender and borrower in the event of a debt crisis.
Private Sector Involvement	PSI	Involvement of the private sector in the financing of crisis prevention programs.

Source: OeNB.

¹ Instruments employed jointly with other sectors with the participation of the IMF.

In principle, financial crises can originate in all three main sectors of the economy (government, banks or corporations). One of the *main sources of financial crises* is the *financial balance sheet structure in emerging market economies*. A country's *balance sheet* reveals financial risks which can materialize quickly. Although there are significant differences between emerging market economies in terms of their financial balance sheet structure, their overall vulnerability to crises is far higher than that of mature market economies.

The IMF document (Allen et al., 2002) underlying substantial parts of this study provides a systematic set of analytical instruments for the purpose of examining whether a country's balance sheet contains weaknesses, whether such vulnerabilities can trigger or exacerbate financial crises and which measures can be taken in each case.

2 The IMF's Balance Sheet Approach

2.1 Definition

The IMF's Balance Sheet Approach is an instrument for the *detection, prevention and resolution of financial crises*. The BSA allows the IMF to analyze the *size and composition of the assets and liabilities on a country's aggregate financial balance sheet as well as the financial balance sheets of its most important sectors*.

The BSA is not based on a balance sheet in the conventional sense of the term, that is, the accounts of an economic entity (usually a company) for a business year in the form of a comparison of financial and nonfinancial balance sheet positions on the assets

and liabilities sides as of a certain accounting date (Betriebswirtschaftlicher Verlag Dr. Th. Gabler GmbH, 1984, p. 748). The Balance Sheet Approach in the IMF model is merely a comparison of financial assets and liabilities as of a certain accounting date, which means that nonfinancial balance sheet positions are omitted. Moreover, the IMF does not draw up such balance sheets for individual economic entities but in aggregate form for the overall economy and for its most important sectors.

In this context, the IMF assumes that the resilience of an economy to various shocks, including financial crises, depends in part on the structure of the country's financial balance sheet. From this perspective, a financial crisis typically emerges in cases where demand for domestic financial assets plunges in one or more sectors (1. government sector, 2. financial sector, 3. nonfinancial sector, 4. external sector). Creditors lose confidence in the government's ability to service its debt, in the banking system's ability to meet deposit outflows, in the corporate sector's ability to repay bank loans and other debt, or in the country's ability to earn sufficient foreign exchange in order to meet its external obligations. This leads to the sale of local assets by nonresidents or to a surge in demand among residents for foreign assets and/or assets denominated in foreign currency. The results are massive capital outflows, a sharp decline in the exchange rate (in a flexible exchange rate regime) or an outflow of reserves (in a fixed exchange rate regime) along with other potential negative economic and social effects (Allen et al., 2002, p. 5).

2.2 Concept of the Balance Sheet Approach

2.2.1 The Balance Sheet Approach – A Third-Generation Model for Explaining Currency Crises

Economics literature provides three model theory-based approaches for the explanation of currency crises:

Until the mid-1990s, the standard *first-generation model* explained currency crises as a consequence of monetized fiscal deficits leading to losses in currency reserves and eventually to an abandonment of the exchange rate peg (Krugman, 1979; Flood and Garber, 1984).

Second-generation models were developed after the European Monetary System's exchange rate mechanism crisis in 1992 and the Mexican crisis of 1994 to 1995. These models were based on fundamental weaknesses (e.g. an overvalued currency, an unsustainable current account deficit), but for the first time they also included the potential consequences of maturity and currency mismatches on the balance sheet (Obstfeld, 1994; Drazen and Masson, 1994, etc.).

Third-generation models were developed on the basis of experience from the Asian crisis of 1997 to 1998, in which weaknesses in the private sector played a more important role than fiscal imbalances. These models are based explicitly on the analysis of financial balance sheets. They point out additional vulnerabilities in the financial and corporate sectors as causes of currency crises and show that currency crises often bring about banking crises (twin crises) (Kaminsky et al., 1997; Calvo, 1998; Kaminsky, 1999; Krugman, 1999; Dornbusch, 2001, etc.) (IMF, 2003, pp. 3–4).

2.2.2 The Balance Sheet Approach – A Stock Concept

The IMF's traditional *financial programming* approach basically builds on the examination of *flow variables* such as the current account or capital account. Those analyses focus on the gradual accumulation of unsustainable deficits in the respective areas.

While the traditional analysis of financial crises relies on the examination of flow variables over a certain period of time, the BSA focuses on examining *stock variables* on a country's financial balance sheet and on the balance sheets of key sectors (i.e. their assets and liabilities) at a certain point in time. Therefore, the BSA constitutes an enhancement and extension of the set of instruments available for analyzing capital account crises. Especially in the wake of the capital account crises of the 1990s, academics and policymakers are now attributing greater importance to the continued development of these tools (IMF, 2003, pp. 1–2).

2.2.3 Compiling a Country's Intersectoral Balance Sheet by Consolidating its Sectoral Financial Balance Sheets

In the BSA, an economy is analyzed as a *system of sectoral balance sheets*, with a distinction being made between the following sectors:

1. Government sector (including the central bank);
2. Financial sector (mainly banks);
3. Nonfinancial sector (corporations and households);
4. External sector (nonresidents, i.e. rest of the world).

The first three sectors listed above each have claims and receivables vis-à-vis one another and the rest of the world.

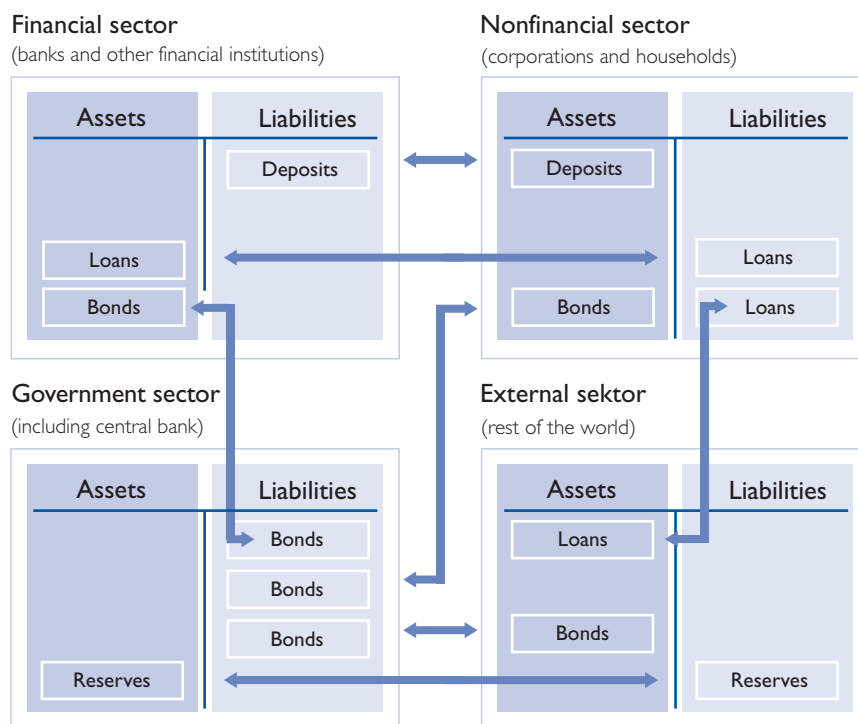
When the first three sectoral balance sheets are consolidated to yield a country's aggregate balance sheet, the assets and liabilities held by residents are netted out, and what remains is the external balance sheet

vis-à-vis the rest of the world (i.e. nonresidents).

Chart 1 gives a simplified overview of the system of sectoral and aggregate balance sheets; nonfinancial assets and liabilities are omitted.

Chart 1

Sectoral Financial Balance Sheets and Their Main Interlinkages



Source: Rosenberg, 2003.

