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Contents

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ANALYSES

Growth Prospects for Austria Are Weakening

Economic Outlook for Austria from 2007 to 2009
(December 2007)

Christian Ragacs,
Klaus Vondra

1 Summary

In its economic outlook for Austria of December 2007, the Oesterreichische Nationalbank (OeNB) expects Austria's real GDP to increase by 3.3% in 2007. In 2008 and 2009, real GDP will grow by 2.5% and 2.3%, respectively. The rate of inflation will rise to 2.1% in 2007 and increase further to 2.4% in 2008 and will decrease again to 1.8% in 2009. Employment growth will remain strong, and the unemployment rate will decrease to 4.2% in 2008.

Although the turbulence on the international financial markets caused by the subprime crisis in the U.S.A., the high price of oil and the strong devaluation of the U.S. dollar have significantly increased economic risks, global economic growth (excluding the euro area) only slowed slightly from +5.9% (2006) to +5.6% in 2007. The current published indicators do not allow any clear conclusions regarding the extent of the effects of the American subprime crisis on the Austrian economy. The OeNB forecast presumes a "soft landing" for the American economy and a slow recovery of real estate markets. Above all as a result of the positive profit situation and favorable financing conditions, the economy is expected to shift once again to a higher growth path for 2008 and 2009. Asia (excluding Japan) will continue to post very strong growth. Economic growth in the euro area will be increasingly driven by private consumption, which will be supported by powerful increases in employment and higher wage agreements. The unemployment rate will even be lower in 2007

Chart 1

Real GDP Growth (Seasonally and Working-Day Adjusted)
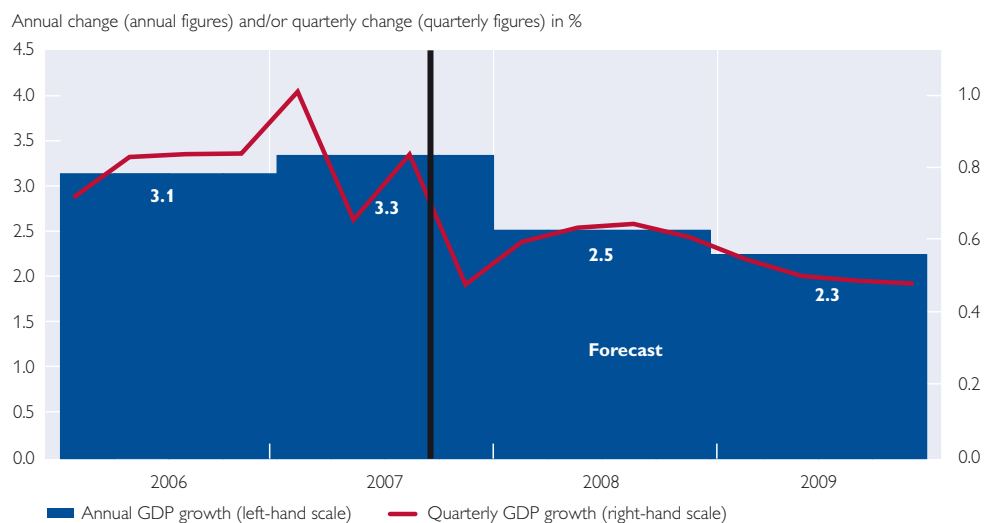
Annual change (annual figures) and/or quarterly change (quarterly figures) in %

■ Annual GDP growth (left-hand scale) ── Quarterly GDP growth (right-hand scale)

Source: Eurostat, OeNB.

Table 1

OeNB December 2007 Outlook for Austria – Key Results[1]

	2006	2007	2008	2009
	Annual change in % (real)			
Economic activity				
Gross domestic product	+3.1	+3.3	+2.5	+2.3
Private consumption	+2.0	+1.6	+1.5	+1.6
Government consumption	+2.0	+2.3	+2.9	−0.1
Gross fixed capital formation	+3.1	+4.5	+2.6	+2.3
Exports of goods and services	+7.5	+6.4	+6.1	+6.7
Imports of goods and services	+4.6	+4.7	+5.5	+6.1
	Percentage points of GDP			
Contribution to real GDP growth				
Private consumption	+1.1	+0.9	+0.8	+0.9
Government consumption	+0.4	+0.4	+0.5	+0.0
Gross fixed capital formation	+0.6	+0.9	+0.6	+0.5
Domestic demand (excluding changes in inventories)	+2.1	+2.2	+1.9	+1.4
Net exports	+1.8	+1.3	+0.7	+0.9
Changes in inventories (including statistical discrepancy)	−0.8	−0.2	−0.1	+0.0
	Annual change in %			
Prices				
Harmonized Index of Consumer Prices (HICP)	+1.7	+2.1	+2.4	+1.8
Private consumption expenditure (PCE) deflator	+1.9	+2.0	+2.3	+1.8
GDP deflator	+1.9	+2.2	+2.0	+1.9
Unit labor costs in the total economy	+1.1	+1.1	+1.6	+1.2
Compensation per employee (at current prices)	+2.5	+2.6	+3.4	+2.8
Productivity (whole economy)	+2.0	+1.8	+1.7	+1.5
Compensation per employee (real)	+0.6	+0.6	+1.0	+1.0
Import prices	+3.4	+1.1	+1.4	+1.4
Export prices	+2.8	+1.6	+1.3	+1.5
Terms of trade	−0.6	+0.5	−0.1	+0.1
Income and savings				
Real disposable household income	+2.4	+1.9	+1.7	+1.6
	% of nominal disposable household income			
Saving ratio	9.7	10.1	10.2	10.2
	Annual change in %			
Labor market				
Payroll employment	+1.7	+1.9	+0.8	+0.7
	%			
Unemployment rate (Eurostat definition)	4.7	4.3	4.2	4.3
	% of nominal GDP			
Budget				
Budget balance (Maastricht definition)	−1.4	−0.7	−0.7	−0.4
Government debt	61.7	59.9	58.3	57.0

Source: 2006: Eurostat, Statistics Austria; 2007 to 2009: OeNB December 2007 outlook.

[1] *The outlook was drawn up on the basis of seasonally adjusted and working-day adjusted national accounts data. Therefore, the historical values for 2006 may deviate slightly from the nonadjusted data released by Statistics Austria.*

than during the economic boom at the turn of the millennium and should continue to decrease over the further forecast horizon.

In its current forecast for Austria, the OeNB expects exports to continue to develop dynamically – though less so than in 2006 – with growth rates for real exports of 6.4% for 2007, 6.1% for 2008 and 6.7% for 2009. The growth contribution of net exports will be positive over the entire forecast period, and the current account surplus is anticipated to

widen significantly from 2.8% (2006) of nominal GDP to 4.6% (2009).

Real consumption demand of private households has remained clearly behind the development of real disposable household income in recent years, leading to a steady increase in the savings rate since 2002. Despite the dynamic development of employment and higher wage increases compared to recent years, consumer demand will develop only modestly, with growth forecast at +1.6% (2007), +1.5% (2008), and +1.6% (2009). The investment cycle will have peaked in 2007. At 4.5%, the growth of real investment demand will be robust in 2007, but will weaken to 2.6% and 2.3%, respectively, in 2008 and 2009.

Coming to 1.9% in 2007, employment growth in Austria is above average and represents the highest rate of growth since 1991. The development of employment also remains positive over the entire forecast horizon. Payroll employment will increase by 0.8% and 0.7%, respectively, in 2008 and 2009, and total employment will rise by 0.8% a year in both years. The unemployment rate will exhibit a strong decreasing trend through 2008 and will sink from 4.7% in 2006 to 4.2% in 2008.

Inflation has accelerated sharply in recent months. The rate of inflation measured by the Harmonized Index of Consumer Prices (HICP) will thus increase to 2.1% in 2007 and will continue to augment to 2.4% in 2008. The rate of inflation will not ease before 2009, when it is anticipated to decrease to 1.8%. This forecast is based on a reduction of the oil price over the course of 2008 as well as a return of food price inflation to moderate levels in the second half of 2008.

2 Technical Assumptions

The current forecast for Austria is the contribution of the OeNB to the December 2007 Eurosystem staff macroeconomic projections. The forecast horizon ranges from the fourth quarter of 2007 to the fourth quarter of 2009. The assumptions regarding the development of the global economy as well as the technical assumptions with respect to interest rates, exchange rates, and crude oil prices take developments up to and including November 23, 2007, into account. The forecast was prepared on the basis of OeNB's macroeconomic quarterly model.

The national accounts data calculated by the Austrian Institute of Economic Research (WIFO), which are seasonally and working-day adjusted, are completely available up to the second quarter of 2007 and serve as the main data basis. For the third quarter of 2007, the flash estimate of GDP is available – for a portion of the national accounts data.

The short-term interest rate used for the forecast horizon is based on market expectations for the three-month EURIBOR. For the years 2007 to 2009, it is set at 4.3%, 4.5%, and 4.3%, respectively. The long-term interest rates are based on market expectations for ten-year government bonds, and are 4.3%, 4.2%, and 4.2%, respectively, for the years 2007 to 2009. For the further development of the EUR/USD exchange rate, a rate of 1.46 USD/EUR is assumed. Taking into account the exchange rate data to date, this results in an average rate of 1.36 USD/EUR for 2007. The assumed development of crude oil prices is oriented on futures prices. For 2007, an oil price of USD 72.6 per barrel of Brent is assumed; for 2008 and 2009, the

prices are USD 88.6 and USD 83.7, respectively. Compared to the forecast of June 2007, this means a revision of USD of +7.6 (2007), of USD +18.7 (2008), and of USD +14.1 (2009).

The budget forecast includes only those measures that had been passed and that had been suitably specified at the time the OeNB outlook was prepared.

3 Robust Global Economic Development Continues on the Back of Strong Emerging Markets Despite Financial Market Turbulence

3.1 Asia as the Engine of the Global Economy

Although the turbulence on the international financial markets brought about by the American subprime crisis, the high price of oil, and the strong devaluation of the U.S. dollar harbor risks for global economic developments, only slightly weaker growth of 5.6% is expected in 2007 (2006: 5.9%) for the *global economy* (excluding the euro area). For both 2008 and 2009 as well, continued robust growth of 5.2% is expected. The concentration of growth, however, will shift from the U.S.A. to Asia, where an expansion of +9.3% is expected for 2007. Following the extraordinarily strong performance in 2006 (+9.0%), *global trade* will slow significantly to 6.1% in 2007, but will increase again afterwards.

The development of the *price of oil* and of the U.S. dollar strongly characterized the global economy in 2007. From January 11, 2007, to November 23, 2007, the price of oil increased from around USD 52.6 per barrel of

Brent to USD 95.0, a gain of around 60%. The rise in the price of oil was not caused by a single factor, but rather by a combination of factors. Thus, the weak U.S. dollar, the geopolitical situation, and increasing demand for oil all exerted strong upward pressure on the price of oil. On the other hand, the current U.S. inventories of crude oil, heating oil, and diesel, which were all above the long-term average in 2007, argue against the price increase. The positive net position[1] of noncommercial traders on the futures market of the New York Mercantile Exchange throughout 2007 was partly very pronounced, signaling that the price of oil was also driven by speculation.

The USD/EUR exchange rate increased significantly over the course of the year as well, augmenting from USD/EUR 1.29 (January 11, 2007) to USD/EUR 1.48 (November 23, 2007). The strong depreciation of the U.S. dollar – above all in the second half of 2007 – can be attributed mostly to the decreases in the policy interest rate by the Federal Reserve in the wake of the financial market turbulence. The unexpected intensity of these developments implied a significant change in the external assumptions compared to the June outlook (represented in chart 2 by the arrow in the forecast horizon).

Chart 2 reflects the long-term developments of the price of oil in U.S. dollars and in euro, as well as the bilateral USD/EUR exchange rate and the nominal effective exchange rate of the euro. The chart shows that on the one hand, the price of oil in U.S. dollars has currently reached a historical peak, whereas on the other hand,

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[1] *A net positive position means that the majority is betting on increasing prices.*

Chart 2

Forecast Assumptions Reflect Strong Rise in Oil Prices and Exchange Rates

Oil Price

Price per barrel of Brent

Exchange Rate

USD/EUR

- USD, after Q4 07 December forecast
- USD, after Q2 07 June forecast
- EUR
- EUR, real data (2005)

- USD/EUR exchange rate; after Q4 07 December forecast
- USD/EUR exchange rate; after Q2 07 June forecast
- Nominal effective exchange rate (inverted)
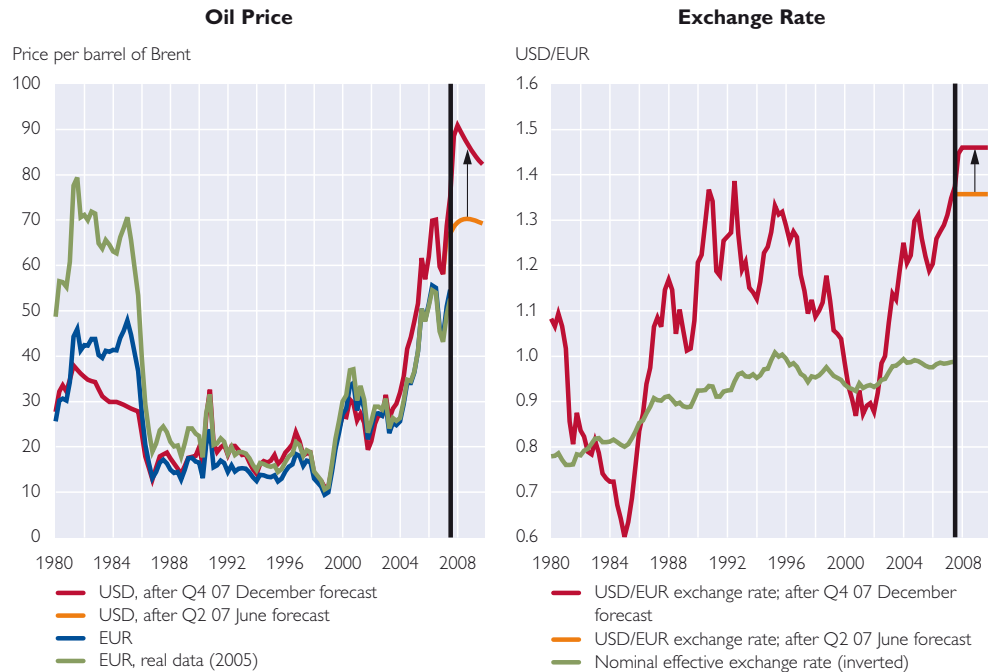
Source: OeNB.

the price of oil billed in euro temporarily exceeded the price of oil during the second oil crisis at the beginning of the 1980s as late as mid-2006. The price level of the second oil crisis period was not noticeably and sustainably exceeded until the second quarter of 2007. Taking inflation into account, a significant increase is still noticeable in recent months; however, the current real price of oil is below the level observed between 1981 and 1985. Moreover, the USD/ EUR exchange rate only exceeded the level of the early 1990s with the increase in recent weeks. By contrast, the nominal effective exchange rate of the euro (for Austrian exports), which takes trading shares into consideration, has been relatively constant since 1995.

The *U.S. economy* performed surprisingly well, with real GDP growth

coming to +1% in the third quarter of 2007 compared to the previous quarter; annual growth can be expected to run to 2.1% in 2007. On the one hand, the robust growth was driven by a significant increase in industrial investment (+1.9%), and on the other hand by a solid increase in exports (+3.8%) with only a slight increase in imports (+1.3%). The data currently available do not allow for an assessment of the actual effects of the real estate market crisis on real economic development. This OeNB forecast is based on the premise of a "soft landing" for the U.S. economy and a slow recovery of real estate markets. Above all as a result of the positive profit situation and favorable financing conditions, the economy is expected to shift once again to a higher growth path for 2008 and 2009. These expectations coincide

Table 2

Underlying Global Economic Conditions

	2006	2007	2008	2009
	Annual change in % (real)			
Gross domestic product				
World excluding the euro area	+5.9	+5.6	+5.2	+5.2
U.S.A.	+2.9	+2.1	+2.3	+2.6
Japan	+2.2	+1.8	+1.8	+2.0
Asia excluding Japan	+9.1	+9.3	+8.3	+8.2
Latin America	+5.2	+4.8	+4.3	+4.1
United Kingdom	+2.8	+3.1	+2.4	+2.7
New EU Member States	+6.2	+5.8	+5.0	+5.0
Switzerland	+3.2	+2.5	+1.7	+2.0
Euro area[1]	+2.9	+2.4 to +2.8	+1.5 to +2.5	+1.6 to +2.6
World trade (imports of goods and services)				
World economy	+9.0	+6.1	+6.5	+7.0
Non-euro area countries	+9.4	+6.5	+7.2	+7.8
Real growth of euro area export markets	+9.8	+6.0	+6.9	+7.1
Real growth of Austrian export markets	+9.9	+6.4	+6.3	+6.6
Prices				
Oil price in USD/barrel (Brent)	65.4	72.6	88.6	83.7
Three-month interest rate in %	3.1	4.3	4.5	4.3
Long-term interest rate in %	3.7	4.3	4.2	4.2
USD/EUR exchange rate	1.26	1.37	1.46	1.46
Nominal effective exchange rate of the euro (euro area index)	103.63	107.54	110.33	110.33

Source: Eurosystem.

[1] Results of the Eurosystem's December 2007 projections. The ECB presents the results in ranges based on average differences between actual outcomes and previous projections.

with the Federal Reserve's estimate of growth of 1.8% to 2.5% in 2008 and of 2.3% to 2.7% in 2009.

In *Asia* (excluding Japan), growth will stay very strong. Following 9.0% in 2006, it will be as much as 9.3% in 2007. For 2008 and 2009, a slight decrease to 8.3% and 8.2%, respectively is forecast. Economic activity in China and India is developing particularly dynamically. Growth in *China* is being driven not only by exports, but also by investment. Both countries continue to propagate an economic policy of moderation to prevent their economies from overheating. However, robust economic growth and above all strongly increasing food prices are causing inflation to accelerate. Economic activity in *Japan* is slowing once again and is being carried by private consumption

despite the ongoing decline of nominal wages. In contrast, investment demand fell in the second quarter of 2007; however, it is likely to recover over the course of the year.

In the *United Kingdom*, growth prospects weakened – despite strong growth in the third quarter of 2007 (0.7% compared to the second quarter of 2007) – as a result of turbulence on the financial markets and the slump in residential market prices, which slowed private consumption. Growth is still expected to come to 3.1% in 2007, but will weaken to 2.4% in 2008 and to 2.7% in 2009.

For *Switzerland* as well, a weakening of the robust growth in 2006 is expected beginning in 2007.

By contrast, the *Central and Eastern European EU Member States*, which are especially important for the Austrian

exports, will exhibit sustained high rates of growth between 5.8% (2007) and 5.0% (2008 and 2009) and will therefore grow much more vigorously than the euro area.

3.2 Domestic Demand is the Engine of Euro Area Growth

After modest GDP growth of 0.3% in the euro area in the second quarter of 2007 compared to the previous quarter, the economy clearly picked up again in the third quarter and, with 0.7% (flash estimate compared to the previous quarter), recorded a surprisingly strong growth dynamic. However, the "hard facts," such as the development of the price of oil and the USD/EUR exchange rate, as well as the "soft facts," such as the Manufacturing Purchasing Managers' Index (NTC)[2] or the declining trend of the Economic Sentiment Indicator, suggest a weakening of economic growth in the fourth quarter of 2007. The Eurosystem expects economic growth of 2.4% to 2.8% for 2007, and 1.5% to 2.5% for 2008.

Economic growth in the euro area will be increasingly sustained by private consumption, which, in turn, will be supported on the one hand by strong employment growth and on the other hand by higher wage agreements than in recent years. Forecast to run to 7.3% in 2007 (European Commission), the unemployment rate will even be lower than during the economic boom at the turn of the millennium and should continue to fall in the forecast horizon (7.1% for both 2008 and 2009). However, inflation increased to 2.6% in October 2007. Sustained high energy prices are anticipated to lead to continuous

high rates of inflation in the coming months. Driven by food and energy price inflation, a further increase in the HICP is expected for 2007 to 2008; a significant decrease is first expected in 2009.

After modest development in the first half of 2007, *Germany* recorded unexpectedly strong growth of +0.7% in the third quarter (compared to the previous quarter). Following the extraordinarily strong growth dynamic in 2006, with GDP augmenting by +2.7%, the German economy will once again lose some momentum in 2007 and the coming years. As a result of external developments, net exports are not expected to make a positive contribution to growth in the near future. Furthermore, Germany is also showing a vigorous increase in prices induced by higher food and energy prices. Inflation (HICP) was 2.7% (compared to the previous year) not only in September, but also in October 2007. A quick reduction in inflation is not in the cards at this time.

France also exhibited surprisingly strong growth of +0.7% in the third quarter of 2007 (compared to the previous quarter). The positive contribution to growth in the third quarter also resulted from net exports, above all from the delivery of the Airbus A380 to Singapore Airlines. Private consumption continues to be typically robust and is also supported by increasing employment. Nevertheless, continuously moderate growth is expected over the forecast horizon.