A country's aggregate financial balance sheet can reveal the potential extent of its vulnerability to changes in external financial flows, but it is rarely suited for examining the causes behind such changes. *Sectoral financial balance sheets provide important information* which is not visible in the aggregate financial balance sheet. One conspicuous example is foreign currency-denominated debt between residents, which is netted out in the aggregate balance sheet. Weaknesses in a sectoral balance sheet can contribute to the development of a nationwide balance of payments crisis without even appearing on a country's aggregate balance sheet.

The risk of problems in one sector spilling over into other healthy sectors is exacerbated in countries which have liberalized their capital flows if external investors only take country risk into account and do not necessarily differentiate between sectors (Allen et al., 2002, pp. 13–15).

2.2.4 Four Types of Risk in the Analysis of Financial Balance Sheet Mismatches

The four most important risk types included in the analysis of balance sheet mismatches are as follows:

- *Maturity mismatch risk*
This type of risk typically arises when *assets are long-term* and

mainly illiquid, while *liabilities are short-term*. Maturity mismatches create *rollover risk*, that is the risk that it will not be possible to refinance maturing debts and that debtors will have to meet their obligations with liquid assets. Mismatched maturities also constitute an *interest rate risk* for the debtor, that is the risk that the level and/or structure of interest rates on the outstanding debt will change. Maturity mismatches can arise in both domestic and foreign currency.

For example, debtors may have short-term liabilities in foreign currency which exceed their short-term liquid assets in foreign currency, even though their total assets in foreign currency are equal to their total liabilities in foreign currency.

This risk has consistently played a key role in recent financial crises. Maturity mismatches in foreign currencies often led to a rollover crisis because short-term liabilities in foreign currency exceeded liquid assets. In some countries, financial pressure arose due to short-term government debt (e.g. Mexico, Russia, Turkey, Argentina), while in other countries (e.g. Korea, Thailand, Brazil) it was triggered by the short-term liabilities of the banking system. In other cases, (e.g. Russia, Turkey, Brazil, Argentina), short-term interest rates on government debt rose substantially even before the financial crisis struck.

– *Currency mismatch risk*

This risk arises when assets and liabilities are denominated in different currencies. If *assets are held in domestic currency but liabilities*

are denominated in foreign currency, substantial losses may result if the domestic currency depreciates sharply in an exchange rate shock. Currency mismatches tend to be more prevalent in emerging markets than in mature market economies. This is because financial intermediaries in emerging markets are often unable to borrow long-term capital in local currency domestically. As a result, it is often only possible to obtain capital for investment purposes by assuming currency risk. Hedging this currency exposure domestically merely transfers it to another sector within the country. If, for example, banks in an emerging market economy take on liabilities in U.S. dollars, a currency risk results. If the banks pass those liabilities on to corporations in the form of U.S. dollar-denominated loans, the banks' currency exposure declines again, while that of the corporations increases. If the corporations are not major net exporters, the risk that they will not be able to repay their foreign-denominated liabilities increases as well.

Currency mismatches can also trigger capital flows, which in turn create pressure on a country's currency reserves.

This risk has also played a significant role in nearly all recent crises. Currency mismatches were very pronounced in the government sector (e.g. in Mexico, Brazil, Argentina), in the banking sector (e.g. in Korea, Thailand, Indonesia, Brazil) and in the corporate and household sector (e.g. in Korea, Thailand, Indonesia, Turkey, Argentina, Brazil).

- *Capital structure mismatch risk*
This risk results from *excessive reliance on debt financing instead of equity*. The absence of an “equity buffer” can lead to a financial crisis when a sector encounters a shock. While profits slacken in economically bad times, interest payments on debt generally remain unchanged. Excessive debt financing is usually accompanied by excessive short-term borrowing, and thus not only leads to capital structure mismatches but also to maturity mismatches. The reasons for excessive debt financing can include poor corporate governance as well as tax and regulatory distortions.

In this context, Korea and Thailand can be mentioned as examples of countries in which excessive debt financing has been a factor. The Korean government imposed severe restrictions on foreign direct investment until 1997 and encouraged inflows of external capital in the form of debt. In Thailand, the tax regime favored corporate debt over equity financing. The resulting *debt-to-equity ratio* in each country's corporate sector was therefore very high at the onset of the crisis (1997: Korea, 320%; Thailand, 200%; as compared to USA, 110%). In addition, the capital structure of the banking and financial sector was also poorly balanced, as banks and financial institutions were undercapitalized. In many crisis countries, the banks were leveraged excessively and often showed capital adequacy indicators far below international standards. Therefore, when liquidity and currency shocks hit the financial institutions' balance

sheets, the “equity buffer” was not sufficient to absorb them.

- *Solvency risk*
This risk emerges when a sector's financial assets no longer cover its financial liabilities. *Solvency risk* is closely linked to maturity mismatch risk, currency mismatch risk and capital structure mismatch risk. These three types of risk can all increase the risk of insolvency in the wake of a negative shock.

The concept of solvency is easy to explain for private sector balance sheets: A private firm can be considered solvent when its financial assets exceed its financial liabilities. The government sector is considered to have sufficient cover when the present value of all future revenues (mainly taxes) is higher than the current stock of net government debt on its sectoral balance sheet. Likewise, a country as a whole will remain solvent as long as the present value of all future current account balances is higher than the current stock of net external debt.

In order to assess solvency, government debt is often compared to flow figures such as gross domestic product (GDP) or government revenues, and a country's aggregate debt is usually compared to GDP or exports.

Solvency risk varied widely in the countries most recently affected by crises. In Mexico, Korea and Thailand, the government appeared to be solvent despite some macroeconomic, structural and financial weaknesses. In other cases, high ratios of debt to GDP and/or government revenues already signaled the risk of a government liquidity and/or solvency crisis. In many

other cases (and especially in Russia and Argentina), stable exchange rates prior to the crises improved the ratio of foreign currency debt to GDP. Once the crisis had erupted, however, drastic declines in exchange rates gave rise to a sharp increase in government debt relative to GDP. In some cases, this shock was further amplified by the high fiscal costs of recapitalizing domestic banks (and, indirectly, the cash-strapped corporate sector), by a drastic increase in real interest rates and by a slump in economic growth.

All of the risk types discussed above are closely interrelated and can generate *credit risk*, that is the risk that debtors will no longer be able to repay their debts. Solvency risk for the debtor is equivalent to credit risk for the creditor. Due to its specific functions, the banking system is especially susceptible to credit risk, which itself can lead to a run on deposits. On the other hand, solvency problems in another sector can also trigger a run on the banks and thus quickly bring about payment difficulties in the economy as a whole.

In its analyses, the IMF examines whether the risks mentioned above are found on the financial balance sheets of the main sectors of the economy in question and how such problems in one sector might spill over into other sectors, possibly causing a balance of payments crisis. However, balance sheet weaknesses can persist for years without triggering a crisis as long as investor confidence remains unbroken (Allen et al., 2002, pp. 15–20).

2.2.5 Potential Course of a Financial Crisis in an Economy with Sectoral Balance Sheet Mismatches

An economy which shows mismatches on its sectoral financial balance sheets (i.e. those of the government, banks, corporations and households) will tend to be more vulnerable to financial as well as real economic shocks.

A financial crisis in an economy with sectoral financial imbalances typically takes the following course:

Shocks (e.g. a plunge in demand or prices for an important export product, deterioration of government revenues or corporate earnings, or worse-than-expected economic data) can trigger a *loss of confidence* in the economy.

This can affect a country's capital flows, in particular bringing about capital outflows (especially portfolio investment but also foreign direct investment), which in turn put pressure on the exchange rate. In the case of a managed float or an exchange rate peg, the country's government will attempt to stabilize its exchange rate, usually by raising interest rates.

This loss of confidence can trigger three effects:

- *Rollover shock*, that is banks will demand repayment of their claims.
- An *exchange rate shock*, that is corporations which have foreign-denominated liabilities and earn the bulk of their revenues in domestic currency will have to make higher capital repayments on their foreign-denominated liabilities.
- An *interest rate shock*, that is refinancing costs will rise along with interest rates.

These three effects have implications for the overall economy. In the case of financial mismatches on a sec-

toral balance sheet, the problems can spill over into other sectors and snowball very quickly.

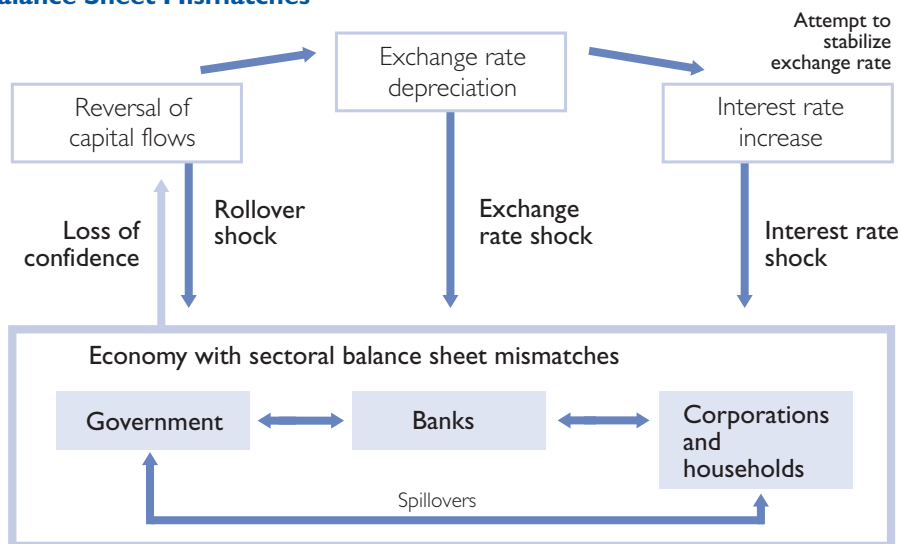
- Corporations and households experience economic problems, which in turn affect
- banks. When the banks find themselves in a problem situation, they turn to the
- ministry of finance or the central bank (due to guarantees, contingent liabilities, etc.).

Once the entire country ends up with a financing problem, corporations and households have to provide financing (e.g. by means of tax increases and interest rate hikes).

Mismatches on a country's aggregate balance sheet or sectoral balance sheets can lead to a loss of confidence, thus triggering the course of events and effects described above. If the loss of confidence is caused by exogenous factors, any existing sectoral imbalances can exacerbate these effects.

Chart 2

Course of a Financial Crisis in an Economy with Sectoral Balance Sheet Mismatches



Source: Rosenberg, 2003.

2.2.6 Characteristics of Financial Crises under the Balance Sheet Approach

The following *characteristics of financial crises* can be derived from the IMF's experience in recent years:

- *Exchange rate pegs* have played an important role in recent financial crises. In each balance of payments crisis in the 1990s, the countries in question maintained some form of exchange rate peg. In many cases, the nominal stability of the exchange rate led to a real appre-

ciation of the local currency, which reduced the real costs of foreign currency borrowing. In effect, this strategy led to an *accumulation of severe currency mismatches*. By contrast, countries with *floating exchange rate regimes* were often better equipped to withstand external shocks.

- *Sectoral financial balance sheet problems spilled over into other sectors and snowballed*, with the banking sector often playing a key role in the transmission proc-

ess. In all cases, sectoral financial balance sheet problems led to *twin crises*, that is currency and banking crises. The depreciation of the currency weakened the financial asset side of the banks' balance sheet, even in cases where the banking sector was formally matched in terms of currencies at the onset of the crisis. The appreciation of the foreign currency led to an increase in credit defaults, while foreign-denominated liabilities persisted.

- Problems on both the sectoral and aggregate financial balance sheets of a country showed the potential of developing into *balance of payments crises*.
- *Weaknesses in the private sector's financial balance sheet* often brought about problems in the banking sector due to implicit and explicit guarantees provided by the banks and *ultimately encumbered the government sector's financial balance sheet* due to contingent liabilities. In Indonesia, for example, these liabilities amounted to 50% of GDP in 1997.
- *Sectoral financial balance sheet problems led to a more severe slowdown in economic growth than expected*. Corporate expenditure cuts as well as the required restrictions on bank lending exceeded the immediate positive effect on competitiveness triggered by the depreciation of the domestic currency.
- *It was difficult to determine the scale of external financing needs* because information on the size and maturity of financial assets and liabilities was incomplete (or completely missing) on the balance sheets of banks and especially of the private sector. Moreover,

the rollover rate and the extent of the exchange rate adjustment could not have been anticipated. *Short-term external financing needs can be extremely high*; in 1997, they reached 43% of GDP in Indonesia and 31% of GDP in Thailand (Allen et al., 2002, pp. 20–23; IMF, 2003, pp.3–5).

2.3 Objectives of the Balance Sheet Approach

2.3.1 Crisis Prevention Objectives

Financial crises and subsequent balance of payments crises do not arise by pure coincidence. As long as a country's aggregate and sectoral financial balance sheets do not show severe mismatches, economic entities in the country can borrow in order to sustain imports (and thus consumption and investment), for example. However, persistent deficits can translate into balance sheet problems. Therefore, one important objective of the IMF is to *develop the data sources* necessary to create transparency regarding financial asset and liability positions and in order to monitor them effectively.

Information about sectoral financial balance sheets is very useful when it is available in due time, as it enables policymakers to *identify and correct weaknesses before these trigger financial difficulties*. In practice, however, this information is often only available in part or with significant time lags, meaning that its utility is frequently limited to ex post analysis.

In addition to the development of data sources necessary for monitoring, government economic policies in emerging market economies can also have a significant influence on the strength of their national balance sheets.

Information about sectoral financial balance sheets can also be useful in evaluating the tradeoffs between various economic policy goals; such tradeoffs arise as soon as sectoral problems spill over into other sectors and thus pose a systemic danger to the economic and financial system. Finally, the BSA makes it possible to assess whether and to what extent financial intervention by the government is warranted.

The BSA thus focuses on *measures to reduce sectoral financial vulnerabilities* (especially those which are affected by changes in key financial variables), specifically:

- First, sound debt management in the public sector (a reasonable level of public debt, insulation of liabilities against shocks, a gradual shift from foreign currency-denominated liabilities to long-term debt in local currency, limitation of contingent liabilities).
- Second, the creation of incentives for the private sector to limit its exposure to balance sheet risks (mismatches), especially the explosive combination of currency and maturity mismatches, by means of sufficient equity buffering and hedging.
- Third, the need to maintain sufficient foreign currency reserves (as exchange rate risk is largely not covered in emerging markets with high levels of foreign currency-denominated debt (i.e. high liability dollarization); Allen et al., 2002, pp. 24–29, and IMF, 2003, pp. 5–6).

2.3.2 Crisis Resolution Objectives

The BSA not only provides guidance in estimating a country's vulnerability and in preventing crises through suitable economic policy measures, it also

serves to support crisis resolution once a financial crisis has erupted. Specifically, it is useful in determining the required economic policy measures and external financing needs.

Common *economic policy measures for crisis resolution* include exchange rate policy, monetary policy, capital outflow controls and fiscal policy. These instruments not only serve to address specific macroeconomic and structural problems, they are also intended to renew confidence in the economy in order to prevent a broader financial crisis.

If financial imbalances in the sectoral balance sheets can be offset before they spill over into other sectors, it is possible to avoid a larger financial and economic crisis. The BSA can help determine when *official external financing* is warranted. Balance sheet problems in private firms tend to pose less risk of spilling over into other sectors and leading to a broader crisis. However, there are cases in which the need to resolve a financial crisis in the private sector justifies intervention on the part of the national government in order to prevent the crisis from spilling over into other areas of the economy (e.g. the banking sector). By contrast, financial problems in the government sector usually harbor a high risk of triggering a broader financial crisis, as government debt is often the banking sector's most important financial asset. The BSA can also help in assessing sectoral demand for foreign currency liquidity, although the calculation of financing needs should not prejudice the appropriate level of IMF support. However, the BSA provides a series of tests which enable policymakers to judge how strong the case for official external financing is.