Following a healthy 2006, the growth dynamic in *Italy* slowed noticeably in 2007. In addition to private consumption and investments,

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[2] *This fell to 51.5 points in October 2007; the "recession threshold" is 50 points.*

Box 1

The International Financial Crisis Currently Has only Minor Effects on Austria

The granting of mortgage loans to subprime borrowers triggered strong turbulence on the international financial markets in the summer months of 2007, leading to high losses in some cases. Loan defaults surged in the wake of the expiration of highly favorable fixed interest agreements in the first two to three years of a loan ("teaser rates") and the higher interest rate level in the U.S.A. In addition, real estate prices had been stagnating for more than a year and had recently even been falling, making refinancing more difficult. The spread of the subprime crisis in the U.S.A. to the global financial markets can be attributed to the securitization of these loans. Uncertainty about the distribution and concentration of these credit risks, as well as about unrealized losses and hidden accounting losses, have led to a crisis of confidence among banks and thus to liquidity constraints. As a consequence, the ECB and the Federal Reserve – among others – added liquidity to the money markets, whereby the situation was somewhat alleviated. In the U.S.A., the Federal Reserve reduced the federal funds rate in two steps by 75 basis points to 4.5% and the discount rate by 1 percentage point to 5.25%. In the euro area, the ECB held the interest rate constant; however, it injected liquidity into the money market in the form of overnight quick tenders and long-term refinancing transactions.

The consequences of the financial market turmoil for Europe remain unclear. Although there were corrections in the Irish and Spanish real estate markets – which are to be considered as only partially related to the U.S. credit crisis – the European banking market is the focus of observation. In addition to large American banks, a few large European banks had to record value adjustments of structured financial instruments, which in some cases considerably affected their earnings position. Liquidity constraints and a sharp rise in short-term interest rates (EONIA and the one- and three-month EURIBOR), as well as in swap spreads,[1] resulted directly from the loss of confidence between banks. Swap spreads widened from 21 basis points in May 2007 to 34 basis points until mid-August. Following a slight recovery in early fall, they once again climbed to 32 basis points mid-November – a sign that the fundamental difficulties have still not been resolved. Thus, a spreading of the financial market crisis to the real economy – hardly imaginable over the summer – is no longer out of the question. The problems on the interbank market could affect lending to private households as well as to businesses. If credit should become scarce, the direct effects on the real economy would be a drop in investments and lower consumption, if private households and businesses were unable to completely replace credit by savings or profit transfers. Fewer investments and less consumption would hamper GDP growth.

Estimating the effects of the financial market crisis on Austria remains difficult, given the current level of information. Based on the results for Austria of the last bank lending survey, Austrian banks have felt the effects of the crisis in the form of more difficult refinancing conditions. The effect on the surveyed institutions was more expensive large-volume financing via medium- and long-term bonds and the money market. Conversely, the crisis has hardly affected lending policy. The banks indicate that the credit guidelines in the corporate customer segment were somewhat tightened, whereas they were slightly loosened in the retail customer segment – in particular to finance residential construction. Overall, the exposure of Austrian banks vis-à-vis the U.S. mortgage market seems to be low – especially considering that they primarily pursue a strategy of expansion in Central, Eastern and Southeastern Europe.

[1] *The swap spread is the difference between interbank swaps and long-term government bonds. For the purposes of this analysis, we use the swap spread based on ten-year bonds.*

net exports also contributed positively to growth, although Italy must accept further market share losses as a result of its reduced price competitiveness.

4 Exports Continue to Drive Growth

Exports and imports both reached the EUR 100 billion benchmark for the first time in 2006. In total, exports increased by 9.5% in 2006. Austrian exporters profited from the strong global economic development as well as from the economic recovery in the EU-25 (+7.5%) – but in particular from the recovery of the German and Italian economies. They were also highly successful in increasing exports outside the EU (+14.5%). In the same period, imports increased by 8.0% (EU-25: 7.5%, non-EU countries: 13.7%). The results for 2007 are set to be just as favorable. Between January and July 2007, exports increased by 10%, imports by 8%. Exports to the EU mounted by 10.3% and imports by 8.3% compared to the reference period of the previous year. Exports to all other countries also increased by 10.3% and imports by 6.6% compared to the reference period. However, export growth has lost some momentum since its peak in the fourth quarter of 2006.

Whereas the Austrian export market[3] had grown by 9.9% in 2006, growth is still expected to remain dynamic at around 6½% over the entire forecast horizon. The price competitiveness of Austrian exports worsened slightly in 2007 as a result of the depreciation of the U.S. dollar vis-à-vis the euro at the end of the year. For 2008, an additional marginal loss in price competitiveness is expected owing to the higher wage increases compared to recent years. At the end of the forecast horizon, domestic exporters will once again be able to realize small market share gains.

Table 3

Growth and Price Developments in Austria's External Trade

	2006	2007	2008	2009
	Annual change in %			
Exports				
Competitors' prices in Austria's export markets	+2.4	+0.6	+0.9	+1.4
Export deflator	+2.8	+1.6	+1.3	+1.5
Changes in price competitiveness	−0.3	−1.0	−0.4	−0.1
Demand on Austria's export markets (real)	+9.9	+6.4	+6.3	+6.6
Austrian exports of goods and services (real)	+7.5	+6.4	+6.1	+6.7
Market share	−2.4	+0.0	−0.2	+0.2
Imports				
International competitors' prices on the Austrian market	+2.2	+0.8	+0.9	+1.4
Import deflator	+3.4	+1.1	+1.4	+1.4
Austrian imports of goods and services (real)	+4.6	+4.7	+5.5	+6.1
Terms of trade	−0.6	+0.5	−0.1	+0.1
	Percentage points of real GDP			
Contribution of net exports to GDP growth	+1.8	+1.3	+0.7	+0.9

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook, Eurosystem.

[3] The Austrian export markets are defined as the total imports of Austrian trading partners weighted with Austrian export shares.

Table 4

Austria's Current Account				
	2006	2007	2008	2009
	% of nominal GDP			
Balance of trade	4.4	5.4	5.6	6.3
Goods	0.1	1.0	0.9	1.4
Services	4.3	4.4	4.8	4.8
Euro area	0.0	0.3	0.8	0.9
Non-euro area countries	4.4	5.1	4.9	5.4
Balance on income	−1.2	−1.4	−1.4	−1.3
Balance on current transfers	−0.4	−0.6	−0.5	−0.5
Current account	2.8	3.3	3.8	4.6

Source: 2006: OeNB; 2007 to 2009: OeNB December 2007 outlook.

As a result of the slight weakening in global trade growth and the loss of price competitiveness, the OeNB expects export growth to slacken in the coming years. Real exports will increase by 6.4% in 2007, by 6.1% in 2008 and by 6.7% in 2009. The growth contribution of net exports will weaken above all in 2008. Net exports will, however, support growth over the entire forecast period.

In 2006, the favorable export development led to a significant increase in the current account surplus to 2.8% of GDP. From 2007 to 2009, a further improvement to 4.6% in 2009 is expected. In the forecast period, the trade surplus of 4.4% (2006) of GDP will increase significantly to 6.3% (2009). This can be attributed not only to the recovery of services (2006: 4.3% of GDP; 2009: 4.8% of GDP), but also to the balance of goods (2006: 0.1% of GDP; 2009: 1.4% of GDP). The income deficit measured on the share of GDP will shrink slightly in the forecast period; the transfer balance, however, will remain nearly unchanged.

5 Food and Energy Push Inflation to over 2%

The HICP inflation rate has increased significantly in recent months and reached 2.9% in October (compared to the previous year). Energy and food prices are mostly responsible for the strong increase in prices. Contributing 0.85 percentage points to inflation, food was the primary price driver in October. In particular, dairy products, bread, and grain products were much more expensive compared to the reference month in 2006. The higher cost of food can be traced to the increase in grain prices on global markets, which was caused above all by crop failures in Australia. The strong increase in the price of fruits and vegetables, however, is likely to be temporary. The contribution of energy to inflation increased to 0.64 percentage points in October, foremost because of the higher price of fuels and household energy (electricity, gas, heating fuels). The prices of processed foods recently increased far more than the euro average in Austria. Moreover, Austrian energy price inflation was somewhat higher than the euro area average.

The rate of inflation will persist at this level until the end of 2007. The rate of price increase will weaken noticeably once again in the second half of 2008 and will decrease to around 2% by the end of 2008. The annual average HICP inflation

Chart 3

Sharp Rise in HICP Inflation

Percentage points
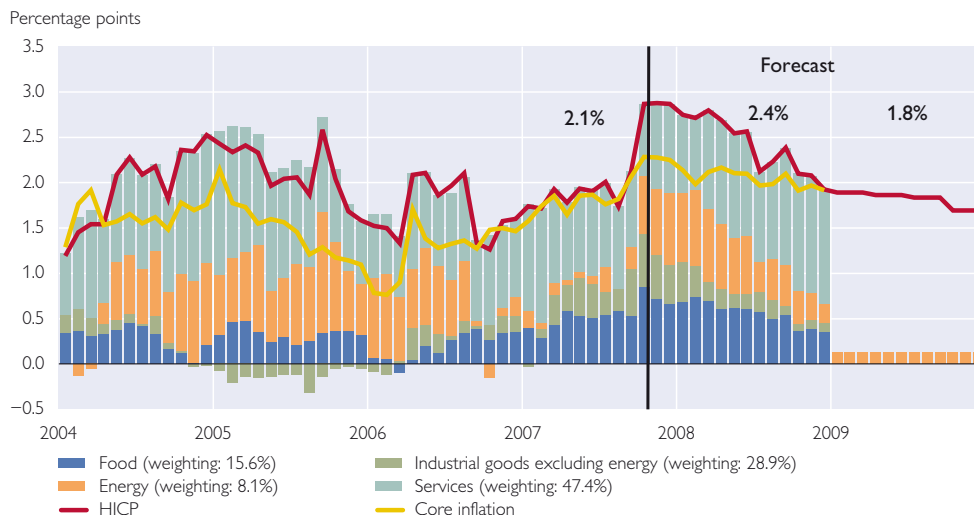
Source: OeNB, Statistics Austria; last observation: October 2007.

Table 5

Selected Price Indicators for Austria

	2006	2007	2008	2009
	Annual change in %			
HICP	+1.7	+2.1	+2.4	+1.8
HICP energy	+6.3	+3.3	+6.6	+1.6
HICP excluding energy	+1.3	+2.0	+2.1	+1.8
Private consumption expenditure (PCE) deflator	+1.9	+2.0	+2.3	+1.8
Investment deflator	+2.7	+1.8	+1.7	+1.6
Import deflator	+3.4	+1.1	+1.4	+1.4
Export deflator	+2.8	+1.6	+1.3	+1.5
Terms of trade	−0.6	+0.5	−0.1	+0.1
GDP deflator at factor cost	+1.8	+2.2	+2.1	+1.9
Unit labor costs	+1.1	+1.1	+1.6	+1.2
Compensation per employee	+2.5	+2.6	+3.4	+2.8
Labor productivity	+2.0	+1.8	+1.7	+1.5
Collectively agreed wage settlements	+2.7	+2.5	+3.1	+2.6
Profit margins[1]	+1.4	+1.4	+0.4	+0.6

Source: 2006: Eurostat, Statistics Austria; 2007 to 2009: OeNB December 2007 outlook.

[1] GDP deflator divided by unit labor costs.

rate will thus accelerate to 2.4% in 2008 and will decline again to 1.8% in 2009. This forecast is based on a continuous reduction in the price of oil after the second quarter of 2008, as well as a moderation of food prices in the second half of 2008.[4]

[4] Chart 3 combines two forecasts prepared with different models: From November 2007 until and including November 2008: Monthly forecast of the HCPI and its components; 2009: Quarterly forecast of the HICP.

6 Domestic Demand Weakens

6.1 Consumer Demand Remains Weak despite Increasing Household Income

After the economic downturn at the beginning of the decade, private household income recovered relatively quickly. Disposable household income after taxes and transfers grew by around 4% annually in nominal terms (by around 2% to 2.5% in real terms) from 2003. However, as a result of moderate wage agreements, wage income advanced at a comparably slower rate than investment income and self-employment income. The minimum wage agreements for 2008 that had already been concluded at the time the forecast was prepared were significantly higher than in preceding years. For the metal industry, an increase in collectively agreed wages of 3.6% and in actual wages of between 3.2% and 3.5% was negotiated.[5] The retail sector agreed to minimum and actual wage increases of 3.1%, or at least EUR 45, the highest wage agreement since 1998. Despite these higher wage agreements for 2008 compared to recent years, the OeNB assumes that the collective bargaining partners in Austria will principally abide by wage moderation; therefore, wages will not exert significant pressure on inflation.

The wage negotiation results for 2008 were made possible by the relatively good business profits of 2006 and 2007. The significantly lower profit margins expected for 2008 and 2009 limit unions' room for negotiation for 2009, though, which is why wage increases are expected to be significantly smaller than in 2008.

Income development was also supported by unusually strong employment growth in 2006 and in the first three quarters of 2007 (2006: +1.7%, forecast for 2007: +1.9%), as well as the continuous reduction in the unemployment rate since the fourth quarter of 2005. Similar employment growth rates were last

Table 6

Determinants of Nominal Household Income in Austria

	2006	2007	2008	2009
	Annual change in %			
Payroll employees	+1.7	+1.9	+0.8	+0.7
Wages per employee	+2.5	+2.6	+3.4	+2.8
Compensation of employees	+4.2	+4.5	+4.2	+3.5
Investment income	+10.2	+9.0	+6.8	+4.7
Self-employed income and operating surpluses (net)	+4.3	+5.2	+3.4	+3.6
	Contribution to disposable household income in percentage points			
Compensation of employees	+3.4	+3.5	+3.3	+2.8
Investment income	+1.4	+1.3	+1.1	+0.8
Self-employed income and operating surpluses (net)	+0.8	+1.0	+0.7	+0.7
Net transfers less direct taxes[1]	−1.4	−1.7	−1.1	−0.8
Disposable household income (nominal)	+4.3	+3.9	+4.1	+3.5

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

[1] *Negative values indicate an increase in (negative) net transfers less direct taxes; positive values indicate a decrease.*

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[5] *If operating profits (EBIT) exceed 6% of turnover, an additional nonrecurring payment of EUR 200 and between 0% and 6% of the turnover of EUR 150 must be made. By comparison, actual and minimum wages augmented by 2.6% in 2007, and if the company turned a profit, it made a nonrecurring payment of EUR 100.*

Table 7

Private Consumption in Austria				
	2006	2007	2008	2009
	Annual change in %			
Disposable household income (nominal)	+4.3	+3.9	+4.1	+3.5
Private consumption expenditure (PCE) deflator	+1.9	+2.0	+2.3	+1.8
Disposable household income (real)	+2.4	+1.9	+1.7	+1.6
Private consumption (real)	+2.0	+1.6	+1.5	+1.6
	% of disposable nominal household income			
Saving ratio	9.7	10.1	10.2	10.2

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

achieved at the beginning of the 1990s.

The real household income dynamic will weaken over the forecast period compared to previous years. Additionally, real disposable household income in 2008 will be dampened by the high rate of inflation.

Real consumer demand has clearly lagged behind the development of real disposable household income in recent years, so that the savings rate has continually increased since 2002. In the first three quarters of 2007, real demand of private households also fell significantly short of expectations. Retail sales revenues grew even less than in 2006; automobile sales were quite unimpressive. It is striking that households' consumption expectations according to the European Commission's economic sentiment indicator were much more positive than was reflected by actual consumption. As opposed to the OeNB's June economic outlook, in which consumer demand was expected to jumpstart after mid-2007, the December outlook presumes that real private consumption will remain subdued. With growth rates of 1.6% (2007), 1.5% (2008), and 1.6% (2009), private consumption will be weaker over the forecast horizon than the average of the last three years (just under 2%). The growth contri-

bution of domestic demand is sinking accordingly.

In 2008, the savings rate will again increase slightly as a result of favorable income development. For 2009, however, no further increase in the savings rate is anticipated, owing to the expected economic slowdown.

6.2 The Investment Cycle Peaks in 2007

As a result of strong demand for exports in recent years and a gradual stabilization of sales expectations, the growth of capital expenditure on equipment has accelerated since the fourth quarter of 2006 and reached its peak in the first quarter of 2007. Residential investment expanded for the first time again in 2005 after having recorded negative growth rates eight years in a row and in the following year contributed substantially to the growth of overall investment activity. It was unexpectedly low in the first three quarters of 2007, however, despite the unusually mild winter. But a slight increase in this type of investment is expected for the further course of the forecast owing to increasing residential demand.

Overall, the slight decline of capacity utilization and the development of industrial confidence indicators signal a significant reduction in

Table 8

Investment Activity in Austria				
	2006	2007	2008	2009
	Annual change in %			
Total gross fixed capital formation (real)	+3.1	+4.5	+2.6	+2.3
of which: Investment in plant and equipment (real)	+3.2	+4.3	+2.9	+2.0
Residential construction investment (real)	+5.6	+0.8	+2.1	+2.9
Non-residential construction investment and other investment	+3.6	+5.6	+2.8	+2.3
Government investment (real)	−2.5	+3.4	+4.5	+2.5
Private investment (real)	+3.4	+4.5	+2.5	+2.3
	Contribution to total gross fixed capital formation growth in percentage points			
Investment in plant and equipment (real)	+1.3	+1.7	+1.1	+0.8
Residential construction investment (real)	+1.1	+0.2	+0.4	+0.6
Non-residential construction investment and other investment	+1.4	+2.2	+1.1	+0.9
Government investment (real)	−0.1	+0.2	+0.2	+0.1
Private investment (real)	+3.2	+4.3	+2.4	+2.2
	Contribution to real GDP growth in percentage points			
Changes in inventories (real)	−0.1	−0.4	+0.0	+0.0

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

the growth of construction and equipment expenditure in the forecast period. The expenditure dynamic is expected to weaken as a result of deteriorating business profits, slightly worsening external financing conditions, and the lower rate of growth of both private consumption and exports compared to 2007. Thus, the investment cycle will have peaked in 2007.

The OeNB expects strong investment growth of 4.5% for 2007, but significantly lower rates of growth for 2008 (2.6%) and 2009 (2.3%). After 2008, inventories will rise once again. As a result of the anticipated lower economic growth, the investment share in the forecast period will remain close to constant.

6.3 Labor Market Improvement to Continue until 2008

The number of registered jobseekers (employment as registered by the Main Association of Austrian Social Security Institutions) was 4.6% lower in October 2007 than in the previous year. Thus, the number of registered jobseekers has decreased for 20 months in a row.

Two demand-side factors are responsible for this development. First, many companies apparently continued to wait at the beginning of the upturn and absorbed the higher demand for labor with overtime and unused plant capacities, which resulted in a need to catch up. Second, temporary factors, such as the mild winter, led to additional dynamic on the labor market (in particular in the construction industry).

The growth of the labor supply is the result of the effects of the reform of the pension system in 2003 (increase in the supply of older persons), the childcare benefit reform (increase in the supply of women), demographic developments, and the influx of foreign labor. On May 1, 2007, the labor market was opened for 800 lathe operators, welders, and milling cutters. For 2008, another partial opening of

Table 9

Labor Market Developments in Austria

	2006	2007	2008	2009
	Annual change in %			
Total employment	+1.2	+1.5	+0.8	+0.8
of which: Payroll employment	+1.7	+1.9	+0.8	+0.7
Self-employment	−1.2	+0.1	+0.7	+1.1
Public sector employment	+0.7	+0.3	+0.0	+0.1
Registered unemployment	−5.7	−5.0	−3.0	+5.3
Labor supply	+0.8	+1.2	+0.6	+1.0
	%			
Unemployment rate (Eurostat definition)	4.7	4.3	4.2	4.3

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

the labor market for skilled workers is planned.[6] Principally, the limitations for entry to the labor market should be completely lifted as early as May 2009. However, the current transitional regulations will presumably remain in force until May 1, 2011; only a formal and well-grounded notification of the European Commission is necessary for this. Thus, only a moderate increase in the supply of foreign labor is expected. In total, the OeNB expects lower labor supply growth than in 2007 (1.2%) not only for 2008 (0.6%), but also for 2009 (1.0%).

In 2007, employment growth is likely to be powerful at 1.9%, representing the greatest increase since 1991. Even if this dynamic is not achieved in the further course of the forecast horizon, the expectations for employment growth remain positive for the entire forecast horizon. Payroll employment will mount by 0.8% (0.7%) in 2008 (2009), and total employment will increase by 0.8% in both years. The unemployment rate will sink to 4.3% in 2007 (2006:

4.7%) and to 4.2% in 2008 before rising marginally to 4.3% in 2009.

7 Significantly Increased Forecast Risks

Whereas the external economic risks are clearly on the downside, the majority of domestic economic risks point upward. Upside risks for investments, consumption, and wages, but also for inflation, could be cited as specific domestic risks. In light of the current capacity utilization in 2007, which continues to be high, the investment cycle could last longer than forecast in 2008, despite a worsening of the international economic picture. The expected restraint in spending leaves room for stronger growth in private consumption.