In general, official financing is best suited for financing needs created by maturity mismatches. It is then possible to make additional capital available, either in foreign currency (in the form of preferred IMF loans) or in local currency through expansive monetary policy measures. The other imbalances (currency mismatch, capital structure mismatch and solvency risk) cannot be alleviated by official external financing measures. By definition, external capital inflows will augment a country's external debt in foreign currency and thus also

exacerbate currency mismatches or shift them from one sector to another. Official external financing would only improve poor capital structure matching if it were extended as a grant. In practice, however, official financing for emerging market economies is almost always provided in the form of low-interest loans. Additional loans do not help either in cases where a country requires substantial debt restructuring in order to regain its solvency and to be able to service its debts sustainably (Allen et al., pp. 29–41).

Practical Application of the Balance Sheet Approach

by the IMF – Case Study: Thailand

The information necessary for crisis prevention and resolution can be presented in a matrix of a country's intersectoral financial assets and liabilities which highlights intersectoral financial linkages as well as currency and maturity mismatches.¹

The example below analyzes Thailand's sectoral financial balance sheets at the outset of its 1997 crisis and illustrates the scope for and severe limitations of forecasting external financing gaps. Thailand was selected as an example for various reasons: First, Thailand's crisis is better documented statistically compared to other countries. Second, the financial crisis originated in the private sector, which made sectoral analysis especially useful. Finally, the size of capital account adjustment and the scale of potential financing needs were substantially underestimated; in fact the IMF's projection error in the case of Thailand was by far the largest among all crisis countries.

If we look at Thailand's intersectoral financial assets and liabilities as of the end of 1996, we can see the existing stock positions and the related financial vulnerabilities which continued to accumulate through the end of June 1997 and led to the financial crisis starting on July 2, 1997, when the baht was floated. The financial balance sheet only helps to highlight the vulnerabilities themselves, not to reveal the causes behind these weaknesses (in Thailand's case, the quality of investments). In Thailand, the weaknesses were the high short-term foreign-denominated liabilities of banks (nearly USD 29 billion in 1996) and of the nonfinancial sector, that is, corporations and households (almost USD 19 billion in 1996), making for a total of some USD 48 billion in short-term foreign currency debt. On the assets side, the Bank of Thailand (BOT) held almost USD 39 billion in foreign currency reserves, thus showing a potential financing gap of some USD 10 billion.

The sectoral financial balance sheet for commercial banks showed extremely severe maturity and currency mismatches. Under the pessimistic assumption that no short-term debt would be rolled over and in light of its liquid assets in foreign currency (USD 2.6 billion), the banking sector showed a short-term financing need of USD 26 billion.

Although no information was available on the short-term assets held by the nonbank sector, we can assume that the balance sheet mismatches were even larger among corporations and households than in the case of banks. Any calculation of an external financing gap is highly sensitive to behavioral assumptions, in particular the willingness to roll over short-term debt. Aside from possible financing gaps, the matrix also shows a capital structure mismatch in the nonfinancial private sector. A comparison of the private sector's total liabilities (approximately USD 269 billion) and its equity (approximately USD 137 billion) implies a debt-to-equity ratio of almost 200% as of the end of 1996. Ultimately, it was possible to detect a significant level of solvency risk at the aggregate country level,

as the external foreign-denominated debt of the private and public sectors came to a total external debt of USD 115 billion, that is, more than 60% of GDP and over 200% of exports (Allen et al., 2002, pp. 50–59).

The Thai example shows that a country can have extremely high external financing needs if it has a large stock of short-term liabilities in foreign currency which cannot be refinanced.

¹ See Allen et al., 2002, p. 44. The liabilities in each line are divided among the columns depending on which sector used the relevant instrument. As the liabilities are already consolidated data, the matrix diagonal (representing intrasectoral liabilities, e.g. the level of the financial sector's liabilities to the financial sector) is blank.

In practice, the lack of data in many IMF member countries poses an obstacle to the complete numerical application of the BSA. The reasons for this are the lack of resources for data preparation and misgivings with regard to data confidentiality. In the future, such information should be more readily available as soon as more countries subscribe to the Special Data Dissemination Standard (SDDS) for the worldwide collection and preparation of economic indicators. Some of the data can be derived from other sources, for example national authorities, the country pages in the IMF's monthly International Financial Statistics (IFS), and the international banking statistics published by the Bank for International Settlements (BIS). IFS and BIS data provide information on the assets and liabilities of the public sector and on the aggregate external debt of a country. However, information on the residual maturity of individual sectors' external liabilities as well as data on financial assets and liabilities in the nonfinancial private sector (including corporations) are generally scarce.

Matrix of Thailand's Intersectoral Assets and Liabilities

(End of December 1996)

USD million (1 USD = 25,6 baht)

Debtor	Creditor				Total
	General government and central bank (BOT)	Commercial banks	Nonbank sector	Rest of the world	
General government and central bank (BOT)					
Domestic currency		2,394.0	11,885.0		14,279.0
Total other liabilities		5,555.0		5,152.0	10,707.0
a) short-term		3,616.0		34.0	3,650.0
in foreign currency					
in domestic currency		3,616.0			
b) medium and long-term		1,939.0		5,118.0	7,057.0
in foreign currency					
in domestic currency		1,939.0			
Commercial banks (incl. BIBF)					
Total liabilities	10,327.0		139,299.0	48,790.0	198,417.0
a) deposits and other short-term liabilities	9,366.0		131,866.0	28,858.0	170,090.0
in foreign currency			448.2	28,189.0	28,637.0
in domestic currency	9,366.0		131,417.0	669.0	141,453.0
b) medium and long-term	961.0		7,434.0	19,932.0	28,327.0
in foreign currency					
in domestic currency			7,433.7		
Equity (capital)					23,439.0
Nonbank sector					
Total liabilities		206,715.0		61,701.0	268,416.0
a) short-term				18,831.0	18,831.0
in foreign currency				18,831.0	
in domestic currency		555.2			
b) medium and long-term				42,870.0	42,870.0
in foreign currency		31,542.0		42,870.0	42,870.0
in domestic currency					
Equity (capital)				4,745.0	136,252.0
Rest of the world					
Total liabilities	38,694.0	7,029.0			45,723.0
Currency and short-term liabilities	38,694.0	2,580.0			41,274.0
Medium and long-term liabilities		4,449.0			4,449.0
Equity (capital)			481.0		

Source: Allen et al., 2002, p. 51.

BOT – Bank of Thailand, BIBF – Bangkok International Banking Facility.

3 Evaluation of the Balance Sheet Approach

3.1 General Remarks

The BSA is primarily useful for *emerging market economies*, as these have recently begun to issue foreign currency-denominated bonds on international capital markets, have experienced major financial crises in connection with the opening of capital markets in recent years and tend to be more susceptible to crises than mature market economies.

If the information contained in sectoral balance sheets is available in due time, it can allow economic policymakers to identify and correct weaknesses before these give rise to financial difficulties, provided the measures are politically and economically feasible. In practice, balance sheet data are often only available in part or with significant *time lags*, meaning that this instrument is mainly suited for *ex post* analysis. For example, Austria, like all other EU Member States, is required to provide Eurostat with its financial accounts data within six to twelve months, while some countries are exempt from this requirement. Due to these delays in data publication, this approach will at best make it possible to detect emerging structural problems.

3.2 Evaluation in Comparison to the 1995 European System of National Accounts (ESA 95)

In Austria, sectoral financial corporate balance sheet data can be derived from financial accounts data compiled in accordance with the *1995 European System of National Accounts* (ESA 95), which itself is based on the international System of National Accounts (SNA). In effect, the BSA constitutes a different type of financial accounts.

The BSA's *classification of currencies* as domestic and foreign is not provided for in the ESA 95, can only be calculated with considerable effort, and usually bears little significance in highly mature market economies such as Austria. The classification of currencies is mainly relevant in cases where capital only flows into a country in foreign currency (as is the case in emerging market economies, e.g. Thailand), and not in domestic currency as well (as is the case in countries belonging to a currency zone, e.g. Austria).

For those countries which belong to a *monetary union* (e.g. the euro area), the currency question is entirely different than for a country with its own currency, as the bulk of their financial claims and liabilities are denominated in this common currency. However, foreign currency-denominated debt (i.e. debt which is not denominated in the common currency) still poses an individual currency risk. Therefore, it is not the national currency reserves indicated on the balance sheet which are relevant in the case of a financial crisis, but rather the total currency reserves of the entire monetary union.

Moreover, the BSA only includes *consolidated data*, which means that intrasectoral claims and liabilities are netted out among the various sectors of the economy. The IMF approach only makes it possible to detect structural shifts over time, as actual transactions cannot be derived. The table values show net stocks and net year-on-year changes therein, that is, the values include exchange rate fluctuations, reclassifications, inflows and outflows. Accordingly, the IMF approach contributes little to revealing the causes of vulnerabilities in a

country, but it does make it possible to detect the weaknesses themselves.

3.3 Applicability of the Balance Sheet Approach to Mature Market Economies

In principle, this approach can be applied to emerging markets as well as mature market economies.

While missing or insufficient data hamper the BSA's application in emerging markets, most of the countries in which financial accounts are obligatory (i.e. most mature market economies) can already provide data material which is nearly sufficient for the BSA. Thus the BSA can be applied as an additional analysis tool with a reasonable level of effort. The IMF considers it wise to apply the BSA to mature market economies as well, even if those countries are not subject to the same types of risk (e.g. rollover risk, foreign currency exposure in the corporate sector) as emerging markets.

3.4 Applicability of the Balance Sheet Approach in the IMF's Practical Work

In general, the IMF's view is that the BSA is a useful analytical tool for identifying currency mismatches and other vulnerabilities of an economy and its most important sectors as causes of financial crises and for the purpose of supporting the IMF in making economic policy recommendations.

For some time now, the approach has already been in use as a supplement to traditional flow-based analysis (IMF, 2004a, p. 1), and many of its elements are applied in the practical work of the IMF in (country) analyses, e.g. Article IV consultations, fiscal and external sustainability, liquidity and debt management, debt sustainability

analysis (DSA), quarterly external vulnerability exercise or the Financial Sector Assessment Program (FSAP).

The BSA already serves as a systematic framework for IMF supervision in mature market economies. For example, selected sectors were analyzed in the course of *Article IV consultations* in 2003. In the consultations for Australia, Ireland, the United Kingdom and the U.S.A., the IMF focused on potential changes in real estate prices and the implications for mortgage lending and household debt. The international linkages of the banking and insurance sector were examined in selected issues papers for Germany and Spain.

In the case of Austria, IMF staff scrutinized currency mismatches which had arisen due to rapidly increasing foreign-denominated loans to households.

Comprehensive intersectoral balance sheet analysis is highly data intensive; however, some countries (e.g. the United Kingdom) have already made great advances in this area. In Article IV consultations for selected emerging market economies (e.g. Thailand, Peru) the IMF has already integrated several sectors and their interlinkages into its balance sheet analysis.

In some cases, the *analysis of individual sectoral balance sheets*, in particular those of the financial sector, is useful for detecting weaknesses which could spill over into other sectors. For example, the IMF routinely applies the BSA to the financial sector in the course of FSAP reviews of individual countries and includes some sectoral data on corporations and households in stress tests. Some studies (e.g. for Ecuador, Uruguay) have examined fiscal policy on the basis of public-sector balance sheet analysis.

Article IV reports on some emerging market economies (e.g. Malaysia, Mexico, South Africa) have focused on the corporate sector (IMF, 2004a, p. 3). In the Global Financial Stability Report (GFSR), the IMF analyzed structural developments in selected sectors in mature market economies over a quarter as well as a longer period and aggregated these developments for the euro area (IMF, 2004b, pp. 64–66).

The IMF's *debt sustainability analysis (DSA)* examines the potential impact of shocks (e.g. changes in exchange rates, interest rates, etc.) on a country's debt level with regard to solvency.

The quarterly *external vulnerability exercise* quantifies potential short-term financing needs in the case of reduced rollover rates as well as the extent to which currency reserves may serve as liquidity buffers.

FSAP reviews reflect the conclusion that the banking sector's financial balance sheet plays a key role in a country's resilience to crises.

Efforts to integrate the BSA into the ongoing work of the IMF have been supported by statistical and transparency initiatives. The requirements of the *Special Data Dissemination Standard (SDDS)*, the *Coordinated Portfolio Investment Survey* and the new *Government Finance Statistics Manual (GFSM)* have improved the availability, accuracy and comparability of important balance sheet stock figures (IMF, 2003, pp. 6–7).

3.5 Future Use of the Balance Sheet Approach at the IMF

Recent experience with the practical application of the BSA has highlighted the paramount importance of high *data quality*. In emerging and mature market economies alike, the necessary

data are often not available (or not in the proper formats). The development of sound databases requires a great deal of time and effort on the part of a country's authorities and the IMF. Thus it will still take some time before the IMF can routinely integrate the BSA into its work.

The analysis of the corporate sector in particular is subject to practical limitations. The available data often only cover publicly listed corporations, that is a sub-group of firms which does not adequately reflect the complex vulnerabilities of this heterogeneous sector.

However, even an analysis which is confined to the banking and government sectors (where data are more readily accessible) can provide useful information on a country's vulnerability to shocks. As a caveat, however, it is necessary to note that partial analyses can provide a misleading picture of the risks to an economy.

The IMF plans to examine BSA data requirements thoroughly for the purposes of supervision and crisis resolution. In addition, the IMF is working together with the World Bank to develop a standardized quarterly statistical report on the external debt of countries subscribing to the SDDS. The coordinated compilation exercise for Financial Soundness Indicators (FSIs) will also be useful for BSA-related work (IMF, 2004a, pp. 4–5; IMF, 2003, pp. 8–9). The IMF will also include the BSA in the guidance note on the coverage of financial sector issues in Article IV consultations using the same macroprudential analysis framework employed in FSAPs. Finally, the IMF is planning broad-based outreach work on the topic of BSA with numerous analytical papers, publications and expert lectures (IMF 2004a, pp. 5–6).

4 Conclusions

In summary, the IMF's Balance Sheet Approach is an interesting new instrument for crisis detection, prevention and resolution.

For some time now, the IMF has been using the BSA as a complement to traditional flow-based analysis, and many BSA elements have already been applied in the IMF's practical work in country analyses, such as Financial Sector Assessment Programs (FSAPs), debt sustainability analyses (DSAs), quarterly external vulnerability exercises, etc. The IMF also uses the BSA as a supplementary analysis tool to examine selected sectors (e.g. the banking and corporate sectors) in Article IV consultations for mature market economies.

The IMF plans to enhance its work in this area by means of case studies on additional countries (in the course of

Article IV consultations), country comparisons of debt structures and relevant weaknesses, training seminars, etc.

The further integration of sectoral balance sheet analysis into IMF work can refine and reinforce existing instruments such as the DSA, vulnerability exercise, etc., by enabling the identification of existing weaknesses in those balance sheets. The systematic recording of sectoral weaknesses in an economy will allow the IMF to assess more precisely the type and amount of liquidity required as well as the need for IMF loans and any accompanying debt restructuring measures. However, due to incomplete data and the static nature of the approach, the BSA can only be regarded as a useful complement to the other IMF instruments (IMF, 2003, pp. 9–10).

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HIGHLIGHTS

Company Taxation in an Enlarged European Union

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The Oesterreichische Nationalbank (OeNB), the Austrian Institute of Economic Research (WIFO) and the University of Vienna organized a full-day workshop on “Capital Taxation after EU Enlargement,” which was hosted by the OeNB on January 21, 2005.