The greatest downward risk from a current point of view is the danger of an even faster slowdown on the U.S. real estate market (box 1). A "hard landing" in the U.S.A. would negatively impact the entire global economy via numerous transmission channels (trade, confidence, financial markets, exchange rates, etc.).

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[6] *The corresponding regulation was still under examination at the time the forecast was prepared. The main point is the opening for skilled workers in 50 shortage professions, with a shortage profession being defined as a number of job seekers per position equal to or less than 1.5.*

Furthermore, additional increases in the price of oil, further acceleration of food prices, and further devaluation of the U.S. dollar vis-à-vis the euro represent central forecast risks. Continued wage moderation is a key assumption of this forecast. In light of the steady decline of the wage share on the one hand and unexpectedly strong inflation in October 2007 on the other hand, wage agreements could also turn out higher than assumed. This would strengthen consumption growth in the short term, but would also drive prices up. Overall, the risk of this forecast is oriented downward on the real side and upward on the nominal side.

8 Downward Revision of Growth Forecast Compared to June 2007

Compared to the June 2007 economic outlook, the basic external conditions have significantly worsened – above all for 2007 and 2008. While the price of oil has undergone sharp fluctuations, it is significantly higher overall, and the nominally effective exchange rate for Austria has fallen – in particular as a result of the USD/EUR development (in effect, euro appreciation). The growth prospects for the U.S.A. have worsened noticeably, and the growth of the Austrian export markets in 2007 is more than 1 percentage point lower than predicted in June 2007. The market expectations for the further development of short- and long-term interest rates are – in light of worsening economic prospects – mostly just below the values of the June 2007 economic outlook.

The effects of the changed external assumptions were simulated using the OeNB's macroeconomic model.

The result is a downward revision of GDP by 0.1 percentage points for 2007, a downward revision by 0.3 percentage points for 2008, and an upward revision by 0.1 percentage points for 2009.

Table 10 lists the causes for the forecast revision in detail. In addition to the effects of the changed external assumptions, this is also explained by the effects of new data and influences listed under "Other." The influence of new data takes the effects of the revisions of historical data (up to the first quarter of 2007) already available at the time of the last forecast and the errors of the last forecast into consideration for those quarters now published for the first time (the second and third quarters of 2007). The item "Other" includes changes in expert estimates regarding the development of domestic aggregates, such as public consumption or wage agreements, as well as any changes to the forecast models.

The growth revision for Austria for 2007 (+0.1 percentage points) is based essentially on data revisions; these outweigh all other factors. The revision of the growth forecast for 2008 (−0.2 percentage points) largely reflects changes in external assumptions, but also amended expert estimates, whereby the decrease in investment demand occurs somewhat more slowly than was assumed in the June forecast.

The revision of the inflation forecast for 2007 is almost equally attributable (0.2 percentage points each) to new external assumptions and new data. The revision of the inflation forecast for 2008 is essentially determined by the revision of external assumptions (+0.3 percentage points) and the forecasting error (+0.2 percentage points) caused by the unex-

Table 10

Change in the Underlying External Economic Conditions since the OeNB June 2007 Outlook

	December 2007			June 2007			Difference		
	2007	2008	2009	2007	2008	2009	2007	2008	2009
	Annual change in %								
Growth of Austria's export markets	+6.4	+6.3	+6.6	+7.3	+6.5	+6.5	−0.9	−0.2	+0.1
Competitors' prices in Austria's export markets	+0.6	+0.9	+1.4	+0.5	+1.3	+1.4	+0.1	−0.4	+0.0
Competitors' prices in Austria's import markets	+0.8	+0.9	+1.4	+0.8	+1.3	+1.4	+0.0	−0.4	+0.0
	USD								
Oil price per barrel (Brent)	72.6	88.6	83.7	65.0	69.9	69.6	+7.6	+18.7	+14.1
	Annual change in %								
Nominal effective exchange rate (exports)	−0.6	−0.4	+0.0	−0.5	−0.1	+0.0	−0.1	−0.3	+0.0
Nominal effective exchange rates (imports)	−0.1	−0.2	+0.0	+0.0	+0.0	+0.0	−0.1	−0.2	+0.0
	%								
Three-month interest rates	4.3	4.5	4.3	4.2	4.5	4.4	+0.1	+0.0	−0.1
Long-term interest rates	4.3	4.2	4.2	4.1	4.3	4.3	+0.2	−0.1	−0.1
	Annual change in %								
Real GDP, U.S.A.	+2.1	+2.3	+2.6	+2.0	+2.7	+3.2	+0.1	−0.4	−0.6
	USD/EUR								
USD/EUR exchange rate	1.37	1.46	1.46	1.34	1.36	1.36	+0.03	+0.10	+0.10

Source: Eurosystem.

Table 11

Breakdown of Forecast Revisions

	GDP			HICP		
	2007	2008	2009	2007	2008	2009
	Annual change in %					
December 2007 outlook	+3.3	+2.5	+2.3	+2.1	+2.4	+1.8
June 2007 outlook	+3.2	+2.7	+2.3	+1.7	+1.8	+1.9
Difference	+0.1	−0.2	+0.0	+0.4	+0.6	−0.1
Due to:						
External assumptions	−0.1	−0.3	+0.1	+0.2	+0.3	−0.1
New data	+0.2	+0.0	x	+0.2	+0.2	x
of which: Revision of historical data up to Q1 07	+0.4	x	x	+0.1	x	x
Projection errors for Q2 07 and Q3 07	−0.1	+0.0	x	+0.1	+0.2	x
Other[1]	+0.0	+0.2	−0.1	+0.0	+0.1	+0.0

Source: OeNB June 2007 and December 2007 outlooks.

[1] Different assumptions about developments in domestic variables such as wages, government consumption, effects of tax measures, other changes in assessment or in the model.

pected development of inflation at the end of 2007.

A comparison with other available forecasts for Austria shows that the OeNB's estimate of real GDP growth is near the average, but that its estimate for the rate of inflation is at the top end. This is the result of the timing of publication, which allowed the current development of inflation to be taken into account.

Economic Outlook for Central and Eastern European Countries[1,2]

The OeNB compiles semiannual forecasts of economic developments in the Czech Republic, Hungary and Poland as well as Russia. Taken together, the 3 CEE Member States already account for more than 60% of the 12 CESEE EU Member States' overall GDP and are thus representative of trends in this region of the EU. Among the CEE Member States, economic growth is expected to decelerate in the Czech Republic and in Hungary in 2007 compared to 2006, whereas growth will pick up in Poland. In 2008, economic growth will be stronger only in Hungary; the Czech Republic and Poland are expected to register weaker growth rates.

GDP Growth in Three Central and Eastern European Member States and Russia: Forecast of October 2007

Annual change at constant prices (%)

Gross domestic product	2004	2005	2006	2007	2008[1]
Czech Republic	4.6	6.5	6.4	5.4	5.1
Hungary	4.8	4.1	3.9	2.0	2.5
Poland	5.3	3.5	5.8	6.5	5.7
Russia	7.1	6.4	6.7	7.0	6.2

Source: Eurostat, national statistical offices, OeNB, Suomen Pankki.

[1] *Forecast.*

*In the **Czech Republic**, the growth rate of private consumption is expected to pick up in 2007, driven by a sizeable increase in gross disposable income. Considering the slowdown of GFCF in the first half of this year, GFCF growth in 2007 is expected to be below that of 2006. Export and import growth rates will decline slightly in 2007 compared to 2006. The contribution of net exports to GDP growth is expected to be about neutral. For **2008**, private consumption growth is expected to slow down in the wake of a recently accorded reform package which includes i.e. higher VAT and excise taxes and lower social transfers. The negative effects on private consumption will be mitigated by employment increases. Due to the reform package, public consumption growth will be slightly negative. GFCF growth is expected to pick up. On the external side, a slowdown both of import and export growth is expected. The contribution of net exports to GDP will again be about neutral.*

*In **Hungary**, both private and public consumption will contract in **2007**. This can largely be explained with the fiscal consolidation program, which includes, inter alia, an employment cut and a wage freeze in the public sector, an increase in health care contributions and the elimination of some tax exemptions. Real net disposable income is expected to decrease, even if no significant moderation of gross nominal wages in the private sector is assumed. The dynamics of public consumption in the first half of 2007 are considerably below previous expectations, due to a particularly strong decline of social transfers in kind. After declining in 2006, GFCF growth is expected to recover marginally in 2007. The deceleration of export growth will be accompanied by a slowdown of import*

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[1] *Compiled by Antje Hildebrandt.*

[2] *These forecasts 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 in broad macroeconomic projection exercises. These assumptions are central to the current outlook for two reasons: first, the sizeable export links of these three EU countries with the euro area, and second, the fact that Russia is one of the world's largest oil-producing nations and that energy sources account for some 60% of the country's total exports. (In the case of Russia, the forecast is established in collaboration with Suomen Pankki, Finland's central bank.)*

*dynamics, especially as domestic demand continues to contract. The contribution of net exports is expected to remain positive, but significantly smaller than in 2006. For **2008**, economic growth in Hungary is expected to pick up moderately. Private consumption will grow marginally as a result of a modest recovery of employment and a stabilization (or minor increase) of real wages. GFCF growth is expected to augment. On the external side, export growth will moderate slightly, and import dynamics are expected to remain roughly stable as a result of deceleration export growth coupled with a gradual recovery of domestic demand. The contribution of net exports will erode further, but will remain positive.*

*In **Poland**, the domestic demand boom is expected to continue in 2007, driven by private consumption and GFCF. Private consumption is rising on the back of high employment growth combined with robust real wage growth and the high growth of credit to households. On the back of buoyant demand, (still) high profitability, robust credit growth and a further increase in the absorption of structural funds, GFCF growth is expected to accelerate further. Export growth is anticipated to decline, while import growth will moderate less strongly. Thus, the contribution of net exports will become more negative. For **2008**, GDP growth will moderate somewhat, as domestic demand growth is expected to decline. With real wage growth forecast to slow, private consumption growth will diminish. The deceleration of private consumption growth will be moderated mainly by social reforms. GFCF growth is expected to decelerate from very high levels in 2007, as profitability will come down, credit growth will be dampened and the increase of the absorption of structural funds will slow. Export growth will weaken slightly, import growth will slow moderately. Overall, the contribution of net exports will stay negative.*

Regarding possible sources of risk to these forecasts, deviations from the underlying assumptions for external factors, like import growth of the main trading partners and oil price developments, constitute one source of risk. Additionally, some uncertainty remains about the emergence of bottlenecks on the labor market (in particular in the Czech Republic and in Poland), which could lead to an acceleration of real wages, higher inflation and, finally, to tighter than expected monetary policy. In Poland, reforms were adopted before elections took place; thus, there remains some uncertainty about whether they will be changed. Furthermore, the region depends largely on foreign capital inflows. The recent developments on the financial markets could have a deeper impact on the region than up until now. In Hungary, public expenditures represent a source of some uncertainty: with elections coming up in 2010, it is unclear how long restraint in public sector investment and wages will last.

*In **Russia**, the economic situation and prospects for **2007** and **2008** are quite good. Annual real growth of private consumption has remained high in recent years and is forecast to continue at a slightly weaker, but still robust rate, due the confluence of buoyant (preelection) rises in real income and the somewhat weaker expansion of lending. Credit growth may be curbed somewhat in late 2007 and in 2008 by a tighter liquidity situation in the banking sector stemming from repercussions of the most recent financial turbulences.*

There is pressure to loosen fiscal policy in Russia, given the upcoming elections. Thus, government consumption is expected to speed up somewhat in 2007 and in 2008. GFCF is predicted to continue growing at a robust pace in 2007 and 2008, driven by huge projects in the energy sector and increased public investment. Rapid economic growth and the further real appreciation of the ruble will sustain high import growth which, however, is expected to decline somewhat. Import demand growth is expected to ease because the upward pressure on the ruble will presumably weaken somewhat once the strong rise of oil prices experienced in recent years levels off, as expected and because the economic expansion will lose some momentum. Rapidly rising imports are not yet considered to pose a threat to Russia's external balances.

Given the persisting dependence of the Russian economy on the extraction and export of raw materials, the oil price remains a key risk factor for Russian growth. If the oil price

were to drop sharply, Russia's current account balance could run into the red in one or two years from now and economic growth could suffer. However, there are now some buffers that can cushion the decline. Furthermore, the stability of the capital inflows is not guaranteed. Another risk factor consists of a possible excessively quick appreciation of the real exchange rate, triggered by accelerating inflows of energy proceeds and/or capital inflows. The rapid expansion of domestic lending, which has been going on for some years now, will also trigger risks if the number of problem loans swells further. Recently, non-performing household credits have been proliferating swiftly, albeit from a low point of departure. Another risk could be a stronger curbing of credit growth. Finally, the political uncertainty brought on by the presidential elections in the spring of 2008 could also spill over into economic risks to growth expected toward the end of the forecast period.

Annex
Detailed Result Tables

Table 12

Demand Components (Real Prices)

Chained volume data (reference year = 2000)

	2006	2007	2008	2009	2006	2007	2008	2009
	EUR million				Annual change in %			
Private consumption	129,554	131,612	133,632	135,817	+2.0	+1.6	+1.5	+1.6
Government consumption	41,544	42,484	43,715	43,681	+2.0	+2.3	+2.9	−0.1
Gross fixed capital formation	49,149	51,353	52,693	53,915	+3.1	+4.5	+2.6	+2.3
of which: Investment in plant and equipment	*19,552*	*20,397*	*20,981*	*21,405*	*+3.2*	*+4.3*	*+2.9*	*+2.0*
Residential investment	*10,269*	*10,351*	*10,571*	*10,882*	*+5.6*	*+0.8*	*+2.1*	*+2.9*
Non-residential and other investment	*19,377*	*20,464*	*21,041*	*21,528*	*+3.6*	*+5.6*	*+2.8*	*+2.3*
Changes in inventories (including statistical discrepancy)	−759	−1,167	−1,495	−1,465	×	×	×	×
Domestic demand	219,487	224,282	228,545	231,948	+1.4	+2.2	+1.9	+1.5
Exports of goods and services	135,602	144,265	153,069	163,397	+7.5	+6.4	+6.1	+6.7
Imports of goods and services	121,826	127,492	134,492	142,660	+4.6	+4.7	+5.5	+6.1
Net exports	13,776	16,773	18,577	20,738	×	×	×	×
Gross domestic product	233,263	241,055	247,122	252,685	+3.1	+3.3	+2.5	+2.3

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

Table 13

Demand Components (Current Prices)

	2006	2007	2008	2009	2006	2007	2008	2009
	EUR million				Annual change in %			
Private consumption	142,608	147,706	153,460	158,778	+3.9	+3.6	+3.9	+3.5
Government consumption	46,408	48,421	51,041	52,026	+4.2	+4.3	+5.4	+1.9
Gross fixed capital formation	53,153	56,540	58,999	61,309	+5.9	+6.4	+4.3	+3.9
Changes in inventories (including statistical discrepancy)	719	521	100	363	×	×	×	×
Domestic demand	242,888	253,188	263,600	272,477	+3.6	+4.2	+4.1	+3.4
Exports of goods and services	145,338	157,059	168,795	182,906	+10.5	+8.1	+7.5	+8.4
Imports of goods and services	130,257	137,755	147,379	158,544	+8.1	+5.8	+7.0	+7.6
Net exports	15,081	19,304	21,416	24,362	×	×	×	×
Gross domestic product	257,969	272,493	285,016	296,839	+5.1	+5.6	+4.6	+4.1

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

Table 14

Deflators of Demand Components

	2006	2007	2008	2009	2006	2007	2008	2009
	2000 = 100				Annual change in %			
Private consumption	110.1	112.2	114.8	116.9	+1.9	+2.0	+2.3	+1.8
Government consumption	111.7	114.0	116.8	119.1	+2.1	+2.0	+2.5	+2.0
Gross fixed capital formation	108.1	110.1	112.0	113.7	+2.7	+1.8	+1.7	+1.6
Domestic demand (excluding changes in inventories)	110.0	112.1	114.5	116.6	+2.1	+1.9	+2.2	+1.8
Exports of goods and services	107.2	108.9	110.3	111.9	+2.8	+1.6	+1.3	+1.5
Imports of goods and services	106.9	108.0	109.6	111.1	+3.4	+1.1	+1.4	+1.4
Terms of trade	100.2	100.8	100.6	100.7	−0.6	+0.5	−0.1	+0.1
Gross domestic product	110.6	113.0	115.3	117.5	+1.9	+2.2	+2.0	+1.9

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook,

Table 15

Labor Market

	2006	2007	2008	2009	2006	2007	2008	2009
	Thousands				Annual change in %			
Total employment	4,230.5	4,295.1	4,328.8	4,362.2	+1.2	+1.5	+0.8	+0.8
of which: private sector	*3,745.3*	*3,808.5*	*3,842.4*	*3,875.3*	*+1.2*	*+1.7*	*+0.9*	*+0.9*
Payroll employment (national accounts definition)	3,411.3	3,474.7	3,502.6	3,527.0	+1.7	+1.9	+0.8	+0.7
	%							
Unemployment rate (Eurostat definition)	4.7	4.3	4.2	4.3	×	×	×	×
	% of real GDP							
Unit labor costs (whole economy)[1]	53.6	54.2	55.1	55.8	+1.1	+1.1	+1.6	+1.2
	EUR thousand per employee							
Labor productivity (whole economy)[2]	55.1	56.1	57.1	57.9	+2.0	+1.8	+1.7	+1.5
	EUR thousand							
Real compensation per employee[3]	33.3	33.5	33.8	34.2	+0.6	+0.6	+1.0	+1.0
	At current prices, EUR thousand							
Gross compensation per employee	36.7	37.6	38.9	39.9	+2.5	+2.6	+3.4	+2.8
	At current prices, EUR million							
Total gross compensation of employees	125,094	130,675	136,153	140,899	+4.2	+4.5	+4.2	+3.5

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

[1] Gross wages as a ratio of real GDP.
[2] Real GDP divided by total employment.
[3] Gross wages per employee divided by the private consumption deflator.

Table 16

Current Account

	2006	2007	2008	2009	2006	2007	2008	2009
	EUR million				% of nominal GDP			
Balance of trade	11,280.5	14,655.4	16,100.6	18,629.0	4.4	5.4	5.6	6.3
Goods	220.8	2,738.7	2,497.3	4,249.5	0.1	1.0	0.9	1.4
Services	11,059.7	11,916.8	13,603.3	14,379.5	4.3	4.4	4.8	4.8
Euro area	−66.1	842.0	2,274.3	2,539.7	0.0	0.3	0.8	0.9
Non-euro area countries	11,346.6	13,813.4	13,826.3	16,089.3	4.4	5.1	4.9	5.4
Balance on income	−3,033.0	−3,942.3	−3,865.7	−3,769.6	−1.2	−1.4	−1.4	−1.3
Balance on transfers	−1,140.0	−1,643.0	−1,348.0	−1,348.0	−0.4	−0.6	−0.5	−0.5
Current account	7,107.5	9,070.1	10,886.9	13,511.4	2.8	3.3	3.8	4.6

Source: 2006: Eurostat; 2007 to 2009: OeNB December 2007 outlook.

Table 17

Quarterly Forecast Results

	2007	2008	2009	2007				2008				2009			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Annual change in %															
Prices, wages and costs															
HICP	+2.1	+2.4	+1.8	+1.8	+1.9	+1.9	+2.9	+2.8	+2.6	+2.3	+2.1	+1.9	+1.9	+1.8	+1.7
HICP excluding energy	+2.0	+2.1	+1.8	+1.8	+2.0	+1.9	+2.3	+2.1	+2.1	+2.0	+1.9	+1.9	+1.8	+1.8	+1.7
Private consumption expenditure (PCE) deflator	+2.0	+2.3	+1.8	+1.9	+1.9	+1.9	+2.2	+2.4	+2.4	+2.4	+2.1	+1.9	+1.8	+1.8	+1.7
Gross fixed capital formation deflator	+1.8	+1.7	+1.6	+2.1	+1.8	+1.7	+1.6	+1.8	+1.8	+1.7	+1.6	+1.6	+1.6	+1.5	+1.5
GDP deflator	+2.2	+2.0	+1.9	+2.2	+2.2	+2.2	+2.2	+2.1	+2.1	+2.0	+1.9	+1.8	+1.8	+1.9	+1.9
Unit labor costs	+0.4	+1.6	+1.4	−2.6	−1.8	+4.4	+1.7	+3.2	+3.2	−1.7	+1.8	+1.7	+1.5	+1.1	+1.1
Nominal wages per employee	+2.6	+3.4	+2.8	+2.3	+2.6	+2.8	+2.5	+3.1	+3.1	+3.5	+3.7	+3.4	+3.0	+2.4	+2.3
Productivity	+1.8	+1.7	+1.5	+3.1	+3.0	+0.0	+1.2	+0.8	+0.8	+3.5	+1.9	+1.8	+1.6	+1.4	+1.2
Real wages per employee	+0.6	+1.0	+1.0	+0.4	+0.7	+0.9	+0.3	+0.7	+0.7	+1.0	+1.6	+1.5	+1.2	+0.7	+0.5
Import deflator	+1.1	+1.4	+1.4	+1.6	+1.0	+0.6	+1.0	+1.3	+1.4	+1.6	+1.4	+1.4	+1.4	+1.4	+1.4
Export deflator	+1.6	+1.3	+1.5	+2.1	+1.7	+1.3	+1.2	+1.1	+1.2	+1.4	+1.4	+1.5	+1.5	+1.5	+1.5
Terms of trade	+0.5	−0.1	+0.1	+0.5	+0.7	+0.6	+0.2	−0.2	−0.2	−0.1	+0.0	+0.1	+0.1	+0.1	+0.1
Annual and/or quarterly changes in %, in real terms															
Economic activity															
GDP	+3.3	+2.5	+2.3	+1.0	+0.7	+0.8	+0.5	+0.6	+0.6	+0.6	+0.6	+0.5	+0.5	+0.5	+0.5
Private consumption	+1.6	+1.5	+1.6	+0.4	+0.4	+0.5	+0.4	+0.3	+0.3	+0.4	+0.4	+0.4	+0.4	+0.4	+0.4
Government consumption	+2.3	+2.9	−0.1	+0.3	+0.4	+2.0	+0.0	+1.0	+0.7	+0.4	+0.1	−0.2	−0.2	−0.2	−0.2
Gross fixed capital formation	+4.5	+2.6	+2.3	+1.3	+0.8	+0.7	+0.7	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6
of which: Investment in plant and equipment	*+4.3*	*+2.9*	*+2.0*	*+1.4*	*+1.2*	*+1.2*	*+0.6*	*+0.6*	*+0.6*	*+0.6*	*+0.5*	*+0.5*	*+0.5*	*+0.5*	*+0.4*
Residential construction investment[1]	*+0.8*	*+2.1*	*+2.9*	*−0.4*	*−0.3*	*+0.2*	*+0.7*	*+0.6*	*+0.6*	*+0.7*	*+0.7*	*+0.7*	*+0.8*	*+0.8*	*+0.8*
Exports	+6.4	+6.1	+6.7	+1.7	+0.9	+1.2	+1.4	+1.5	+1.6	+1.7	+1.7	+1.7	+1.6	+1.6	+1.6
Imports	+4.7	+5.5	+6.1	+1.1	+0.4	+1.0	+1.3	+1.6	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5
Contribution to real GDP growth in percentage points															
Domestic demand	+2.2	+1.9	+1.4	+0.5	+0.5	+0.8	+0.4	+0.5	+0.4	+0.4	+0.4	+0.3	+0.3	+0.3	+0.3
Net exports	+1.3	+0.7	+0.9	+0.4	+0.3	+0.2	+0.2	+0.1	+0.2	+0.2	+0.2	+0.2	+0.2	+0.2	+0.2
Changes in inventories	−0.2	−0.1	+0.0	+0.1	−0.2	−0.2	−0.1	+0.1	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
%															
Labor market															
Unemployment rate (Eurostat definition)	4.3	4.2	4.3	4.4	4.3	4.3	4.2	4.1	4.2	4.2	4.2	4.3	4.3	4.4	4.4
Annual and/or quarterly changes in %															
Total employment	+1.5	+0.8	+0.8	+0.1	+0.2	+3.0	−1.5	+0.1	+0.2	+0.2	+0.2	+0.2	+0.2	+0.2	+0.2
of which: Private sector employment	*+1.7*	*+0.9*	*+0.9*	*+0.1*	*+0.2*	*+3.4*	*−1.6*	*+0.1*	*+0.2*	*+0.2*	*+0.2*	*+0.2*	*+0.2*	*+0.2*	*+0.3*
Payroll employment	+1.9	+0.8	+0.7	+0.7	+0.2	+0.4	+0.2	+0.2	+0.1	+0.1	+0.2	+0.2	+0.2	+0.2	+0.2
Annual and/or quarterly changes in %, in real terms															
Additional variables															
Disposable household income	+1.9	+1.7	+1.6	+2.3	+1.7	−1.5	−0.9	+1.6	+1.0	+0.7	+0.2	+0.2	+0.3	+0.5	+0.5
% of disposable real household income (saving ratio) and % of real GDP (output gap)															
Household saving ratio	10.1	10.2	10.2	10.6	12.2	9.7	8.1	9.7	10.3	10.6	10.4	10.2	10.2	10.2	10.3
Output gap	0.0	0.4	0.4	−0.2	−0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.4	0.4	0.3

Source: OeNB December 2007 outlook. Quarterly values are seasonally adjusted.

[1] *Excluding other construction investment and other investment.*

Table 18

Comparison of Current Economic Forecasts for Austria

Indicator	OeNB			WIFO		IHS		OECD			IMF		European Commission		
	June 2007			Sep. 2007		Sep. 2007		Dec. 2007			Oct. 2007		Nov. 2007		
	2007	2008	2009	2007	2008	2007	2008	2007	2008	2009	2007	2008	2007	2008	2009
Annual change in %															
Key results															
GDP (real)	+3.3	+2.5	+2.3	+3.4	+2.4	+3.2	+2.6	+3.3	+2.5	+2.5	+3.3	+2.5	+3.3	+2.7	+2.4
Private consumption (real)	+1.6	+1.5	+1.6	+1.9	+2.1	+2.0	+2.2	+1.6	+1.9	+2.0	×	×	+1.7	+1.9	+2.1
Government consumption (real)	+2.3	+2.9	−0.1	+2.0	+2.3	+2.1	+2.8	+2.3	+2.0	+1.3	×	×	+1.9	+2.1	+0.6
Gross fixed capital formation (real)[1]	+4.5	+2.6	+2.3	+6.3	+3.7	+5.9	+3.9	+4.4	+2.6	+1.8	×	×	+5.7	+3.2	+2.4
Exports (real)	+6.4	+6.1	+6.7	+8.3	+6.0	+6.5	+6.0	+6.3	+5.4	+6.2	×	×	+7.2	+6.5	+5.9
Imports (real)	+4.7	+5.5	+6.1	+7.7	+6.5	+6.2	+6.6	+4.6	+4.9	+5.4	×	×	+6.1	+6.0	+5.3
GDP per employee	+1.8	+1.7	+1.5	+2.5	+1.7	+1.3	+1.6	×	×	×	×	×	+1.6	+1.8	+1.8
GDP deflator	+2.2	+2.0	+1.9	+2.2	+2.0	+1.8	+1.5	+2.2	+2.3	+1.9	+2.0	+1.9	+2.3	+2.1	+1.4
CPI	×	×	×	+1.9	+2.0	+1.8	+1.6	×	×	×	+1.9	+1.9	×	×	×
HICP	+2.1	+2.4	+1.8	+1.9	+2.0	×	×	+2.1	+2.4	+2.0	×	×	+1.9	+1.9	+1.8
Unit labor costs	+1.1	+1.6	+1.2	+0.1	+1.4	×	×	×	×	×	×	×	+0.8	+1.0	+0.8
Total employment	+1.5	+0.8	+0.8	+1.9	+0.9	+1.9	+1.0	×	×	×	×	×	+1.6	+0.9	+0.6
%															
Unemployment rate[2]	4.3	4.2	4.3	4.3	4.2	4.3	4.3	5.3	5.3	5.5	4.3	4.2	4.3	4.2	4.2
% of nominal GDP															
Current account	3.3	3.8	4.6	3.5	3.7	×	×	4.7	4.9	5.5	3.7	3.7	4.8	5.3	5.3
Government surplus/ deficit	−0.7	−0.7	−0.4	−0.4	−0.5	−0.6	−0.5	−0.8	−0.6	−0.2	−0.8	−0.6	−0.8	−0.7	−0.4
External asssumptions															
Oil price in USD per barrel (Brent)	72.6	88.6	83.7	64.0	69.0	67.0	67.0	90.0	90.0	90.0	68.5	75.0	70.6	78.8	76.0
Short-term interest rate in %	4.3	4.5	4.3	4.2	4.4	4.2	4.4	4.3	4.2	4.1	4.0	4.1	4.3	4.4	4.3
USD/EUR exchange rate	1.37	1.46	1.46	1.35	1.40	1.35	1.35	1.45	1.45	1.45	1.35	1.37	1.36	1.42	1.42
Annual change in %															
Euro area GDP (real)	+2.4 bis +2.8	+1.5 bis +2.5	+1.6 bis +2.6	+2.7	+1.9	+2.5	+2.3	+2.6	+1.9	+2.0	+2.5	+2.1	+2.6	+2.2	+2.1
U.S. GDP (real)	+2.1	+2.3	+2.6	+1.9	+1.8	+2.0	+2.5	+2.2	+2.0	+2.2	+1.9	+1.9	+2.1	+1.7	+2.6
World GDP (real)	+5.2	+4.7	+4.7	+5.1	+4.8	×	×	×	×	×	+5.2	+4.8	+5.1	+4.7	+4.8
World trade	+6.1	+6.5	+7.0	+7.0	+7.0	+6.0	+5.5	+7.0	+8.1	+8.1	+6.6	+6.7	+7.5	+7.0	+7.2

Source: OeNB, WIFO, IHS, OECD, IMF, European Commission.

[1] *For IHS: Gross investment.*
[2] *Eurostat definition; for OECD: OECD definition.*

Comparing the Predictive Accuracy
of Macroeconomic Forecasts
for Austria from 1998 to 2006

This study for the first time presents an analysis of the predictive accuracy of all forecasts available for the Austrian economy. To be precise, the fall 1998 to fall 2006 forecasts of the following three national and three international institutions are compared: the Oesterreichische Nationalbank (OeNB), the Austrian Institute of Economic Research (WIFO), the Institute for Advanced Studies (IHS), the Organisation for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF) and the European Commission. The forecasts of the various institutions tend to paint a relatively similar picture of the economy. As a case in point, all institutions markedly underestimated both the magnitude and the duration of the 2001 slowdown. Credit for the most accurate forecasts is due to the national institutions; none of the international institutions reach or significantly surpass their performance. WIFO posts the smallest error in the GDP forecasts for the current year, the OeNB for the year ahead. The OeNB outperforms all institutions in predicting inflation, recording the smallest mean forecast error.

Christian Ragacs,
Martin Schneider[1]

1 Introduction

Macroeconomic forecasts are an important input for economic policymakers and are likewise essential in guiding monetary, fiscal and wage policy decision making. Also, budget preparation, interest rate decisions and wage bargaining would be severely hampered without forecasts. Economic policymakers in Austria have been able to draw on periodic forecasts since 1963, when the WIFO published its first macroeconomic forecast.

Many factors driving economic developments are subject to a high degree of uncertainty, which is why predictions and outcomes hardly ever match perfectly. It is common wisdom that forecasts are prone to errors. Given that macroeconomic forecasts are meant to provide an accurate snapshot of the economy at future points in time, they must pass muster in an ex-post quantitative evaluation of their predictive power.

Several authors compared the predictive accuracy of forecasts for the Austrian economy already in the 1970s, 1980s and 1990s (Thury, 1970; Fleissner, 1980; Kramer, 1980; Schebeck and Thury, 1980; Hofer and Koman, 1991; Wörz, 1994). More recently, Rabitsch (2002) and Baumgartner (2002a) assessed the forecasting performance of WIFO and the IHS. Baumgartner (2002b) also included the OECD forecasts. In light of the relatively short forecasting history of the OeNB, no study had as yet considered the OeNB forecasts. Both the IHS and the OECD started publishing periodic forecasts in 1972, while the OeNB followed suit only in the fall of 1998. This study is the first to present an analysis of the predictive accuracy of all six institutions (OeNB, WIFO, IHS,

Refereed by:
Christian Dreger
(German Institute for
Economic Research –
DIW Berlin).

OECD, IMF and the European Commission) that prepare macroeconomic forecasts for Austria.

We discuss the characteristics of the forecasts under investigation in section 2. In section 3, we present an overview of the movements of the GDP forecasts over time. Section 4 centers on the quantitative assessment of the predictive power of forecasts by the various institutions. Here, we first shed light on the measures we used to assess forecasting performance and then ascertain the average predictive accuracy across all institutions for the variables under investigation, namely GDP, inflation, the unemployment rate, the budget balance, private consumption, government consumption, investment, exports and imports. We then round out this section by juxtaposing the forecasting performance of the individual institutions. Section 5 concludes with a summary of the key findings.

2 Characteristics of the Macroeconomic Forecasts under Investigation

To ensure forecast comparability, it is important to consider several basic characteristics, such as the *number of forecasts released per year, the forecast horizons, the dates of publication*[2] as well as the *cutoff dates*, since these factors may vary from institution to institution (table 1).

While WIFO and the IHS release quarterly forecasts, the other four institutions, i.e. the OeNB, the European Commission, the IMF and the OECD, publish forecasts twice a year. Consequently, we use only the June

and December forecasts of WIFO and the IHS when comparing predictive accuracy in section 4. In the same vein, *forecast horizons* differ across the surveyed institutions. The OeNB is the only institution whose spring forecast provides predictions for two years ahead *(t+2)* apart from the current year *(t)* and the next year *(t+1)*, i.e. the two forecast horizons common to all spring predictions. The fall forecasts of all institutions except the IMF cover the three horizons *t*, *t+1* and *t+2*. In light of these differences, we limit our assessment of predictive accuracy to the current-year and next-year forecasts.

This brings us to the *dates of publication*: the international institutions publish their forecasts up to two or three months ahead of the national forecasters, which puts the former at a clear informational disadvantage.

The latest information available when formulating the forecast, reflected by the *cutoff date*, also plays an important role. Here, not only the date of publication is relevant, but also the length of time an institution uses for producing a forecast. Neither WIFO nor the IHS has to coordinate its economic predictions with other country forecasts. By contrast, the European Commission, the OECD and the IMF – and also the OeNB – use a markedly longer forecasting process that precludes them from factoring in recent developments. The cutoff dates for the OeNB forecasts under investigation were, for instance, mid-May and mid-November, respectively. By contrast, WIFO and the IHS had the advantage of using an additional quarterly System of

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[2] *Over time, there have repeatedly been minor shifts in the dates of publication.*

The OeNB Projections

Its strong conditional nature stands out as the most distinctive feature of the OeNB forecast. Drawn up in cooperation with the other national central banks in the euro area and the ECB, its results are used in the Eurosystem staff macroeconomic projections for the euro area, which serve as an important input into the assessment of economic developments and the risks to price stability of the Governing Council of the ECB. Meant to anticipate economic developments under a given monetary policy stance, the projections were based on the assumption of a constant level of short-term interest rates and exchange rates up to 2005. Assumptions on long-term interest rates reflect market expectations for ten-year government bonds. Since June 2006, the underlying short-term interest rate for the forecast horizon has been based on market expectations for the three-month EURIBOR. The OeNB forecast, or rather projection, has been much more conditional by nature (especially until 2005) than the forecasts released by the other institutions surveyed in this study. A comparison of OeNB predictions with actual outcomes is therefore, strictly speaking, inadmissible.

National Accounts (SNA) observation.[3] Since fall 2005 GDP flash estimates have been available; they serve as an input for the OeNB projections.

3 Forecast Errors for GDP over Time

The forecasts for Austria examined in this study cover a period which saw a pronounced yet atypical business cycle. The global economy slowed down sharply in 2001, reflecting the recession in the U.S.A., which was attributable to surging crude oil prices, the appreciation of the U.S.

dollar, the correction of irrationally high prices on technology stock exchanges, sinking consumer confidence and the terrorist attacks of September 11, 2001. GDP growth in Austria plunged from a remarkable 3.4% in 2000 to 0.8% in 2001 and remained very subdued until 2003. In 2004, however, GDP growth accelerated markedly thanks to the robust global economy, and following a brief slowdown in early 2005 recorded an even faster clip in 2006.[4]

Chart 1 shows the movements from 1999 to 2006 of *GDP growth predictions averaged across all institutions.*

Dates of Publication and Forecast Horizons of the Forecasts for Austria

	Winter	Spring	Summer	Fall
OeNB	×	June: t, t+1, t+2	×	Dec.: t, t+1, t+2
WIFO	March: t, t+1	June: t, t+1	Sep.: t, t+1	Dec.: t, t+1, t+2
IHS	March: t, t+1	June: t, t+1	Sep.: t, t+1	Dec.: t, t+1, t+2
European Commission	×	April: t, t+1	×	Oct.: t, t+1, t+2
IMF	×	April: t, t+1	×	Sep.: t, t+1
OECD	×	April: t, t+1	×	Nov.: t, t+1, t+2

Source: OeNB.

[3] *In this respect, above all the IMF is at a disadvantage, given its extremely long forecasting process. The IMF produces its global economic forecast on the basis of individual country forecasts. To allow the IMF to ensure consistency between the country forecasts, the latter are released with a pronounced lag. The information disadvantage is as large as two quarters.*

[4] *For an analysis of past business cycles in Austria and for dating turning points, see Scheiblecker (2002, 2007).*

Chart 1
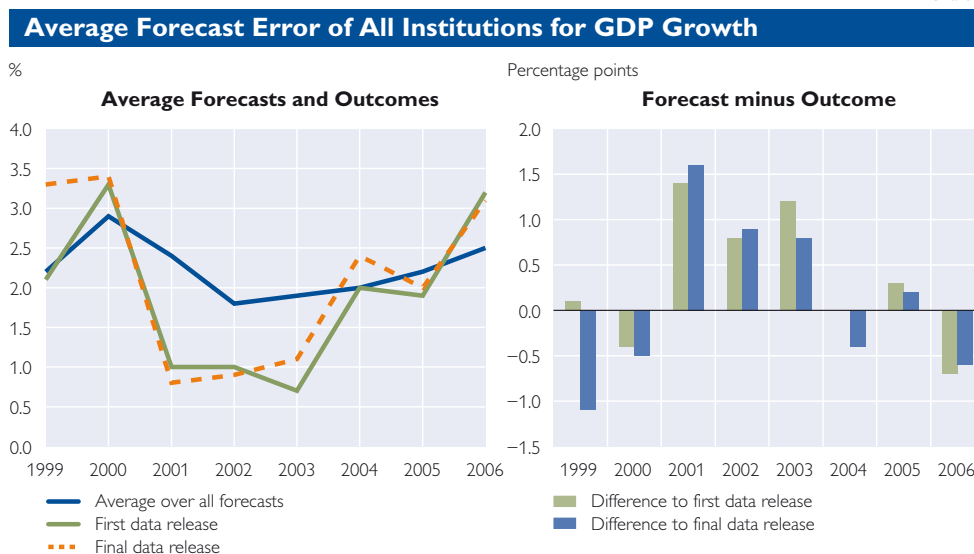
Average Forecast Error of All Institutions for GDP Growth

Source: Forecasts of all surveyed institutions, Statistics Austria, authors' calculations.

To this end, we calculated the mean of all forecast values for every year. The left panel also includes the movements of the outcomes, namely the quarterly SNA data both as first and finally released by WIFO.[5] The right panel illustrates the forecast errors resulting for each year.

All institutions failed to foresee the magnitude and duration of the economic slump in 2001. They also clearly underpredicted growth for the boom years 2000 and 2006. Analyzing the forecast errors over time, we see that growth tends to be underpredicted during a boom and overpredicted during a recession. Thus, the forecasts smooth out the peaks and troughs evident in the actual GDP series.

Chart 2 shows the ranges of real GDP growth forecasts for the period from 1999 to 2006 across all institutions.[6] The lowest and highest values per publication date are indicated for each forecast year.[7] For example, the lowest prediction presented in the fall 1998 forecasts for 2000 ("98 f") came to 1.9%; the highest prediction was 3.0%. The OeNB forecasts are plotted in addition. As a rule, forecasts for two years ahead start out at around 2½% for all forecast years and over time gradually converge toward the actual values. At an average 0.4 percentage points, the forecast ranges may be considered relatively small. The unusually large range evident for the fall 2001 forecasts for the year 2002 stems from the fact that

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[5] Frequent far-reaching data revisions and conceptual changes sometimes result in pronounced changes in the assessment of the current economic situation. For this reason, we examine the forecasts relative to the first data release when we conduct the quantitative assessment of the forecasting performance in section 4.

[6] As mentioned before, the OeNB has been releasing periodic forecasts only since fall 1998. To ensure consistency across the institutions, we did not include forecasts for the years 1999 and 2000 published earlier than 1998 by the other institutions in chart 2.

[7] Note that not all six institutions produce forecasts for every indicated publication date (table 1).

the IMF was the only institution which released its forecast prior to the September 11 terrorist attacks.

The forecasts were gradually revised to reflect the downturn of 2001. Even though the slowdown became evident from the data of the first quarter of 2001 at the latest, all institutions interpreted it as only a temporary dent in growth. They consequently overpredicted growth for 2001 to 2003 up until the final forecasts. By contrast, the predictions for 2004 and 2005 largely corresponded with the outcomes. It took forecasters rather long to edge up GDP growth predictions for the year 2006, which was above all ascribable to an overly cautious outlook for exports.