Matthias Roche (*Ernst&Young Frankfurt/Main*) opened the first session with a comprehensive overview of company tax systems and effective taxation in the ten new EU Member States. Since the accession of the ten new members in May 2005, transnational corporations have had to cope with 25 different systems of capital income taxation in the EU, and another two systems will be added in 2007, when Bulgaria and Romania are expected to join the EU. The statutory tax rates in the new Member States are on average lower than in the EU-15. However, not only the statutory tax rates, but also the national provisions for computing the taxable base are relevant for determining the effective tax burden on enterprises. The rules on computing taxable income of all new members allow for the depreciation of buildings and the amortization of intangibles and tangible fixed assets, whereas setting up contingency reserves and loss carryback are prohibited. Roche used a model investment project based on assumptions about the sources of finance and types of assets to calculate the effective average tax rates (EATRs) for a German parent company which operates a subsidiary in each of the new Member States: At 19.99 percentage points, the spread between the highest EATR (Malta: 32.81%) and the most attractive EATR (Lithuania: 12.82%) is very wide; the EU average stands at 19.61%. Compared with the EU-15, the EATRs in all new Member States except Malta are significantly lower. Tax incentives, such as reduced corporate income tax (CIT) rates (offered e.g. by Cyprus and Malta) or CIT re-

bates in special economic zones (e.g. in Latvia and Lithuania) still play an important role in the new Member States. In his conclusions, Roche pointed out that the new Member States offer a highly attractive tax environment.

Christian Bellak (*Vienna University of Economics and Business Administration*) and Markus Leibrecht (*OeNB*) presented preliminary results of their research project “Taxation and FDI in Central and East European Countries” (carried out in cooperation with Roman Römisch of the Vienna Institute for International Economic Studies – WIIW), in which they investigate the implications of company taxation for foreign direct investment (FDI). According to Bellak and Leibrecht, methodological differences are, among other things, responsible for the highly divergent outcomes of past empirical analyses closing in on the influence of the effective corporate tax burden on FDI flows. In addition, the DI tax rate elasticity is significantly higher in “core countries” than in “periphery countries.” To obtain valid empirical results on the interrelationship of these two factors, it is necessary to choose the appropriate computation method. First, multinational DI activity can be determined on the basis of financial measures (DI flows and stocks) or measures of real activity (corporate assets and investments in plant, property and equipment, gross product of affiliates, number of affiliates); many studies are based on DI flows since these data are more readily available. Second, the effective corporate tax burden can be measured with several indica-

tors (based on different methodological approaches): the statutory tax rate, backward looking effective tax rates and forward looking rates. EATRs impact on business location decisions; the relevant data for DI are bilateral EATRs, as they account for the tax provisions of the host country, international tax provisions (e.g. double taxation conventions) as well as the corporate tax provisions applicable in the home country of the parent company. The bilateral EATRs calculated by Bellak et al. for seven important home countries and five new EU members for the period 1996 to 2004 show that statutory tax rates are higher than domestic EATRs, the variabilities of statutory tax rates and domestic EATRs are within a similar range, and country rankings by statutory tax rates and domestic EATRs produce similar results. Bilateral EATRs are usually higher than the statutory CIT rates of the host country, which is also reflected in the country rankings by bilateral EATRs. Using the latter, instead of statutory tax rates, in the empirical determination of DI tax rate elasticity yields significantly higher (negative) tax elasticities for the five new EU Member States examined. The estimated tax rate elasticities are, however, likely to decrease when other business location factors (e.g. public infrastructure and agglomeration effects) are included.

In his summary of the pros and cons of the existing methodological approaches to computing the effective corporate tax burden, *Christian Beer (OeNB)* emphasized that individual tax burden indicators shed light on different aspects. According to him, the macro backward looking approach should be used to analyze the burden of different tax bases (e.g. capital

and labor) or to measure changes of the tax burden over time. The micro backward looking approach – while inappropriate for isolating the influence of the different corporate taxation systems – can be used to compute the effective corporate tax burden on enterprises of different sizes and sectors. *Beer* maintains that the micro forward looking approach neglects key elements of the tax systems and is based on – often rather arbitrarily chosen – restrictive assumptions.

Otto Farny (Vienna Chamber of Labor) pointed out that the micro forward looking approach to computing effective tax rates, which is based on model investment projects and the respective tax laws, disregards the fact that the difference between the notional and the actual tax burden may be significant (especially in the new EU Member States); the backward looking approach, on the other hand, uses the actual tax payments.

He furthermore criticized stylizing the corporate tax burden as the key determinant of business location and investment decisions and called for further empirical analyses of the influence of wage-based taxes and charges on DI.

Session 2 revolved around two central aspects of corporate and capital taxation.

In his presentation “(Why) Do we need corporate taxes,” *Alfons Weichenrieder (University of Frankfurt)* questioned the need for corporate taxation and underscored the relevance of this issue for small open economies. Tax theory suggests that, under specific conditions, the optimal solution for small open economies would be not to tax capital income. Despite an international trend in recent years to lower CIT rates, the GDP share of CIT revenues

remained relatively stable owing to an increase in the number of incorporated enterprises and to tax base broadenings coupled with the tax rate reductions. International comparisons show that EATRs (which constitute an important factor in the competition of business locations) were lowered to a considerable extent during the last decades. Against this backdrop, it is interesting to examine whether the erosion of corporate taxes has any alarming economic or fiscal effects at all. Analyzing the arguments given in the corporate finance literature in favor of the separate taxation of incorporated companies, Weichenrieder arrived at the conclusion that neither the classic argument of a benefit tax, i.e. a “quasi fee” for the use of the public infrastructure, nor the argument of a fee for the privilege of the shareholders’ limited liability (and limited risk) sufficiently justify the separate taxation of incorporated enterprises. The argument that CIT can be used as a way to tax foreigners in a system of liberalized capital transactions is only valid on condition that the home country has a tax credit system in place for taxes paid in the source country. If, on the other hand, CIT is regarded as a prepayment of the personal income tax (PIT), precautions have to be taken to avoid double taxation, e.g. by introducing a shareholder tax or applying a full imputation system of corporate taxes with respect to the shareholders’ PIT (with the latter solution leading to approximative results). However, full imputation systems usually apply only to resident taxpayers and there is no imputation system for cross-border dividends arising from tax burdens. If PIT on capital income is desired, a positive CIT rate is essen-

tial according to Weichenrieder. In this scenario, CIT is supposed to function as a “backstop” to prevent shareholders from escaping capital income taxation via profit retention and to reduce the attraction of declaring labor income as capital income. However, if CIT is more favorable than PIT, taxpayers will try to save money via the corporate shelter, especially if capital gains are not subject to taxation during the retention period. Weichenrieder pointed out that the most important function of the corporate income tax is to make sure that the capital income of natural persons remains taxable at all. Empirical evidence suggests that a reduction of the CIT rate below the PIT rate level results in a tax-induced shift of savings from private households to enterprises.