The OeNB forecasts for 2002 and 2003 – two years of slow growth – were more conservative than the predictions of the other institutions, and developments justified this restraint. OeNB experts remained cautious also for 2004, when the economy picked up again. The forecasts for 2005 were very similar across all publication dates. The OeNB was almost invariably more optimistic in its outlook for 2006 than the other institutions.

4 Evaluation of Predictive Accuracy

In this section, we compare the predictive accuracy of the forecasts produced by the various institutions. To this end, we put the forecast values in relation to the first release of WIFO's quarterly SNA data. We chose this method because frequently, far-reaching revisions and restructuring of SNA data completely change the economic picture as it presented itself at the time a given forecast was drawn up. For this reason, the first data release provides a more accurate snapshot of the information available at

the time of forecast production than the final outcomes (Baumgartner, 2002a, 2002b).

4.1 Measures for Comparing Predictive Accuracy

Several measures are used to assess the quality of forecasts, the most common being the *root mean squared error* (RMSE). Giving greater weights to larger deviations of the forecast values ($\hat{x}_t$) from the actual values (x_t), the RMSE implicitly penalizes large forecast errors.

$$RMSE = \sqrt{\frac{1}{N} \sum_{t=1}^{N} (\hat{x}_t - x_t)^2}$$

The absolute size of the average error is shown by the *mean absolute error* (MAE). This measure has the advantage that it may be interpreted directly as the mean deviation of the forecast from the outcome in percentage points.

$$MAE = \frac{1}{N} \sum_{t=1}^{N} |\hat{x}_t - x_t|$$

The *bias* is calculated as the mean deviation of the forecast values from the actual values. It indicates by how much the forecasts on average over- or underpredicted the actual outcomes.

$$Bias = \frac{1}{N} \sum_{t=1}^{N} (\hat{x}_t - x_t)$$

Theil's inequality coefficient *(Theil's U)* assesses the forecast errors relative to the error of a naive forecast. Under the naive model, we assume a continuation of the previous year (level of unemployment and budget balance, growth rates of the other variables). A value smaller than 1 shows that the

Chart 2

Forecasting Ranges for Real GDP Growth in Austria

First data release   Final data release   OeNB
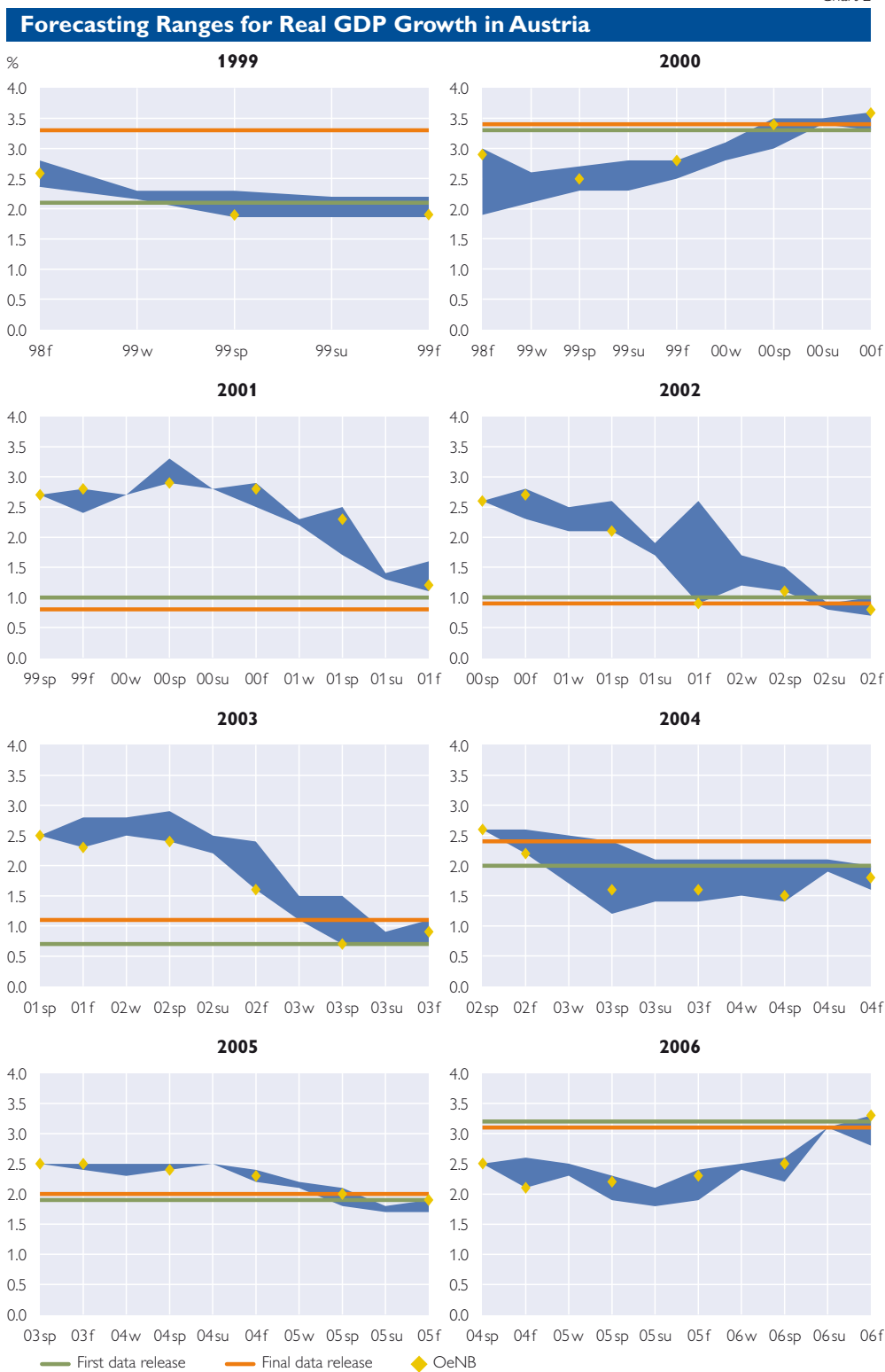
Source: Forecasts of all surveyed institutions, Statistics Austria.

Note: The x axis denotes the forecast dates (sp(ring), su(mmer), f(all) and w(inter)). The respective forecast values are compared with the first release of WIFO's quarterly SNA data for the indicated years and the final release (= most recent data revision) of the GDP growth rate outcomes (y axis).

Table 2

Contingency Table for the Sign Test

		Sign of the change (forecast)	
		≥ 0	< 0
Sign of the change (outcome)	≥ 0	a	b
	< 0	c	d

Source: Spiegel and Stephens (1998).

forecast at hand is superior to the naive forecast.

$$Theil's\ U = \frac{\sqrt{\dfrac{1}{N}\sum_{t=1}^{N}(\hat{x}_t - x_t)^2}}{\sqrt{\dfrac{1}{N}\sum_{t=1}^{N}(x_{t-1} - x_t)^2}}$$

In an evaluation of forecasting performance, it is also interesting to examine whether forecasters predicted the direction of a year-on-year change accurately.[8] For this purpose we use a *sign test* in the form of a chi-square test of independence. In table 2, we differentiate between four scenarios (a–d).

The success rate

$$SR = \frac{a + d}{a + b + c + d}$$

is defined as the share of correctly predicted signs. The null hypothesis

Box 2

Other Factors in Analyzing Predictive Accuracy

While the above-mentioned measures for assessing forecasting performance provide important information about the accuracy of predictions, they do not tell the whole story.

*A subjective evaluation of forecast errors depends on the objectives of the forecast at hand and may even turn out to be **asymmetric**. As a case in point, failing to predict economic downturns might be regarded as a greater error than not foreseeing upturns. On the other hand, under inflation targeting, underestimating inflation might be rated worse than overestimating it.*

*In addition, a forecast error is not necessarily indicative of a "wrong" forecast. Any forecast is to a certain extent a **conditional forecast** resting on given assumptions about the development of exogenous variables. A forecast error may thus reflect a right forecast under wrong assumptions. Vice versa, wrong assumptions combined with a wrong conditional forecast might balance one another out, eventually resulting in an accurate forecast.*

*Moreover, economic forecasts may have direct repercussions on economic developments. The prediction of a downturn may, for instance, affect expectations in such a way that the economy actually slows down. Up to a certain degree, forecasts may therefore play out as **self-fulfilling prophecies**. The opposite – a **self-destructive forecast** – is likewise feasible. Faced with an unfavorable forecast, economic policymakers might for instance take measures that stimulate growth.*

*Last, but not least, it is not really clear to what extent forecast errors may be attributable to **data revisions**. Naturally, it takes time to collect current economic data. Very often data are only preliminary and are revised over time. Furthermore, data reflecting fundamental ex post changes in the collection and computation methods may differ greatly from preliminary figures.*

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[8] We examine the sign of the level of unemployment and of the budget balance. With the other variables, we focus on the sign of the changes in the growth rates.

underlying the test is whether the signs of the change in the forecast and the realization are independent from each other. We compute the test statistic

$$\chi^2 = \frac{(a+b+c+d)(a\cdot d - b\cdot c)^2}{(a+b)(c+d)(a+c)(b+d)}$$

Table 3 indicates the success rate, i.e. the share of sign changes correctly forecast (*sign r*), and the error probability of the sign test (*sign p*) when the null hypothesis is rejected.

When we compare forecast A with forecast B, we want to know whether the differences in the forecast errors are statistically significant. The null hypothesis of the one-sided *Diebold-Mariano test* (Diebold and Mariano, 1994) is that forecast A is not better than forecast B (one-sided test). The result denotes the error probability upon the rejection of the null hypothesis.

4.2 Comparison with Time Series Models

Apart from comparing the surveyed forecasts with a naive forecast, juxtaposing them with simple time series models provides further evidence about their relative predictive power. The ARMA (autoregressive moving average) models we use are given as follows:

$$\hat{x}_t = \sum_{p=1}^{P} \alpha_p x_{t-p} + \sum_{q=1}^{Q} \beta_q \varepsilon_{t-q} + \varepsilon_t$$

The forecast variable ($\hat{x}_t$) is explained by its lags (x_{t-p}) to the order of P as well as the lags of the error term (ε_{t-q}) to the order of Q. We chose the optimal model for each variable

and for each forecast date. The number of autoregressive and moving average lags was determined as follows: for every forecast date, we estimated all the different ARMA models up to the ARMA order (P, Q), using the quarterly time series available at the respective date[9] ($P = Q = 8$). We estimated the models for the unemployment rate and the budget balance in levels, the inflation model using annual growth rates and the other models using quarterly growth rates. Of these models, we chose the model with the maximum value of Akaike's information criterion and used it to produce the forecast for the given date for up to eight quarters. We then aggregated the quarterly forecast to annual figures. The forecast of the budget balance was carried out on an annual basis.

4.3 Mean Forecast Error per Variable

Before analyzing the forecasting performance of the individual institutions in subsection 4.4, we investigate the aggregate mean forecast error. To this end, we calculate the mean bias and mean MAE across all forecasts for each forecast horizon. The results are indicative of the degree of predictability of the various variables and illustrate that the predictive accuracy differs markedly from variable to variable (chart 3, upper panel).

Some of the forecasts for the individual variables show a large bias (vis-à-vis the first data release) over the examined horizon. On average, GDP, private consumption and investment were overestimated for both the cur-

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[9] We had real-time data for all forecast dates back to the spring 2001 forecast at our disposal. The data series start in the first quarter of 1988. We used the shortened time series of the 2001 spring forecast for the forecasts between fall 1998 to fall 2000 as a proxy for the respective real-time data series. The ARMA forecast of the budget balance is based on annual figures dating back to the year 1977.

rent year and the year ahead. Over-prediction of investment for the year ahead was particularly prominent, with the mean bias (1.6) four times as large as the bias for the current year (0.4). Among the variables which were underestimated for both forecast horizons are government consumption, unemployment and the budget balance. Interestingly, both exports and imports post one positive and one negative bias each for the two horizons. All forecasters pronouncedly underestimated current-year exports, while markedly overestimating next-year imports, largely because they overpredicted investment for the year ahead.

When it comes to the size of the MAE, we may distinguish between two categories of variables. The MAE is very small for private and government consumption, the budget balance and the unemployment rate, i.e. these variables were predicted quite accurately, whereas this error is large for the cyclical components investment, exports and imports. For these variables, the forecast error for the year ahead is especially sizeable. The forecast error for current-year GDP is relatively small, yet for next-year GDP, it clearly exceeds the error of private consumption.

Dividing the bias and the MAE, respectively, by the standard deviation of a given variable, we arrive at standardized results, which allow for a better comparison across the variables (chart 3, lower panel). Note that now the standardized bias is largest for next-year private and government consumption. The standardized MAE is very similar for all variables, ranging from 0.3 to 0.5 for the current year and from 0.8 to 1.0 for the year ahead. Government consumption is the one exception, posting an MAE

of 1.0 for the current year and no less than 1.2 for the next year. We must bear in mind, however, that, compared with the other variables, much fewer observations are available for forecasting government consumption.

A comparison of the forecasts with the naive forecast (*Theil's U*) reveals pronounced differences in the predictability of the individual variables (table 2). The lowest Theil's U is, on average, evident for the demand components private consumption, investment, exports and imports. In other words, the prediction of these variables by the forecasting institutions yields the largest benefits compared to naive forecasts. The smallest advantage over the naive forecast is evident for the unemployment rate. Yet another interesting finding comes to light in this comparison. The next-year forecasts not only have a larger absolute forecast error than the current-year forecasts, but also a larger error (i.e. increasing Theil's U) relative to the naive forecast. This result confirms the fact that predictability decreases as the forecast horizon increases. However, the increase in Theil's U does not apply to all variables to the same extent, with GDP posting the by far strongest increase. The fact that quarterly SNA data provide forecasters with valuable information about intrayear developments most likely accounts for the low Theil's U of the current-year GDP forecasts. Since such information is also available for the other variables (excluding the budget balance), one might arrive at the conclusion that forecasters apparently pay greater heed to the intrayear developments of GDP than of the other variables.

When we contrast the forecasts with the *time series forecasts*, we iden-

Chart 3

Mean Predictive Accuracy per Variable across All Institutions
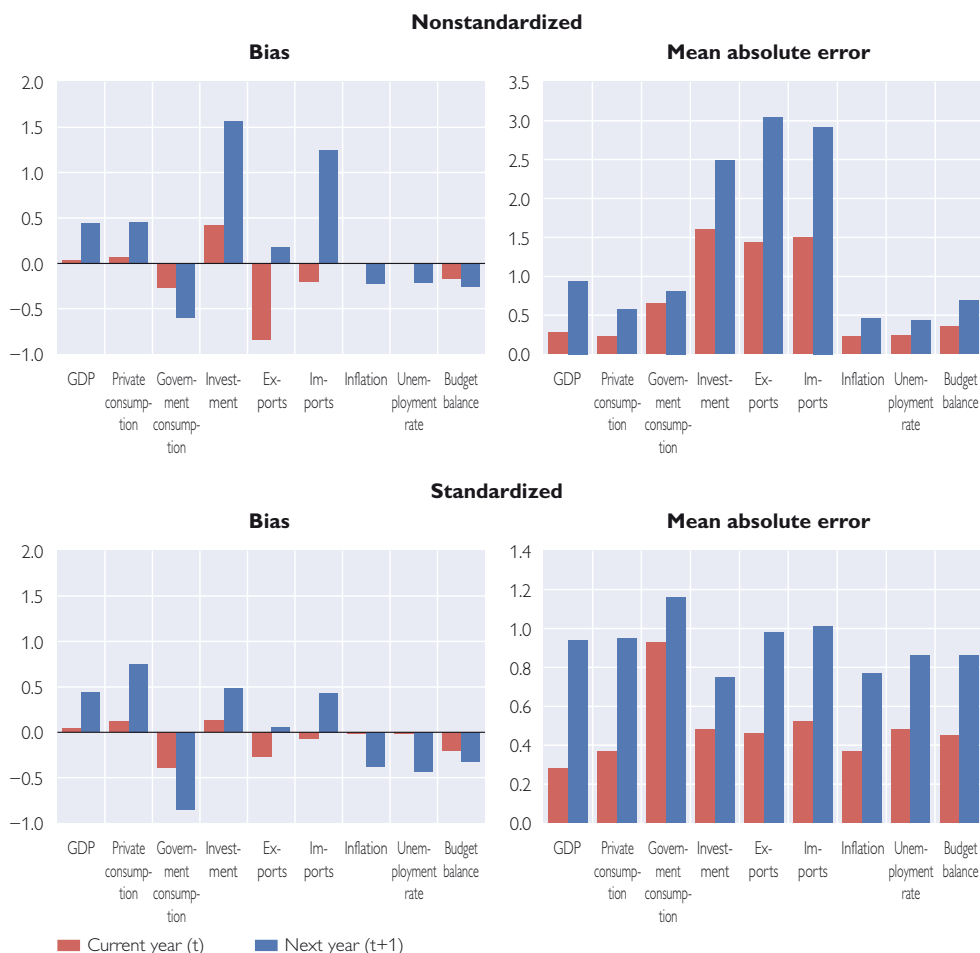
Nonstandardized

Source: Forecasts of all surveyed institutions, Statistics Austria, authors' calculations.

Note: The errors were calculated relative to WIFO's first quarterly SNA data release.

tify considerable differences in terms of the relative predictive quality. The time series forecasts perform worst relative to the institutional forecasts for the variables budget balance and government consumption, which does not come as a surprise given the great importance of discretionary measures. Likewise, the time series models did markedly worse in predicting private consumption. The mean forecast error for GDP and inflation of the time series models across the forecast horizons is only slightly larger than the mean error of the institutional forecasts. We see

differences in the relative predictive quality from one horizon to another, however. The time series models did best in forecasting the unemployment rate and actually beat all institutions in terms of forecasting accuracy. The models likewise provide significantly better next-year estimates of exports and imports than the lion's share of institutional forecasters.

4.4 Relative Predictive Accuracy per Institution

In this subsection, we compare the predictive accuracy of the various institutions. First we contrast GDP, the

Table 3

Predictive Accuracy for Real GDP, Inflation Rate, Unemployment Rate and Budget Deficit Forecasts

GDP, real

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	0.16	0.56	0.76	0.66	17	0.01	0.29	0.42	0.37	0.94	0.00	15	0.33	0.85	1.02	0.87	0.60	0.46
WIFO	32	0.17	0.53	0.79	0.69	17	0.04	0.18	0.27	0.24	0.88	0.00	15	0.33	0.93	1.11	0.95	0.73	0.04
IHS	32	0.25	0.54	0.78	0.68	17	0.07	0.22	0.35	0.31	0.94	0.00	15	0.45	0.90	1.08	0.92	0.73	0.04
European Commission	32	0.26	0.58	0.84	0.73	17	0.08	0.29	0.45	0.40	0.82	0.01	15	0.46	0.91	1.12	0.96	0.73	0.04
IMF	32	0.29	0.74	0.97	0.85	17	0.00	0.40	0.52	0.46	0.88	0.00	15	0.62	1.13	1.31	1.11	0.67	0.10
OECD	32	0.23	0.58	0.84	0.73	17	0.02	0.28	0.42	0.38	0.88	0.00	15	0.46	0.93	1.14	0.98	0.67	0.10
Average		0.20	0.59	0.83	0.72		0.04	0.28	0.41	0.36	×	×		0.44	0.94	1.13	0.96	×	×
NAIVE	32	0.02	0.94	1.15	1.00	17	−0.04	0.91	1.13	1.00	×	×	15	0.07	0.98	1.17	1.00	×	×
ARMA	32	0.08	0.68	0.86	0.75	17	−0.16	0.57	0.66	0.58	0.69	0.13	15	0.36	0.81	1.05	0.89	0.47	1.00

Inflation

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	−0.14	0.27	0.38	0.49	17	−0.03	0.01	0.14	0.22	1.00	0.00	15	−0.28	0.46	0.54	0.58	0.60	0.40
WIFO	32	−0.06	0.29	0.40	0.50	17	0.01	0.14	0.21	0.33	1.00	0.00	15	−0.25	0.45	0.53	0.57	0.67	0.14
IHS	32	−0.16	0.28	0.42	0.53	17	−0.04	0.09	0.16	0.25	1.00	0.00	15	−0.29	0.49	0.59	0.64	0.73	0.06
European Commission	32	−0.10	0.36	0.47	0.60	17	0.00	0.25	0.34	0.53	0.81	0.01	15	−0.23	0.48	0.59	0.64	0.60	0.40
IMF	32	−0.01	0.42	0.46	0.58	17	0.04	0.42	0.47	0.73	0.71	0.09	15	−0.05	0.41	0.46	0.49	0.67	0.19
OECD	32	−0.19	0.40	0.54	0.69	17	−0.13	0.33	0.51	0.79	0.69	0.13	15	−0.26	0.48	0.58	0.63	0.60	0.45
Average		−0.12	0.34	0.45	0.57		−0.00	0.22	0.30	0.47	×	×		−0.23	0.46	0.55	0.59	×	×
NAIVE	32	−0.18	0.64	0.79	1.00	17	−0.08	0.53	0.64	1.00	×	×	15	−0.28	0.78	0.93	1.00	×	×
ARMA	32	0.21	0.37	0.50	0.63	17	0.07	0.16	0.22	0.34	0.63	0.32	15	0.36	0.62	0.68	0.73	0.60	0.44

Unemployment rate

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	−0.05	0.34	0.43	0.81	17	0.04	0.24	0.33	0.71	0.81	0.01	15	−0.16	0.45	0.51	0.87	0.47	1.00
WIFO	32	−0.03	0.31	0.40	0.76	17	0.03	0.23	0.33	0.71	0.81	0.01	15	−0.11	0.39	0.47	0.79	0.53	0.71
IHS	32	−0.05	0.34	0.42	0.80	17	0.02	0.23	0.33	0.71	0.75	0.06	15	−0.14	0.45	0.50	0.85	0.47	1.00
European Commission	32	−0.10	0.40	0.51	0.97	17	0.03	0.34	0.41	0.89	0.69	0.15	15	−0.25	0.46	0.61	1.03	0.40	1.00
IMF	32	−0.11	0.37	0.48	0.91	17	0.02	0.23	0.31	0.67	0.88	0.00	15	−0.26	0.54	0.62	1.05	0.40	1.00
OECD	32	−0.09	0.39	0.52	0.99	17	−0.03	0.27	0.35	0.75	0.56	0.52	15	−0.16	0.54	0.67	1.12	0.60	0.26
Average		−0.08	0.36	0.46	0.87		0.02	0.26	0.34	0.74	×	×		−0.18	0.47	0.56	0.95	×	×
NAIVE	32	−0.10	0.43	0.53	1.00	17	−0.04	0.35	0.46	1.00	×	×	15	−0.18	0.52	0.59	1.00	×	×
ARMA	32	−0.09	0.22	0.30	0.56	17	−0.02	0.11	0.14	0.30	0.69	0.15	15	−0.18	0.34	0.41	0.69	0.20	1.00

Budget balance

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	−0.26	0.55	0.73	0.77	17	−0.20	0.39	0.50	0.68	0.88	0.00	15	−0.34	0.73	0.92	0.81	0.53	0.67
WIFO	32	−0.21	0.46	0.63	0.67	17	−0.13	0.31	0.41	0.56	1.00	0.00	15	−0.29	0.64	0.81	0.72	0.53	0.83
IHS	32	−0.17	0.47	0.62	0.66	17	−0.16	0.29	0.40	0.55	0.94	0.00	15	−0.17	0.66	0.80	0.70	0.53	1.00
European Commission	32	−0.21	0.56	0.74	0.79	17	−0.19	0.38	0.49	0.67	0.94	0.00	15	−0.23	0.77	0.95	0.84	0.67	0.26
IMF	31	−0.14	0.54	0.68	0.72	17	−0.09	0.42	0.51	0.70	0.81	0.02	14	−0.19	0.67	0.84	0.75	0.50	1.00
OECD	32	−0.32	0.51	0.70	0.74	17	−0.26	0.35	0.46	0.63	0.88	0.00	15	−0.37	0.69	0.90	0.79	0.73	0.10
Average		−0.21	0.51	0.68	0.73		−0.17	0.36	0.46	0.63	×	×		−0.27	0.69	0.87	0.77	×	×
NAIVE	32	−0.17	0.78	0.94	1.00	17	−0.12	0.65	0.73	1.00	×	×	15	−0.22	0.93	1.13	1.00	×	×
ARMA	32	−1.24	1.35	1.64	1.75	17	−0.77	0.98	1.15	1.58	0.69	0.04	15	−1.77	1.77	2.06	1.82	0.40	1.00

Source: Authors' calculations based on first data release.

Note: n: Number of forecasts since fall 1998
Bias: Mean deviation of forecasts from outcomes
MAE: Mean absolute error
RMSE: Root mean squared error
t / t+1: Forecast horizon (t: current year, t+1: next year)
TU: Theil's U
Sign r: Share of correctly predicted sign changes (sign test)
Sign p: Error probability of the sign test (H0: signs of change in forecast and outcome are independent from each other)

See table A-1 for the demand component results.

inflation rate, the unemployment rate and the budget deficit, then the individual demand components.

Table 3 shows the results of the test statistics for the forecasts of the various institutions for the current year (*t*), the next year (*t+1*) and for both horizons (aggregate). *n* denotes the number of forecasts.

The predictive accuracy of the *GDP forecasts* averaged out over the forecast horizons (RMSE and MAE) differs only marginally from institution to institution. The current-year *inflation forecasts* post decidedly smaller errors than the GDP forecasts, which may be due to several factors. For one thing, more data points are available for current-year inflation forecasting than for predicting GDP. For another, unlike the SNA data, the inflation data do not undergo noteworthy data revisions. The errors of the next-year inflation forecasts, too, are distinctly smaller than those of the GDP forecasts for the year ahead. On average, inflation was slightly underpredicted, apparently because of the stronger-than-expected rise in the oil price in the review period. Here, the OeNB has the smallest mean forecast error of all institutions. The forecast errors identified for the *unemployment rate* forecasts are markedly larger than those for the inflation forecasts, but they are still pronouncedly smaller than the errors calculated for GDP and the *budget deficit*.

The forecasts of the individual variables have a *bias* that points in the same direction for each institution.

GDP growth was, on average, overpredicted, while all other variables were underpredicted. The forecasts did better than a simple naive forecast with just a few exceptions, namely the IMF forecast of next-year GDP and the next-year unemployment forecasts of the three international institutions.

The results of the *sign test* evidence a consistently high share of correct sign changes (acceleration/slowdown of growth, increase/decrease of the budget balance or the unemployment rate). Ranking the institutions according to this criterion places some institutions in completely different positions than when they are listed according to the MAE or RMSE, with the change particularly prominent for the GDP forecasts.

When we test the *differences in the predictive accuracy among the institutions for significance*[10] (table 4), we find that only a few of the differences are significant. A striking feature is that the international institutions do not outperform the national forecasters for any of the four variables, not even once. The significant differences in predictive accuracy reflect the fact that the national institutions have an informational advantage.

WIFO's *GDP forecast* for the current year exhibits a significantly smaller forecast error over the examined horizon than the comparable OeNB forecast. This may be due to the fact that WIFO disposes of one additional observation of the quarterly SNA when drawing up its forecasts.[11] Furthermore, as the producer

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[10] We cannot test the differences of the aggregate predictive accuracy averaged over both horizons for significance, because the tests are defined for a single horizon only.

[11] A comparison of the WIFO and IHS April and September forecasts with the spring and fall forecasts of the other institutions attests to the effects of the informational advantage of the two former forecasting institutions. Yet, at 0.86 and 0.89, respectively, both WIFO and the IHS have a markedly larger RMSE (spring and fall forecasts: 0.79 and 0.78, respectively). WIFO's and the IHS's forecasting performance worsens notably, above all for the current year (0.42 and 0.50 versus 0.27 and 0.35).

Table 4

Significance of Differences in Predictive Accuracy

GDP

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB					x		x	x		x		x	x	x		
WIFO	x			x	x	x	x	x					x			
IHS					x		x	x		x			x			
EC[1]					x		x	x					x			
IMF							x	x								
OECD					x		x	x					x			
NAIVE																
ARMA							x					x	x	x		

Inflation

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB					x	x	x	x							x	
WIFO					x	x	x	x							x	
IHS					x	x	x	x							x	
EC[1]					x		x	x							x	
IMF															x	x
OECD															x	
NAIVE																
ARMA					x	x		x								

Unemployment rate

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB				x									x		x	
WIFO				x					x		x		x		x	
IHS				x									x		x	
EC[1]																
IMF				x												
OECD																
NAIVE																
ARMA			x	x			x									

Budget balance

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB							x	x								x
WIFO	x			x			x	x								x
IHS	x			x			x	x								x
EC[1]							x	x								x
IMF							x	x								x
OECD							x	x								x
NAIVE								x								x
ARMA																

Private consumption

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB							x	x		x	x	x		x	x	x
WIFO	x		x	x		x	x	x					x		x	x
IHS							x	x							x	x
EC[1]							x	x					x			x
IMF																
OECD							x	x							x	x
NAIVE																
ARMA																

Investment

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB							x								x	
WIFO	x		x	x		x	x	x		x					x	
IHS				x			x								x	x
EC[1]							x								x	
IMF																
OECD							x								x	
NAIVE																
ARMA																x

Exports

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB							x			x				x		
WIFO	x						x	x								
IHS							x	x								
EC[1]							x									
IMF																
OECD							x	x								
NAIVE																
ARMA							x				x	x	x		x	x

Imports

	t								t+1							
	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA	OeNB	WIFO	IHS	EC[1]	IMF	OECD	NAIVE	ARMA
OeNB							x								x	x
WIFO	x					x	x	x							x	x
IHS	x					x	x	x								x
EC[1]							x									
IMF																
OECD							x									
NAIVE																x
ARMA							x						x		x	x

Source: Authors' calculations.

[1] European Commission.

Note: An "x" indicates that the forecast given in the row is significantly better than the forecast given in the column. This is the case when, in comparing the RMSE or the MAE, we can reject the null hypothesis of equal predictive accuracy in the Diebold-Mariano test at the 5% significance level. For detailed results, see the annex. Since the IMF does not publish forecasts for the demand components, the respective fields are shaded.

Example: The "x" in the row "OeNB" and the column "WIFO" for GDP growth at the t+1 horizon indicates that the OeNB's forecast error for the next year is significantly lower than WIFO's error. It is evident from table A-2 that this result stems from rejecting the null hypothesis of a same-size RMSE in the Diebold-Mariano test at the 5% level.

of the quarterly SNA data, WIFO has the advantage of being familiar with the details of the data at the recent end of the time series. Of all institutions, the OeNB has the smallest forecast error for the next year. In this category, the difference to all institutions – except the IHS – is significant. The predictive quality of the IHS next-year forecasts for the examined horizon was significantly better than that of the WIFO forecasts (according to the Diebold-Mariano test for the RMSE). The forecast errors identified for the European Commission and the OECD are significantly smaller only relative to the IMF. The IMF's forecast error is significantly greater than the errors of all the other institutions, which is probably due to the early date of publication and long production process.

In contrast to the GDP forecasts, the *inflation forecasts* are characterized by noticeably fewer significant differences among the Austrian institutions. With only one exception, the inflation forecasts drawn up by the national institutions for time *t* are significantly better than those of their international counterparts. No significant differences are in evidence for the time *t+1*. Given that inflation rates are strongly influenced by international developments, the national institutions do not have an informational advantage, which might account for the lack of significant differences.

The predictive quality of the *unemployment rate* forecasts is very similar for all institutions. For time *t* – with the exception of the European Commission's forecasts, which are significantly worse than the forecasts of all the other institutions – we do not find a difference in predictive accuracy. For time *t+1*, WIFO has a sig-

nificantly smaller forecast error than the OeNB and the IHS. The error of the IMF is, however, significantly larger than that of the national institutions.

The WIFO and IHS current-year *budget balance* forecasts show a significantly lower forecast error than the forecasts of the OeNB and the European Commission. We did not identify significant differences for the forecasts for the next year (*t+1*).

We describe the comparison of the predictive accuracy of the demand components only briefly. As already mentioned, WIFO's current-year GDP forecasts have been significantly better than those of the OeNB since the fall of 1998, but the next-year forecasts of the OeNB have been significantly better than those of WIFO. The demand components mirror this result. The current-year forecasts of private consumption and investment by WIFO are significantly better than those of the OeNB and the IHS. The OeNB's more accurate GDP forecast for the year ahead is traceable above all to a significantly better estimate of private consumption. Since the IMF does not predict demand components, we can only compare the predictive quality of the national institutions with the OECD and the European Commission. Here we have a repeat of the result for the previously examined variables: there is no incident in which the predictive accuracy of the international institutions was significantly better than that of the national forecasters.

5 Summary

This study for the first time presents a comparison of the macroeconomic forecasts the OeNB started to draw up in fall 1998 with the forecasts released by WIFO, the IHS, the OECD,

the IMF and the European Commission.

An analysis of the *GDP forecasts over time* confirms for all institutions that in booming years forecasters exercise too much caution and are too optimistic in times of economic downturns. Hence, the forecasts smooth out the peaks and troughs evident in the actual GDP series. The mean forecast error for the *demand components*, the *unemployment rate* and the *budget balance* show considerable differences: private consumption was, on average, slightly overpredicted and had the smallest forecast error among the demand components. Slightly underestimated, government consumption likewise exhibits a small forecast error. The rise in unemployment that started in 2002 was underpredicted in the next-year forecasts. As expected, we identified large forecast errors for the cyclical components investment, exports and imports. Here, above all investment was markedly overestimated.

A comparison of the *relative predictive accuracy* of the various institutions shows that the mean predictive accuracy of GDP forecasts averaged over the forecast horizons (current and next year) differs only slightly across the institutions. WIFO posts the smallest forecast error in the GDP forecasts for the current year, the OeNB for the year ahead. In contrast to the GDP forecasts, the *inflation forecasts* for the current year exhibit distinctly smaller errors. Here, the OeNB records the smallest mean forecast error of all institutions. The forecasting performance of the Austrian institutions is not surpassed significantly by any of the international forecasters with regard to *all variables.*

A final word of caution: when interpreting our findings, bear in mind that the observation period (1998 to 2006) is short and comprises just one, albeit a very pronounced, business cycle. Forecasting performance comparisons ideally rely on data covering several business cycles.

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Annex

Comparison of the Mean Forecast Errors for the Demand Components of the Spring and Fall Forecasts for Austria from Fall 1998 to Fall 2006 (Comparison with First Data Release)

Private consumption

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	0.17	0.33	0.42	0.51	17	0.03	0.24	0.28	0.43	0.88	0.00	15	0.33	0.43	0.54	0.54	0.73	0.06
WIFO	32	0.25	0.33	0.50	0.60	17	0.08	0.14	0.22	0.35	0.88	0.00	15	0.45	0.54	0.69	0.69	0.73	0.06
IHS	32	0.33	0.42	0.55	0.66	17	0.13	0.24	0.29	0.44	0.82	0.01	15	0.55	0.63	0.74	0.74	0.73	0.06
European Commission	32	0.25	0.42	0.54	0.66	17	0.08	0.27	0.33	0.52	0.82	0.01	15	0.43	0.58	0.71	0.72	0.73	0.06
IMF	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OECD	32	0.27	0.44	0.60	0.72	17	0.05	0.23	0.31	0.48	0.88	0.00	15	0.51	0.69	0.81	0.82	0.67	0.20
Average		0.20	0.39	0.52	0.53		0.07	0.22	0.29	0.37	×	×		0.45	0.57	0.70	0.59	×	×
NAIVE	32	−0.03	0.63	0.83	1.00	17	−0.07	0.52	0.65	1.00	×	×	15	0.01	0.77	0.99	1.00	×	×
ARMA	32	0.42	0.72	0.93	1.12	17	0.20	0.60	0.69	1.06	0.50	1.00	15	0.66	0.86	1.15	1.16	0.27	1.00

Government consumption

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	−0.38	0.80	1.01	1.00	17	−0.36	0.88	1.11	0.94	0.59	0.40	15	−0.41	0.71	0.87	1.16	0.20	1.00
WIFO	12	−0.58	0.77	0.87	0.87	6	−0.28	0.62	0.72	0.61	0.17	1.00	6	−0.88	0.92	1.00	1.33	0.50	1.00
IHS	12	−0.35	0.85	1.00	1.00	6	−0.10	0.60	0.77	0.65	0.67	0.22	6	−0.60	1.10	1.19	1.58	0.75	0.25
European Commission	12	−0.48	0.69	0.74	0.74	6	−0.30	0.70	0.75	0.63	0.00	1.00	6	−0.65	0.68	0.74	0.97	0.75	0.25
IMF	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OECD	12	−0.38	0.53	0.66	0.65	6	−0.32	0.45	0.55	0.46	0.33	1.00	6	−0.45	0.62	0.75	0.99	0.50	1.00
Average		−0.36	0.73	0.86	0.71		−0.27	0.65	0.78	0.55	×	×		−0.60	0.81	0.91	1.01	×	×
NAIVE	32	0.01	0.80	1.00	1.00	17	0.02	0.92	1.18	1.00	×	×	15	−0.01	0.66	0.75	1.00	×	×
ARMA	32	0.28	1.08	1.41	1.41	17	0.10	1.09	1.28	1.08	0.69	0.13	15	0.50	1.08	1.55	2.07	0.67	0.18

Investment

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	1.07	2.12	2.83	0.61	17	0.43	1.65	2.18	0.53	0.94	0.00	15	1.79	2.65	3.42	0.66	0.47	1.00
WIFO	32	0.74	1.77	2.45	0.53	17	0.32	1.24	1.68	0.41	0.94	0.00	15	1.21	2.37	3.10	0.60	0.60	0.26
IHS	32	0.87	1.93	2.69	0.58	17	0.31	1.57	2.07	0.51	0.94	0.00	15	1.50	2.33	3.25	0.63	0.47	1.00
European Commission	32	1.05	2.21	2.93	0.63	17	0.60	1.94	2.33	0.57	0.94	0.00	15	1.55	2.51	3.48	0.67	0.67	0.06
IMF	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OECD	32	1.06	2.07	2.78	0.60	17	0.42	1.62	2.10	0.51	0.94	0.00	15	1.79	2.57	3.39	0.65	0.53	0.21
Average		0.82	2.02	2.74	0.49		0.42	1.60	2.07	0.42	×	×		1.57	2.49	3.33	0.53	×	×
NAIVE	32	0.13	3.75	4.63	1.00	17	−0.05	3.16	4.08	1.00	×	×	15	0.33	4.41	5.19	1.00	×	×
ARMA	32	0.38	2.27	2.91	0.63	17	0.08	1.98	2.45	0.60	0.56	0.61	15	0.71	2.61	3.36	0.65	0.53	0.78

Note: IHS: Gross capital formation, other institutions: gross fixed capital formation.

Exports

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	−0.45	2.13	2.61	0.59	17	−1.01	1.59	2.02	0.44	1.00	0.00	15	0.18	2.75	3.15	0.77	0.80	0.01
WIFO	32	−0.68	2.10	2.72	0.62	17	−0.96	1.25	1.62	0.35	1.00	0.00	15	−0.37	3.05	3.58	0.87	0.73	0.03
IHS	32	−0.77	2.09	2.66	0.61	17	−1.04	1.24	1.56	0.34	1.00	0.00	15	−0.46	3.06	3.51	0.86	0.67	0.06
European Commission	32	0.13	2.35	2.83	0.65	17	−0.51	1.68	2.25	0.49	0.94	0.00	15	0.85	3.11	3.37	0.82	0.73	0.03
IMF	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OECD	32	−0.06	2.29	2.86	0.65	17	−0.75	1.45	1.79	0.39	0.94	0.00	15	0.72	3.25	3.72	0.91	0.73	0.03
Average		−0.30	2.19	2.74	0.52		−0.85	1.44	1.85	0.33	×	×		0.18	3.04	3.47	0.70	×	×
NAIVE	32	0.04	3.80	4.39	1.00	17	−0.12	4.24	4.63	1.00	×	×	15	0.22	3.31	4.11	1.00	×	×
ARMA	32	−1.15	2.08	2.48	0.56	17	−1.69	2.05	2.46	0.53	0.63	0.30	15	−0.54	2.12	2.50	0.61	0.47	1.00

Imports

	Total					t							t+1						
	n	Bias	MAE	RMSE	TU	n	Bias	MAE	RMSE	TU	Sign r	Sign p	n	Bias	MAE	RMSE	TU	Sign r	Sign p
OeNB	32	0.53	2.06	2.52	0.58	17	−0.27	1.65	1.98	0.46	1.00	0.00	15	1.43	2.52	3.01	0.70	0.87	0.00
WIFO	32	0.23	2.01	2.40	0.56	17	−0.29	1.26	1.59	0.37	1.00	0.00	15	0.81	2.87	3.07	0.71	0.80	0.01
IHS	32	−0.13	1.99	2.40	0.56	17	−0.51	1.26	1.49	0.34	1.00	0.00	15	0.30	2.82	3.13	0.73	0.80	0.01
European Commission	32	0.93	2.32	2.76	0.64	17	0.11	1.69	2.04	0.47	1.00	0.00	15	1.87	3.02	3.40	0.79	0.80	0.01
IMF	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OECD	32	0.83	2.45	3.00	0.69	17	−0.07	1.65	2.04	0.47	0.94	0.00	15	1.85	3.36	3.81	0.88	0.67	0.10
Average		0.43	2.17	2.62	0.51		−0.21	1.50	1.83	0.35	×	×		1.25	2.92	3.28	0.63	×	×
NAIVE	32	0.19	3.54	4.32	1.00	17	−0.02	4.11	4.32	1.00	×	×	15	0.43	2.89	4.31	1.00	×	×
ARMA	32	−0.46	2.06	2.55	0.59	17	−1.00	2.09	2.42	0.56	0.69	0.13	15	0.16	2.03	2.69	0.62	0.33	1.00

Source: Authors' calculations based on the first data release.