Christian Keuschnigg (University of St. Gallen) focused on the interrelations of capital income taxation and long-term economic growth on the basis of his complex proposal for a capital taxation reform in Switzerland (in cooperation with Soren Bo Nielsen und M. D. Dietz). This approach essentially aims to eliminate tax-induced distortions of investment and saving decisions by combining a specific variant of the dual income tax (as implemented in northern Europe) with a change in the taxation of equity. In his proposal, Keuschnigg recommends reducing the double taxation of dividends while at the same time introducing effective taxation of capital gains with a view to reducing tax-induced distortions adversely affecting investment demand (and thus also the accumulation of capital) and tax-induced distortions concerning the choice of both organizational form and type of financing. In addition to the CIT reform, he advocates leveling

the tax burden on all types of capital income at the personal level by introducing a uniform proportional tax. He claims that this will in all probability not cause any tax-induced distortions to private investors' behavior and will furthermore result in comparable tax burdens on enterprises independent of their organizational form (equal treatment of equity and debt with respect to the CIT assessment base). In this scenario, only company rents and excess profits would be subject to taxation which constitutes a reduction of the average tax burden on enterprises and would, in turn, improve the competitive position of Switzerland as EATRs play a key role in multinational enterprises' choice of business locations. The comparatively low proportional capital income tax as proposed by Keuschnigg (which would cut the current tax burden on interest and dividend income approximately by half) is designed to mitigate the effects of the double taxation of savings. At the same time, a more effective taxation of capital income would eliminate a tax loophole that exists in almost all countries and makes retentions profitable (lock-in effect). If the tax rate is chosen accordingly, it will not encourage entrepreneurs to record labor income as capital income (tax arbitrage). According to Keuschnigg, the implementation of this reform proposal (computed on the basis of a calibrated growth model) would translate into permanent GDP growth by approximately 2% to 3%. The resulting drop in tax revenues could be canceled out with a higher VAT on the one hand, and with spending cuts or a temporarily higher debt ratio on the other hand. The first option would entail considerable short-term costs because of distortions to the labor market, and

the second (debt-financed) option would somewhat dampen the implied long-term growth effects.

In his presentation, Keuschnigg also touched on the taxation of venture capital (VC)-funded startups. Challenging the current practice of subsidizing them, he claimed that levying taxes on startups might have a positive impact on their quality, i.e. net worth. The resulting tax receipts should be used to compensate for tax losses arising from the tax reduction on capital gains of VC-funded enterprises. Curbing not performance-related subsidies and favoring successful startups is supposed to contribute to a more active style of VC financing.

Anton Rainer (Austrian Federal Ministry of Finance) argued that the significance of corporate taxes, and especially their role in business location decisions, is generally overestimated. Besides, he questioned the results of Keuschnigg's study challenging the relevance of the assumptions implied by dynamic equilibrium models since such models underlying such (quantitative) analyses.

Alex Stomper (Vienna Institute for Advanced Studies) emphasized the impact of the perspective (corporate finance versus tax theory or macroeconomics) on the approach to analyzing the company tax issue. He, too, questions the practice of deducing findings from equilibrium models given their numerous simplifying assumptions (such as perfect competition) and because they fail to address several issues. He argues that Keuschnigg's proposal of levying taxes on VC-backed startups as an incentive (instead of subsidizing them) would discourage entrepreneurs and translate into fewer business startups. Introducing imperfect competition and

imperfect markets might have an impact on the results of model computations. Furthermore, there is no conclusive evidence to substantiate the assumption that a tax reform actually strengthens the equity base of nonincorporated firms, and Stomper voiced doubts about the wisdom of embarking on a comprehensive tax reform when its outcome is so uncertain. He pointed out that the analyses are based on highly simplified assumptions of the financing structure (pure debt or equity financing). In his view, it is most important to find out which financing alternatives are available to a certain type of company in imperfect capital markets and which financing structure serves it best, as well as to determine the impact of the various types of funding on investment decisions and the influence of tax provisions on the various financing alternatives.

The leading question for the third session was whether the tax policies in an economically integrated area should be coordinated or left to the discretion of national governments. In the EU, this question is particularly relevant for direct taxes since indirect taxes are, by and large, already harmonized.

Bernd Genser (University of Konstanz) outlined the achievements and failures of the EU in harmonizing corporate taxation. During the past four decades, the EU commissioned a series of reports on the harmonization of CIT, with the aim of leveling the playing field within the Common Market, abolishing discriminatory tax practices, and avoiding fiscal externalities. None of the blueprints included in these reports was ever implemented. Genser stressed that this must not be interpreted as a failure of coordination policies, since numer-

ous issues tackled in these reports were actually incorporated into the relevant EU provisions, e.g. the Parent-Subsidiary Directive (1990), the Merger Directive (1990) and the Code of Conduct (1997). Nevertheless, several key issues have yet to be resolved. A case in point are the highly heterogeneous statutory and effective marginal and average CIT rates across Europe, which generates distortions in the allocation of capital and creates misplaced incentives for national governments to use their tax instruments in a strategic manner. Some of these problems are addressed in the Bolkestein Report of 2001, which proposes various approaches to harmonizing the CIT base for EU-wide operations of multinationals in combination with an allocation system for the distribution of the tax revenues among the EU Member States. While leaving tax autonomy to the national governments, the proposal aims at substantially reducing compliance costs, eliminating incentives for cross-border profit shifting, implementing capital export neutrality, and crowding out many incentives for unfair or strategic tax practices. However, as Genser pointed out, the Bolkestein proposals give rise to new problems: the Member States need to agree on a reasonable allocation key, the system might produce negative fiscal externalities, and the issue of non-EU activities has not been addressed at all. However, the Bolkestein proposals deserve credit for demonstrating that CIT harmonization is not necessarily accompanied by the loss of national tax autonomy; it allows for various ways of CIT/PIT integration along national tax traditions.

Lars Feld (University of Marburg) discussed the issue of tax competition within the Common Market, where

companies can choose to locate mobile factors in the country offering the most attractive package of tax rules and public services. This fact invariably leads to competition among the EU Member States. According to the Tiebout hypothesis, such a “voting by feet” would serve as an incentive to improve the efficiency of public services. Unfortunately, Feld argues, this effect is of academic value only since externalities between the countries render decentralized tax policies inefficient. Moreover, public services are in many ways not comparable with “normal” goods (non-rivalry in consumption, decreasing average production costs, etc.). Even if a Tiebout world led to increased efficiency, it would still be incompatible with the large-scale redistribution policies of the European welfare states. All these aspects cast doubt on the viability or desirability of tax competition. On the other hand, tax competition may appear attractive from a political-economy perspective: the potential abusive behavior of politicians and governments (e.g. failing to implement welfare-enhancing policies, acting as selfish rent-seeking agents) will be limited by taxpayer mobility. Under the pressure of yardstick competition in an open economy, best-practice solutions and political reforms might be adopted more quickly and effectively. Hence, there is no conclusive evidence in favor of or against tax competition from a theoretical perspective. Therefore, Feld compares the actual performance of decentralized and centralized tax policies and summarizes his insights (gained by reviewing numerous empirical studies) as follows: there is sufficient evidence to substantiate that fiscal competition enhances economic efficiency; the assumption that decentralization will

lead to a collapse of the welfare state and put an end to redistribution policies was not sustained. The impact of fiscal decentralization on economic growth is unclear. Finally, some – if still unsystematic – evidence suggests that fiscal decentralization will lead to more political innovation and higher citizen satisfaction. On the basis of these observations, Feld concluded that fiscal competition, if appropriately controlled by political procedures, has some advantages over harmonization.

The discussants basically agreed with Genser’s and Feld’s analyses but added some qualifications.

Martin Zagler (Vienna University of Economics and Business Administration) questioned whether tax competition is (or will ever be) compatible with the welfare state concept. He argued that harmonized taxes may simply shift intergovernmental competition to other areas, such as public expenditures.

Daniele Franco (Banca d’Italia) warned not to take political-economy arguments in favor of tax competition too seriously since democratic systems had a range of built-in mechanisms apart from tax competition to control government opportunism. He advocated a gradual approach to the design of new tax systems as the benefits and costs of neither tax competition nor tax coordination were certain or quantifiable at this point.