Note: n: *Number of forecasts since fall 1998*
    Bias: *Mean deviation of forecasts from outcomes*
    MAE: *Mean absolute error*
    RMSE: *Root mean squared error*
    t / t+1: Forecast horizon (t: current year, t+1: next year)
    TU: *Theil's U*
    Sign r: *Share of correct sign changes (sign test)*
    Sign p: *Error probability of the sign test (H0: signs of change in forecast and outcome are independent from each other)*

See table 3 for the results on GDP, inflation, the unemployment rate and the budget balance.

Table A-2

Significance of the Differences in Predictive Accuracy of the Spring and Fall Forecasts for Austria from Fall 1998 to Fall 2006 (Comparison with First Data Release)

GDP

				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[0.42]				0.31	0.03 **	0.47	0.00 ***	0.00 ***
OeNB	t	MAE	[0.29]					0.05 *		0.00 ***	0.00 ***
OeNB	t+1	RMSE	[1.02]		0.01 **	0.11	0.02 **	0.02 **	0.04 **	0.26	0.35
OeNB	t+1	MAE	[0.85]		0.06 *	0.25	0.19	0.03 **	0.17	0.29	
WIFO	t	RMSE	[0.27]	0.06 *		0.09 *	0.11	0.01 ***	0.07 *	0.00 ***	0.00 ***
WIFO	t	MAE	[0.18]	0.01 ***		0.12	0.04 **	0.00 ***	0.02 **	0.00 ***	0.00 ***
WIFO	t+1	RMSE	[1.11]				0.44	0.03 **	0.29	0.40	0.00 ***
WIFO	t+1	MAE	[0.93]					0.04 **		0.41	
IHS	t	RMSE	[0.35]	0.09 *			0.14	0.00 ***	0.10	0.00 ***	0.00 ***
IHS	t	MAE	[0.22]	0.07 *			0.09 *	0.01 ***	0.11	0.00 ***	0.00 ***
IHS	t+1	RMSE	[1.08]		0.03 **		0.26	0.02 **	0.11	0.35	
IHS	t+1	MAE	[0.90]		0.35		0.43	0.01 ***	0.29	0.38	
European Commission	t	RMSE	[0.45]					0.15		0.01 ***	0.01 ***
European Commission	t	MAE	[0.29]	0.46				0.04 **		0.00 ***	0.00 ***
European Commission	t+1	RMSE	[1.12]					0.06 *	0.35	0.43	
European Commission	t+1	MAE	[0.91]		0.44			0.04 **	0.40	0.40	
IMF	t	RMSE	[0.52]							0.01 ***	0.02 **
IMF	t	MAE	[0.40]							0.01 ***	0.03 **
IMF	t+1	RMSE	[1.31]								
IMF	t+1	MAE	[1.13]								
OECD	t	RMSE	[0.42]				0.28	0.03 **		0.00 ***	0.00 ***
OECD	t	MAE	[0.28]	0.38			0.43	0.02 **		0.00 ***	0.00 ***
OECD	t+1	RMSE	[1.14]					0.01 **		0.46	
OECD	t+1	MAE	[0.93]		0.50			0.00 ***		0.42	
NAIVE	t	RMSE	[1.13]								
NAIVE	t	MAE	[0.91]								
NAIVE	t+1	RMSE	[1.17]					0.33			
NAIVE	t+1	MAE	[0.98]					0.32			
ARMA	t	RMSE	[0.66]							0.01 **	
ARMA	t	MAE	[0.57]							0.04 **	
ARMA	t+1	RMSE	[1.05]		0.23	0.38	0.02 **	0.04 **	0.10	0.32	
ARMA	t+1	MAE	[0.81]	0.29	0.08 *	0.17	0.04 **	0.01 ***	0.04 **	0.26	

Inflation

				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[0.14]		0.09 *	0.32	0.00 ***	0.00 ***	0.04 **	0.01 ***	0.10
OeNB	t	MAE	[0.10]		0.14		0.00 ***	0.00 ***	0.01 ***	0.00 ***	0.07 *
OeNB	t+1	RMSE	[0.54]			0.17	0.18		0.35	0.02 **	0.13
OeNB	t+1	MAE	[0.46]			0.32	0.38		0.44	0.01 **	0.09 *
WIFO	t	RMSE	[0.21]				0.07 *	0.00 ***	0.04 **	0.02 **	0.45
WIFO	t	MAE	[0.14]				0.08 *	0.00 ***	0.02 **	0.00 ***	0.41
WIFO	t+1	RMSE	[0.53]	0.43		0.07 *	0.18		0.30	0.00 ***	0.13
WIFO	t+1	MAE	[0.45]	0.38		0.17	0.28		0.37	0.00 ***	0.11
IHS	t	RMSE	[0.16]		0.21		0.00 ***	0.00 ***	0.04 **	0.01 **	0.19
IHS	t	MAE	[0.09]	0.35	0.15		0.00 ***	0.00 ***	0.01 ***	0.00 ***	0.06 *
IHS	t+1	RMSE	[0.59]							0.01 **	0.28
IHS	t+1	MAE	[0.49]							0.01 **	0.22
European Commission	t	RMSE	[0.34]					0.06 *	0.13	0.03 **	
European Commission	t	MAE	[0.25]					0.02 **	0.18	0.01 **	
European Commission	t+1	RMSE	[0.59]			0.47				0.03 **	0.28
European Commission	t+1	MAE	[0.48]			0.38				0.02 **	0.19
IMF	t	RMSE	[0.47]						0.37	0.11	
IMF	t	MAE	[0.42]							0.15	
IMF	t+1	RMSE	[0.46]	0.26	0.28	0.19	0.20		0.09 *	0.01 ***	0.01 ***
IMF	t+1	MAE	[0.41]	0.35	0.40	0.30	0.32		0.28	0.00 ***	0.01 **
OECD	t	RMSE	[0.51]							0.23	
OECD	t	MAE	[0.33]					0.20		0.08 *	
OECD	t+1	RMSE	[0.58]			0.47	0.47			0.01 ***	0.25
OECD	t+1	MAE	[0.48]			0.43	0.48			0.00 ***	0.18
NAIVE	t	RMSE	[0.64]								
NAIVE	t	MAE	[0.53]								
NAIVE	t+1	RMSE	[0.93]								
NAIVE	t+1	MAE	[0.78]								
ARMA	t	RMSE	[0.22]				0.05 **	0.00 ***	0.06 *	0.02 **	
ARMA	t	MAE	[0.16]				0.06 *	0.00 ***	0.05 *	0.00 ***	
ARMA	t+1	RMSE	[0.68]							0.08 *	
ARMA	t+1	MAE	[0.62]							0.12	

Table A-2

Significance of the Differences in Predictive Accuracy of the Spring and Fall Forecasts for Austria from Fall 1998 to Fall 2006 (Comparison with First Data Release) − continued

Unemployment rate				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[0.33]			0.50	0.12		0.31	0.12	
OeNB	t	MAE	[0.24]				0.01 ***		0.25	0.16	
OeNB	t+1	RMSE	[0.51]				0.19	0.03 **	0.12	0.05 **	0.30
OeNB	t+1	MAE	[0.45]				0.49	0.05 **	0.22	0.14	0.36
WIFO	t	RMSE	[0.33]	0.47		0.46	0.12		0.24	0.11	
WIFO	t	MAE	[0.23]	0.48			0.01 ***		0.22	0.17	
WIFO	t+1	RMSE	[0.47]	0.01 ***		0.00 ***	0.09 *	0.00 ***	0.08 *	0.01 ***	0.12
WIFO	t+1	MAE	[0.39]	0.01 ***		0.00 ***	0.20	0.01 ***	0.09 *	0.02 **	0.15
IHS	t	RMSE	[0.33]				0.13		0.30	0.12	
IHS	t	MAE	[0.23]	0.47	0.48		0.01 ***		0.21	0.17	
IHS	t+1	RMSE	[0.50]	0.33			0.16	0.04 **	0.11	0.03 **	0.27
IHS	t+1	MAE	[0.45]	0.45			0.47	0.10 *	0.21	0.09 *	0.35
European Commission	t	RMSE	[0.41]							0.32	
European Commission	t	MAE	[0.34]							0.49	
European Commission	t+1	RMSE	[0.61]					0.43	0.38		
European Commission	t+1	MAE	[0.46]					0.17	0.32	0.29	0.42
IMF	t	RMSE	[0.31]	0.18	0.22	0.19	0.05 *		0.14	0.09 *	
IMF	t	MAE	[0.23]	0.37	0.39	0.38	0.00 ***		0.10	0.14	
IMF	t+1	RMSE	[0.62]						0.37		
IMF	t+1	MAE	[0.54]						0.49		
OECD	t	RMSE	[0.35]				0.23			0.16	
OECD	t	MAE	[0.27]				0.08 *			0.25	
OECD	t+1	RMSE	[0.67]								
OECD	t+1	MAE	[0.54]								
NAIVE	t	RMSE	[0.46]								
NAIVE	t	MAE	[0.35]								
NAIVE	t+1	RMSE	[0.59]				0.45	0.36	0.28		
NAIVE	t+1	MAE	[0.52]					0.40	0.43		
ARMA	t	RMSE	[0.22]	0.05 *	0.05 *	0.05 **	0.03 **	0.08 *	0.05 *	0.01 **	
ARMA	t	MAE	[0.17]	0.12	0.14	0.13	0.00 ***	0.15	0.07 *	0.03 **	
ARMA	t+1	RMSE	[0.54]				0.31	0.15	0.18	0.19	
ARMA	t+1	MAE	[0.48]					0.24	0.33	0.29	

Budget balance				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[0.50]					0.45		0.02 **	0.00 ***
OeNB	t	MAE	[0.39]					0.36		0.02 **	0.00 ***
OeNB	t+1	RMSE	[0.95]				0.49			0.35	0.01 ***
OeNB	t+1	MAE	[0.75]				0.46			0.33	0.00 ***
WIFO	t	RMSE	[0.41]	0.01 **			0.07 *	0.13	0.06 *	0.00 ***	0.00 ***
WIFO	t	MAE	[0.31]	0.00 ***			0.03 **	0.10 *	0.17	0.00 ***	0.00 ***
WIFO	t+1	RMSE	[0.84]	0.16			0.16	0.49	0.19	0.14	0.01 ***
WIFO	t+1	MAE	[0.68]	0.12			0.13		0.18	0.20	0.00 ***
IHS	t	RMSE	[0.40]	0.06 *	0.44		0.10 *	0.08 *	0.09 *	0.00 ***	0.00 ***
IHS	t	MAE	[0.29]	0.01 **	0.34		0.04 **	0.07 *	0.08 *	0.00 ***	0.00 ***
IHS	t+1	RMSE	[0.81]	0.16	0.22		0.11	0.33	0.16	0.12	0.01 ***
IHS	t+1	MAE	[0.66]	0.18	0.39		0.13	0.46	0.24	0.18	0.00 ***
European Commission	t	RMSE	[0.49]	0.42				0.42		0.02 **	0.00 ***
European Commission	t	MAE	[0.38]	0.39				0.31		0.02 **	0.00 ***
European Commission	t+1	RMSE	[0.95]							0.37	0.01 ***
European Commission	t+1	MAE	[0.76]							0.34	0.00 ***
IMF	t	RMSE	[0.51]							0.03 **	0.00 ***
IMF	t	MAE	[0.42]							0.04 **	0.00 ***
IMF	t+1	RMSE	[0.84]	0.25			0.14		0.27	0.23	0.01 ***
IMF	t+1	MAE	[0.67]	0.26	0.47		0.14		0.33	0.25	0.00 ***
OECD	t	RMSE	[0.46]	0.18			0.26	0.30		0.01 **	0.00 ***
OECD	t	MAE	[0.35]	0.17			0.25	0.21		0.01 **	0.00 ***
OECD	t+1	RMSE	[0.93]	0.28			0.32			0.33	0.01 ***
OECD	t+1	MAE	[0.73]	0.29			0.35			0.31	0.00 ***
NAIVE	t	RMSE	[0.73]								0.04 **
NAIVE	t	MAE	[0.65]								0.06 *
NAIVE	t+1	RMSE	[1.03]								0.03 **
NAIVE	t+1	MAE	[0.84]								0.02 **
ARMA	t	RMSE	[1.15]								
ARMA	t	MAE	[0.98]								
ARMA	t+1	RMSE	[2.09]								
ARMA	t+1	MAE	[1.79]								

Table A-2

Significance of the Differences in Predictive Accuracy of the Spring and Fall Forecasts for Austria from Fall 1998 to Fall 2006 (Comparison with First Data Release) − continued

Private consumption				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[0.28]			0.37	0.10		0.19	0.02 **	0.00 ***
OeNB	t	MAE	[0.24]				0.18			0.01 ***	0.00 ***
OeNB	t+1	RMSE	[0.54]		0.01 ***	0.01 ***	0.04 **		0.00 ***	0.02 **	0.03 **
OeNB	t+1	MAE	[0.43]		0.07 *	0.01 ***	0.01 **		0.00 ***	0.07 *	0.03 **
WIFO	t	RMSE	[0.22]	0.02 **		0.03 **	0.01 ***		0.01 ***	0.02 **	0.00 ***
WIFO	t	MAE	[0.14]	0.00 ***		0.00 ***	0.00 ***		0.00 ***	0.00 ***	0.00 ***
WIFO	t+1	RMSE	[0.69]			0.14	0.37		0.01 **	0.07 *	0.05 **
WIFO	t+1	MAE	[0.54]			0.06 *	0.18		0.00 ***	0.16	0.05 *
IHS	t	RMSE	[0.29]				0.15		0.27	0.02 **	0.00 ***
IHS	t	MAE	[0.24]	0.49			0.22			0.01 ***	0.00 ***
IHS	t+1	RMSE	[0.74]						0.10	0.11	0.08 *
IHS	t+1	MAE	[0.63]						0.16	0.27	0.15
European Commission	t	RMSE	[0.33]							0.03 **	0.00 ***
European Commission	t	MAE	[0.27]							0.01 **	0.00 ***
European Commission	t+1	RMSE	[0.71]			0.36			0.01 **	0.11	0.04 **
European Commission	t+1	MAE	[0.58]			0.23			0.00 ***	0.22	0.06 *
IMF	t	RMSE									
IMF	t	MAE									
IMF	t+1	RMSE									
IMF	t+1	MAE									
OECD	t	RMSE	[0.31]				0.20			0.03 **	0.00 ***
OECD	t	MAE	[0.23]	0.42		0.44	0.13			0.01 **	0.00 ***
OECD	t+1	RMSE	[0.81]							0.20	0.07 *
OECD	t+1	MAE	[0.69]							0.37	0.18
NAIVE	t	RMSE	[0.65]								0.38
NAIVE	t	MAE	[0.52]								0.26
NAIVE	t+1	RMSE	[0.99]								0.31
NAIVE	t+1	MAE	[0.77]								0.38
ARMA	t	RMSE	[0.69]								
ARMA	t	MAE	[0.60]								
ARMA	t+1	RMSE	[1.15]								
ARMA	t+1	MAE	[0.86]								

Investment				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[2.18]				0.20			0.04 **	0.22
OeNB	t	MAE	[1.65]				0.13			0.03 **	0.15
OeNB	t+1	RMSE	[3.42]				0.34			0.04 **	
OeNB	t+1	MAE	[2.65]							0.05 *	
WIFO	t	RMSE	[1.68]	0.02 **		0.06 *	0.01 ***		0.02 **	0.02 **	0.03 **
WIFO	t	MAE	[1.24]	0.02 **		0.02 **	0.00 ***		0.01 **	0.01 ***	0.01 ***
WIFO	t+1	RMSE	[3.10]	0.03 **		0.16	0.08 *		0.08 *	0.02 **	
WIFO	t+1	MAE	[2.37]	0.13			0.26		0.18	0.03 **	
IHS	t	RMSE	[2.07]	0.23			0.03 **		0.44	0.04 **	0.19
IHS	t	MAE	[1.57]	0.32			0.02 **		0.36	0.02 **	0.11
IHS	t+1	RMSE	[3.25]	0.04 **			0.09 *		0.17	0.04 **	
IHS	t+1	MAE	[2.33]	0.03 **	0.42		0.15		0.11	0.04 **	0.00 ***
European Commission	t	RMSE	[2.33]							0.05 **	0.33
European Commission	t	MAE	[1.94]							0.05 *	0.37
European Commission	t+1	RMSE	[3.48]							0.05 **	
European Commission	t+1	MAE	[2.51]	0.18					0.29	0.05 *	0.28
IMF	t	RMSE									
IMF	t	MAE									
IMF	t+1	RMSE									
IMF	t+1	MAE									
OECD	t	RMSE	[2.10]	0.14			0.08 *			0.04 **	0.16
OECD	t	MAE	[1.62]	0.39			0.08 *			0.03 **	0.11
OECD	t+1	RMSE	[3.39]	0.38			0.22			0.03 **	
OECD	t+1	MAE	[2.57]	0.20						0.04 **	0.37
NAIVE	t	RMSE	[4.08]								
NAIVE	t	MAE	[3.16]								
NAIVE	t+1	RMSE	[5.19]								
NAIVE	t+1	MAE	[4.41]								
ARMA	t	RMSE	[2.54]						0.07 *		
ARMA	t	MAE	[2.05]						0.07 *		
ARMA	t+1	RMSE	[3.34]				0.12		0.25	0.05 **	
ARMA	t+1	MAE	[2.61]	0.40						0.06 *	

Table A-2

Significance of the Differences in Predictive Accuracy of the Spring and Fall Forecasts for Austria from Fall 1998 to Fall 2006 (Comparison with First Data Release) − continued

Exports				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[2.02]				0.28			0.00 ***	0.17
OeNB	t	MAE	[1.59]				0.41			0.00 ***	0.14
OeNB	t+1	RMSE	[3.15]		0.02 **	0.10	0.27		0.01 **	0.11	
OeNB	t+1	MAE	[2.75]		0.10	0.13	0.17		0.04 **	0.25	
WIFO	t	RMSE	[1.62]	0.04 **			0.07 *		0.25	0.00 ***	0.06 *
WIFO	t	MAE	[1.25]	0.07 *			0.15		0.21	0.00 ***	0.04 **
WIFO	t+1	RMSE	[3.58]				0.28			0.27	
WIFO	t+1	MAE	[3.05]			0.48	0.45		0.28	0.39	
IHS	t	RMSE	[1.56]	0.12	0.42		0.06 *		0.25	0.00 ***	0.04 **
IHS	t	MAE	[1.24]	0.14	0.48		0.15		0.26	0.00 ***	0.04 **
IHS	t+1	RMSE	[3.51]		0.38				0.29	0.22	
IHS	t+1	MAE	[3.06]				0.46		0.32	0.39	
European Commission	t	RMSE	[2.25]							0.00 ***	0.32
European Commission	t	MAE	[1.68]							0.00 ***	0.23
European Commission	t+1	RMSE	[3.37]		0.30	0.39			0.06 *	0.21	
European Commission	t+1	MAE	[3.11]						0.29	0.41	
IMF	t	RMSE									
IMF	t	MAE									
IMF	t+1	RMSE									
IMF	t+1	MAE									
OECD	t	RMSE	[1.79]	0.18			0.10			0.00 ***	0.04 **
OECD	t	MAE	[1.45]	0.30			0.23			0.00 ***	0.03 **
OECD	t+1	RMSE	[3.72]							0.31	
OECD	t+1	MAE	[3.25]							0.47	
NAIVE	t	RMSE	[4.63]								
NAIVE	t	MAE	[4.24]								
NAIVE	t+1	RMSE	[4.11]								
NAIVE	t+1	MAE	[3.31]								
ARMA	t	RMSE	[2.51]							0.00 ***	
ARMA	t	MAE	[2.06]							0.00 ***	
ARMA	t+1	RMSE	[2.43]	0.09 *	0.04 **	0.03 **	0.07 *		0.02 **	0.02 **	
ARMA	t+1	MAE	[2.06]	0.11	0.07 *	0.06 *	0.03 **		0.03 **	0.05 *	

Imports				OeNB	WIFO	IHS	European Commission	IMF	OECD	NAIVE	ARMA
OeNB	t	RMSE	[1.98]				0.42		0.39	0.00 ***	0.18
OeNB	t	MAE	[1.65]				0.45			0.00 ***	0.17
OeNB	t+1	RMSE	[3.01]		0.41	0.39	0.12		0.00 ***	0.02 **	
OeNB	t+1	MAE	[2.52]		0.12	0.23	0.07 *		0.00 ***	0.13	
WIFO	t	RMSE	[1.59]	0.05 **			0.13		0.05 **	0.00 ***	0.06 *
WIFO	t	MAE	[1.26]	0.05 **		0.49	0.11		0.06 *	0.00 ***	0.04 **
WIFO	t+1	RMSE	[3.07]			0.43	0.15		0.02 **	0.00 ***	
WIFO	t+1	MAE	[2.87]				0.35		0.10		
IHS	t	RMSE	[1.49]	0.02 **	0.32		0.04 **		0.01 **	0.00 ***	0.03 **
IHS	t	MAE	[1.26]	0.04 **			0.06 *		0.06 *	0.00 ***	0.03 **
IHS	t+1	RMSE	[3.13]				0.29		0.06 *	0.00 ***	
IHS	t+1	MAE	[2.82]		0.44		0.36		0.13		
European Commission	t	RMSE	[2.04]							0.00 ***	0.25
European Commission	t	MAE	[1.69]							0.00 ***	0.21
European Commission	t+1	RMSE	[3.40]						0.10	0.07 *	
European Commission	t+1	MAE	[3.02]						0.13		
IMF	t	RMSE									
IMF	t	MAE									
IMF	t+1	RMSE									
IMF	t+1	MAE									
OECD	t	RMSE	[2.04]				0.49			0.00 ***	0.23
OECD	t	MAE	[1.65]	0.49			0.44			0.00 ***	0.18
OECD	t+1	RMSE	[3.81]							0.13	
OECD	t+1	MAE	[3.36]								
NAIVE	t	RMSE	[4.32]								
NAIVE	t	MAE	[4.11]								
NAIVE	t+1	RMSE	[4.31]								
NAIVE	t+1	MAE	[2.89]				0.36		0.01 ***		
ARMA	t	RMSE	[2.37]							0.00 ***	
ARMA	t	MAE	[2.05]							0.00 ***	
ARMA	t+1	RMSE	[2.65]	0.28	0.23	0.24	0.05 **		0.05 **	0.03 **	
ARMA	t+1	MAE	[1.92]	0.16	0.07 *	0.10 *	0.02 **		0.03 **	0.07 *	

Source: Authors' calculations.
Note: The values indicate the error probability of the Diebold-Mariano test when the null hypothesis of equal predictive accuracy is rejected.