In his presentation “The Future of Capital Income Taxation in the European Union,” *Sjibren Cnossen (University of Maastricht)* gave an overview of current tax practices and focused on the question if (and how) capital income should be taxed in the future. Levying taxes on economic rents is commonly accepted as justified. The question if (and to what extent) taxes

should be levied on normal yields hinges on efficiency, equity and enforcement issues. Cnossen specifies three relevant models apart from the existing capital income taxation systems: the dual income tax model, the comprehensive business income tax model and a net wealth tax. The existing CIT systems are characterized by the trend of levying higher taxes on labor income than on capital income and of tax discrimination against dividend payouts in favor of debt financing. Cnossen recommends the introduction of a dual income tax system that includes comprehensive withholding taxes on interest income and the approximation of capital income tax rates, but voices doubt over the tax harmonization plans currently under discussion in the EU, especially with regard to the introduction of a common tax base and a harmonized European corporate tax system. In his view, tax coordination is indispensable for effective capital income taxation, but he also underscores the importance of the subsidiarity principle. In conclusion, Cnossen argued that tax coordination has to be a bottom-up process that should be realized in a gradual and largely reversible manner.

Ewald Nowotny (Vienna University of Economics and Business Administration) observed that the concept of comprehensive income taxation is advocated in theory only; it is no longer very relevant in the EU: today, taxes on labor income are generally (in part significantly) higher than those on capital income. He acknowledges the Nordic system of dual income taxation favored by Cnossen as an interesting solution, but points out that

Norway, Sweden and Finland have effective wealth taxation systems. Tax competition applies to the taxation of corporate profits, wealth and high labor incomes; these distributional aspects need to be considered in economic policy assessments. According to Nowotny, tax havens pose a real problem in this context. Tax competition leads to distortions in the tax burden for international enterprises and local SMEs as a result of the negative allocative effects.

The workshop “Capital Taxation after EU Enlargement” covered a broad range of topical issues; the accession of ten new Member States with ten different tax systems makes these issues all the more important for the future economic development within the EU and for the design of the EU’s economic policies. Due to varying methodological approaches, however, the analysis of the 25 different CIT systems based on the effective tax burden failed to furnish final and conclusive data of their effects on FDI. Aligning a CIT reform (or a comprehensive capital taxation reform) with the aim of increasing the long-term economic growth potential was generally acknowledged as a highly complex challenge both from an economic and a social perspective. Even if it is not possible to prove conclusively whether tax competition or tax harmonization are more advantageous in the field of corporate taxation, a certain degree of tax coordination between EU countries seems indispensable. The bottom line of this intensive workshop was that more research work is clearly needed to create a firm basis for fiscal policy decisions at the EU level.

NOTES

Abbreviations

ACH	automated clearing house	GNP	gross national product
APSS	Austrian Payment System Services GmbH	GSA	GELDSERVICE AUSTRIA Logistik für Wert- gestionierung und Transportkoordination GmbH (Austrian cash services company)
ARTIS	Austrian Real Time Interbank Settlement (the Austrian RTGS system)	HICP	Harmonized Index of Consumer Prices
A-SIT	Secure Information Technology Center – Austria	IBAN	International Bank Account Number
ASVG	Allgemeines Sozialversicherungsgesetz – General Social Security Act	IBRD	International Bank for Reconstruction and Development
A-Trust	A-Trust Gesellschaft für Sicherheitssysteme im elektronischen Datenverkehr GmbH	IDB	Inter-American Development Bank
ATM	automated teller machine	IFES	Institut für empirische Sozialforschung GesmbH (Institute for Empirical Social Research, Vienna)
ATX	Austrian Traded Index	ifo	ifo Institute for Economic Research, Munich
BCBS	Basel Committee on Banking Supervision (BIS)	IGC	Intergovernmental Conference (EU)
BIC	Bank Identifier Code	IHS	Institut für Höhere Studien und Wissenschaftliche Forschung – Institute for Advanced Studies, Vienna
BIS	Bank for International Settlements	IIF	Institute of International Finance
BOP	balance of payments	IIP	international investment position
BSC	Banking Supervision Committee (ESCB)	IMF	International Monetary Fund
CACs	collective action clauses	IRB	internal ratings-based
CEBS	Committee of European Banking Supervisors (EU)	ISO	International Organization for Standardization
CEE	Central and Eastern Europe	IWI	Industriewissenschaftliches Institut – Austrian Institute for Industrial Research
CEECs	Central and Eastern European countries	IT	information technology
CESR	Committee of European Securities Regulators	JVI	Joint Vienna Institute
CIS	Commonwealth of Independent States	LIBOR	London Interbank Offered Rate
CPI	consumer price index	M3	broad monetary aggregate M3
EBA	Euro Banking Association	MFI	monetary financial institution
EBRD	European Bank for Reconstruction and Development	MRO	main refinancing operation
EC	European Community	MÖAG	Münze Österreich AG – Austrian Mint
ECB	European Central Bank	MoU	memorandum of understanding
Ecofin	Council of Economics and Finance Ministers (EU)	NCB	national central bank
EEA	European Economic Area	ÖBB	Österreichische Bundesbahnen – Austrian Federal Railways
EFC	Economic and Financial Committee (EU)	OeBS	Oesterreichische Banknoten- und Sicherheitsdruck GmbH – Austrian Banknote and Security Printing Works
EIB	European Investment Bank	OECD	Organisation for Economic Co-operation and Development
EMS	European Monetary System	OeKB	Oesterreichische Kontrollbank (Austria's main financial and information service provider for the export industry and the capital market)
EMU	Economic and Monetary Union	OeNB	Oesterreichische Nationalbank (Austria's central bank)
EONIA	Euro OverNight Index Average	OPEC	Organization of the Petroleum Exporting Countries
ERM II	Exchange Rate Mechanism II (EU)	ORF	Österreichischer Rundfunk – Austrian Broadcasting Corporation
ERP	European Recovery Program	ÖBFA	Austrian Federal Financing Agency
ESA	European System of Accounts	ÖNACE	Austrian Statistical Classification of Economic Activities
ESAF	Enhanced Structural Adjustment Facility (IMF)	PE-ACH	pan-European automated clearing house
ESCB	European System of Central Banks	PISA	Programme for International Student Assessment (OECD)
ESRI	Economic and Social Research Institute	POS	point of sale
EU	European Union	PRGF	Poverty Reduction and Growth Facility (IMF)
EURIBOR	Euro Interbank Offered Rate	RTGS	Real-Time Gross Settlement
Eurostat	Statistical Office of the European Communities	SDR	Special Drawing Right (IMF)
FATF	Financial Action Task Force on Money Laundering	SDRM	Sovereign Debt Restructuring Mechanism (IMF)
Fed	Federal Reserve System	SEPA	Single Euro Payments Area
FFF	Forschungsförderungsfonds für die Gewerbliche Wirtschaft – Austrian Industrial Research Promotion Fund		
FMA	Financial Market Authority (for Austria)		
FOMC	Federal Open Market Committee (U.S.A.)		
FSAP	Financial Sector Assessment Program (IMF)		
FWF	Fonds zur Förderung der wirtschaftlichen Forschung – Austrian Science Fund		
GAB	General Arrangements to Borrow		
GATS	General Agreement on Trade in Services		
GDP	gross domestic product		

SPF	Survey of Professional Forecasters	UNO	United Nations Organization
STEP2	Straight-Through Euro Processing system offered by the Euro Banking Association	VaR	Value at Risk
STP	straight-through processing	WBI	Wiener Börse Index
STUZZA	Studiengesellschaft für Zusammenarbeit im Zahlungsverkehr G.m.b.H. – Austrian Research Association for Payment Cooperation	WEF	World Economic Forum
S.W.I.F.T.	Society for Worldwide Interbank Financial Telecommunication	WIFO	Österreichisches Institut für Wirtschaftsforschung – Austrian Institute of Economic Research
TARGET	Trans-European Automated Real-time Gross settlement Express Transfer	WIIW	Wiener Institut für internationale Wirtschaftsvergleiche – The Vienna Institute for International Economic Studies
Treaty	refers to the Treaty establishing the European Community	WKO	Wirtschaftskammer Österreich – Austrian Federal Economic Chamber
UNCTAD	United Nations Conference on Trade and Development	WTO	World Trade Organization

Legend

- × = No data can be indicated technical reasons
- .. = Data not available at the reporting date
- 0 = The numerical value is zero or smaller than half of the unit indicated

Discrepancies may arise from rounding.

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