Effects of the Full Opening of the Austrian Labor Market to EU-8 Citizens

Klaus Prettner,
Alfred Stiglbauer[1]

Within the next few years, Austria will lift its temporary restrictions on the free movement of workers from the EU-8 countries. Estimates of the resulting inflow of foreign labor to Austria are surrounded by a high level of uncertainty and vary widely. A review of the literature and the results of empirical estimations presented in this paper – indicating an expected inflow of some 200,000 immigrant employees within ten years – suggest the following: Immigration will have a small impact on the Austrian labor market at the aggregate level, but may reduce the employability of low-skilled, low-income workers. As regards the impact on inflation, it can be assumed that price pressures will decline.

1 Introduction

Immigration, migrant employment and their effects on the Austrian labor market have been widely discussed in recent years, especially given the upcoming opening of the domestic labor market for workers from the EU Member States of Central, Eastern and Southeastern Europe (CESEE). Nationals from those Central and Eastern European countries that joined the EU in May 2004 – the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Slovenia, referred to as the EU-8 here – must be admitted to the labor markets of all EU countries by May 2009, or by May 2011 at the latest under the agreed transitional arrangements.[2]

Countries intending to prolong the existing transitional arrangements from May 2009 to May 2011 because of concerns about serious disturbances in their labor markets must submit a reasoned notification to the European Commission. Austria will, most likely, gradually open its labor market for workers with higher-level qualifications while retaining the transitional arrangements for unskilled or low-skilled workers until May 2011. The government has already introduced or endorsed some steps to this effect.[3]

The political debate is often dominated by fears that immigration invariably leads to higher unemployment and lower wages. In fact, however, the impact of immigration is

Refereed by:
Julia Bock-Schappelwein,
Austrian Institute
of Economic Research
(WIFO).

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[2] *Until then, employees from these countries are subject to the Aliens Employment Act (Ausländerbeschäftigungsgesetz). Analogous arrangements apply to workers from Romania and Bulgaria, which joined the EU in 2007.*

[3] *In 2007, the access restrictions were lifted for up to 800 welders, turners and milling machine operators from the EU-8. From 2008 on, EU-8 citizens trained in 50 specified trades and professions (e.g. bricklayers, car mechanics, electricians, butchers, railway train drivers and certain university-trained engineers) qualify for unrestricted access to the Austrian labor market. As announced by the Austrian Federal Minister of Economics and Labour, any skilled workers from the EU-8 will be free to work in Austria from May 2009, no matter what occupation they have. From then on, restrictions will be imposed only on unskilled workers, especially from the construction sector. Austria has prenotified the European Commission about these plans and will submit the detailed reasoned notification at a later time (Der Standard daily newspaper, December 6, 2007).*

much more varied and complex. This study investigates the likely inflow of migrants over the coming years and the related impact on the Austrian labor market, notably on employment and unemployment. In addition, it examines an issue that is especially relevant from a central bank perspective: the implications of immigration for the natural rate of unemployment and inflation developments.

This study is structured as follows: Section 2 describes the development of migration to Austria in recent decades and the current patterns of migrant employment. Section 3 outlines the staggered opening of labor markets in the "old" EU Member States (EU-15) and reviews estimation results regarding the migration potential from the CESEE EU Member States (EU-8 plus Bulgaria and Romania) to the EU in general and Austria in particular.

Section 4 analyzes the economic impact of immigration on the Austrian labor market, focusing on the long-term effects on the labor market conditions for the domestic workforce. To this end, section 4 discusses theoretical aspects, summarizes the results of selected relevant international studies and of older empirical studies on Austria, and highlights the dynamic effects of immigration on the natural unemployment rate and on inflation.

Section 5 reports the results of the authors' own empirical approaches, looking into the long-term effects that an increase in migrant employment has on the native-born population's employment and unemployment levels, and presenting a simulation of dynamic effects caused by the expected inflow of labor from CESEE. Section 6 summarizes and draws conclusions.

2 Immigration to Austria: Some Facts and Figures

2.1 Definitions

Migration denotes the movement of people from their country of origin to a destination country. How important immigration is for the destination country is typically measured in terms of the share immigrants have in the destination country's total population. In this respect, "immigrants" can denote (1) residents who are citizens of other countries or (2) the foreign-born population. Both measures are imperfect, however: It is easier to obtain the citizenship of some countries than of others (e.g., some countries grant birthright citizenship while others do not). Therefore, some authors have created combined measures so as to cover all inhabitants with a migration background.

Not all immigrants increase the labor supply, though. To gauge the significance immigrants have in a country's labor market, most authors focus on the share of the non-national workforce rather than the share of the foreign-born workforce. The share of immigrants may be reported for the employed and the unemployed, the total labor force (i.e., employed and unemployed) and the working age population. The employed typically include only immigrants in payroll employment, given the insufficient statistical coverage of self-employed immigrants.

Moreover, stock data mask differences in the pattern of worker flows: Not every immigrant or migrant worker settles permanently in the destination country – many emigrate again; some migrants go back and forth for recurring periods of several weeks or months (seasonal workers), some residents commute across bor-

ders on a daily or weekly basis (cross-border workers).

In light of these considerations, even presenting the various stock data on immigration and migrant employment in Austria in a systematic way would be beyond the scope of this contribution. Therefore, we will highlight only a few stock figures and refrain entirely from presenting flow data.[4]

2.2 Share of Non-nationals in Austria's Total Population Steadily on the Rise

In 2006, non-nationals accounted for 11% of Austria's total population, which is one of the highest shares in the euro area (after Luxembourg and Spain).[5] At just under 15%, the share of the foreign-born population was markedly higher and also significantly above the EU average. The population share of immigrants has increased considerably over the last four decades: In the late 1960s, it still came to a mere 2%. Up to that period, the country's immigration policy had mainly targeted low-skilled workers (primarily from Turkey and the former Yugoslavia). In the 1970s and 1980s, the share of immigrants edged up to 4%, mostly owing to family reunions and in the wake of the Polish crisis. The fall of the Iron Curtain and the wars in Yugoslavia triggered a rapid and large increase in the share of immigrants in Austria: It more than doubled by 1995 (8.5%), and has

continued to grow slowly and steadily since then (Biffl, 2000; Münz, 2007).

2.3 Patterns of Migrant Employment

Based on the monthly employment statistics compiled by the Association of Austrian Social Security Institutions, the total number of immigrants in payroll employment can be expected to come to some 410,000 in 2007,[6] which corresponds to a share in total payroll employment of more than 12%. On average in 2006, most of these employees came from the former Yugoslavia[7] (some 156,000), followed by Germany (55,400) and Turkey (54,100).[8] The figures for other EU countries, e.g. Hungary (15,800), Slovakia and the Czech Republic (14,600), Poland (13,400), and Romania (11,700), are much lower.

The above figures refer to employees who have taken up a job in Austria in compliance with the Aliens Employment Act and to citizens from the EU-15. It is a well-known fact, however, that many people from the CESEE region are working illegally in Austria (i.e., they are not registered with social security). Many of these migrants are employed in households (domestic workers or caregivers), but accurate employment figures are naturally not available. An estimate published in the daily newspaper Der Standard (December 13, 2007)

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[4] See the regular reports submitted by the Austrian Institute of Economic Research (WIFO) to the OECD (e.g. Biffl, 2007) for more details on Austria and the International Migration Outlook series (OECD, 2007a) for an overview of international data.

[5] For an international comparison, see European Commission (2006), Heinz and Ward-Warmedinger (2006) and ECB (forthcoming).

[6] At the time of the editorial close, the data for December were not yet available.

[7] Data for the successor states of the former Yugoslavia and the former Czechoslovakia are (still) compiled into one group, respectively, in the statistics published by the Association of Austrian Social Security Institutions.

[8] These figures do not reflect the large number of immigrants who became naturalized citizens of Austria.

Table 1

Structural Characteristics of the Austrian and Non-national Labor Force in Austria in 2006

%

	Non-citizens	Austrians
Share in the total population	11.0	89.0
of which: males	*51.7*	*48.3*
Age structure of the working age population		
16−24 years	17.2	17.9
25−54 years	71.3	64.6
55−64 years	11.5	17.5
Highest educational attainment level		
ISCED 0−2	36.7	23.3
ISCED 3−4	47.1	62.0
ISCED 5−6	16.2	14.7
Labor force participation rate	70.4	74.1
Unemployment rate	10.6	4.1
Wage differential (adjusted)	−23.0	×

Source: Eurostat, ECB (forthcoming).

assumes that the number of illegal caregivers alone comes to 40,000 in Austria. Another group that is not covered by the migrant employment statistics of the Association of Austrian Social Security Institutions is leasing staff or workers posted to Austria, who typically do not pay social contributions in Austria.[9]

A sectoral breakdown shows that the share of migrant labor is highest in the hotel and restaurant sector as well as in agriculture and forestry (around 30%), followed by the construction sector (slightly below 20%). It is lowest in the electricity, gas and water supply sector as well as in banking and insurance.

Table 1 compares characteristics of nationals and non-nationals in the Austrian working age (15−64 years) population.[10] It shows that the immigrant labor force is characterized by a larger share of men and a slightly lower average age than the Austrian labor force. At the compulsory education level (ISCED[11] levels 0−2), the relative share of immigrants is higher than that of Austrians, while it is much lower at the ISCED 3−4 level. Among university graduates (ISCED 5−6), the relative share of immigrants is slightly higher than that of Austrians, which is, inter alia, attributable to the fact that Austria attracts many highly qualified foreigners, often

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[9] *Foreign firms are, however, obliged to register posted workers and leasing staff. Even though less restrictive provisions apply to EU citizens (e.g. regarding the maximum duration of employment in Austria), they will become effective for EU-8 citizens only after the end of the transitional arrangements. Posted workers and leasing staff seem to constitute a rather small group: In 2006, some 2,400 assignment permits were issued according to the Austrian Public Employment Service.*

[10] *Source: Labor Force Survey. The data only cover people who have a place of residence in Austria, which means that seasonal workers and cross-border commuters are not adequately captured. (By contrast, social security figures include data on these employees – provided they are registered with social security as required.)*

[11] *ISCED (International Standard Classification of Education) is a UNESCO classification of education levels and systems.*

temporarily through multinational corporations (Biffl, 2000). The education level of the foreign labor pool is highly heterogeneous (Bock-Schappelwein, 2006) but on average markedly below that of the Austrian labor force.

The immigrant labor force participation rate is lower than that of Austrians, and unemployment figures are strikingly and significantly higher among immigrants than among Austrians. What is more, migrant employees earn markedly less than Austrians (–23%),[12] reflecting the fact that many enterprises hire migrants as peripheral staff (i.e., they take them on in times of high labor demand and lay them off again when demand drops). These patterns also point to problems in the labor market integration of foreign labor (OECD, 2007b).

3 How Many Immigrants Are to Be Expected?

3.1 Opening of the Labor Markets: EU-15 Countries Adopt Different Strategies

From 2004 on, several EU-15 countries (Ireland, Sweden, United Kingdom) granted unrestricted access to their labor markets to EU-8 citizens, while others (Greece, Spain, Italy, Portugal, Finland) did so in 2006. Still others (Belgium, Denmark, France, Luxembourg, Netherlands) eased the restrictions in 2006. Austria and Germany are the only EU-15 countries that fully retain the provisional arrangements. This is attributable to (1) the comparatively weak labor market conditions in Austria and Germany at the time of the 2004 enlargement and to (2) concerns that

the two countries would have to cope with a disproportionately large share of immigrants, given the geographical proximity.

Thus, a large share of those willing to emigrate from the EU-8 may have done so by the time Austria and Germany open their labor markets – especially young and highly qualified people who are more willing to emigrate than others. As a consequence, Austria may attract mainly low-skilled workers once the restrictions have been lifted.

3.2 Methods for Estimating the Migration Potential

Two questions are particularly relevant when it comes to the opening of the labor market for citizens from the EU-8 plus Bulgaria and Romania: How many economically active persons will enter the economy, and what effects will this inflow have on Austria's labor market? The second question will be addressed in sections 4 and 5.

Studies that focus on the first question can be divided into two categories: econometric studies and surveys. The former are usually based on gravity model estimates (Barro and Sala-i-Martin, 1995) in which immigration is explained by geographical proximity on the one hand and the differences in economic conditions between the destination country and the country of origin on the other.

Surveys conducted among the citizens of potential countries of origin mostly distinguish between the general migration potential (those who consider emigrating), the probable migration potential (people who already compiled information on the

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[12] *The data used in this calculation were adjusted for differences in observable characteristics such as education level and work experience.*

destination country) and the real migration potential (those who applied for a work permit) (Huber, 2001).

Some authors aim at determining the future immigration potential by extrapolating the effects observed following the EU enlargement toward the South in 1986 (Portugal and Spain). At the time, the enormous waves of immigration feared by the "old" EU Member States never fully materialized. Sinn and Werding (2001) point out, however, that the enlargement toward the South is not very suitable as a reference scenario, because (1) lots of Spanish and Portuguese workers had migrated to the EU before 1986, and (2) the income gap between the EU and the two countries was markedly lower at the time of accession than it is today between the EU and its CESEE members.

Overall, estimates of the migration potential involve considerable uncertainties and thus produce widely varying results. This is mainly attributable to:
– differing assumptions regarding the time of accession and the duration of transitional arrangements, the number of countries of origin included, and the time intervals chosen;
– different methodological approaches (longitudinal or cross-section data; projections of immigrant stock or flow data);
– the failure to account for the varying degrees to which destination countries are affected by immigration (e.g. owing to the geographical proximity of Austria and Germany to the CESEE EU countries);
– the exclusion of cross-border workers, who are probably of

higher significance in Austria and Germany than in other EU countries; and
– the failure to account for the fact that the EU-15 countries opened their labor markets at different points in time.

3.3 Migration Potential Estimates

Comparing studies on the migration potential, Huber (2001) found that forecasts of annual migration to the EU-15 range between 41,000 and 680,000 people. On the basis of their literature analysis, Heinz and Ward-Warmedinger (2006) estimate that, within one or two decades after the free movement of workers has become fully effective in the EU, the immigration potential will be 1% to 4% of the total EU-8 population plus Bulgaria and Romania – i.e., 1 to 3 million people. These figures do, however, not take into account immigrants who return to their countries of origin in that period (gross vs. net migration). Table 2 summarizes the results of several key studies on the immigration potential to the EU-15 and to Austria.

Overall, gravity models and the time-series model by Brücker and Boeri (2000) produce higher estimates than the survey by Fassmann and Hintermann (1997). Current evidence seems to suggest that, when access restrictions to the labor markets are lifted by 2009 and 2011, the emigration potential from the CESEE EU countries will be lower than predicted in several older studies, as many people will have emigrated by then (section 3.1) and the economic catching-up process will have continued. Considering this, we may assume that the actual annual immigration potential will be at the lower end of the estimated range, which is

Selected Key Studies on the Emigration Potential from CESEE

Autors	Method	Countries of origin	Immigration potential
Brücker and Franzmeyer (1997)	Gravity model	Poland, Slovakia, Slovenia, Czech Republic, Hungary	EU: 340,000 to 680,000 (annually)
Bauer and Zimmermann (1999)	Extrapolation of migration data following EU enlargement to the South	Bulgaria, Poland, Romania, Slovakia, Slovenia, Czech Republic, Hungary	EU: 3,000,000 (within 10 to 15 years)
Bauer and Zimmermann (2000)	Gravity model with coefficients for EU enlargement to the South	Bulgaria, Poland, Romania, Slovakia, Slovenia, Czech Republic, Hungary	EU: 2% to 3% of the population of the countries under review (total potential)
Straubhaar (2000)	Gravity model with coefficients for EU enlargement to the South	EU-8 plus Bulgaria and Romania	EU: 3,000,000 gross 1,000,000 to 1,500,000 net (total potential)
Fassmann and Hintermann (1997)	Survey	Poland, Slovakia, Czech Republic, Hungary	Austria: 150,000 EU: 721,000 (total potential)
Walterskirchen and Dietz (1998)	Extrapolation of the gravity model by Barro and Sala-i-Martin	Poland, Slovakia, Slovenia, Czech Republic, Hungary	Austria (2005): 42,000 (annually)
Hofer (1998)	Extrapolation of data by Brücker and Franzmeyer (1997) for Austria	Poland, Slovakia, Slovenia, Czech Republic, Hungary	Austria: 25,000 to 40,000 (annually)
Brücker and Boeri (2000)	Time series model	EU-8 plus Bulgaria and Romania (based on EU accession in 2002)	Austria (2002): 41,000 EU (2002): 337,000 (annually, declining later)
Huber and Brücker (2003)	Simulation study based on a gravity model	EU-8 (assumption: free movement of workers from 2004)	Austria (2004): 22,000 Austria (2006): 24,000 (annually, declining later)
		EU-8 (assumption: free movement of workers from 2011)	Austria (2011): 21,000 Austria (2013): 22,000 (annually, declining later)
		Bulgaria, Romania (assumption: free movement of workers from 2013)	Austria (2013): 800 (annually, declining later)

Source: Brücker and Boeri (2000), Huber and Brücker (2003), Heinz and Ward-Warmedinger (2006), Huber (2001), Sinn and Werding (2001), Straubhaar (2000).

22,000 to 42,000 for Austria. In addition, surveys have revealed lower emigration intentions for Austria's neighboring countries – Hungary, Slovenia, Slovakia, the Czech Republic – than for the other EU-8 countries (European Commission, 2006). Moreover, the figures mentioned refer to the first years only; they are expected to decline sharply over time. Our model simulation (section 5), assumes that some 200,000 economically active people will migrate to Austria within ten years.

As soon as the labor market restrictions have been lifted, we may expect both (relatively) permanent immigration and the number of cross-border workers to rise. Seasonal workers from CESEE will also (continue to) play an important role. Table 3 shows recent data on cross-border commuters and seasonal workers from the CESEE EU countries.

It is very difficult to assess the future potential of cross-border commuters. Most studies use the figures on within-country commuters as a basis for cross-border commuters, assuming that the latter will be a certain fraction of domestic commuters. The baseline scenario of Huber and

Table 3

Cross-border Workers and Seasonal Workers from the EU-8

plus Bulgaria and Romania

Annual average, rounded

	Total foreign employment (2006)	Cross-border workers (2003)	Seasonal workers (2006)
Burgenland	10,700	4,300	1,100
Carinthia	15,200	100	300
Lower Austria	54,300	2,200	2,300
Upper Austria	50,800	400	1,000
Salzburg	30,600	<100	1,300
Styria	29,700	1,000	1,800
Tyrol	39,400	<100	2,100
Vorarlberg	26,800	<100	400
Vienna	123,900	400	500
Unidentified	9,200	×	×
Austria total	390,700	8,500	10,900

Source: Biffl and Bock-Schappelwein (2003), Austrian Public Employment Service, Federal Ministry of Economics and Labour.

Table 4

Estimated Commuter Potential from Hungary, Slovenia, Slovakia

and the Czech Republic to Austria

Autors	Method	Maximum Travel Time	Commuter Potential
Walterskirchen and Dietz (1998)	Adjusted within-country commuter data	90 minutes	150,000 daily commuters
Birner et al. (1999)	Adjusted travel time model	90 minutes	41,000 to 61,000 daily commuters, 85,000 to 95,000 other commuters
Huber (2001)	Adjusted within-Austria commuter model	90 minutes	85,000 daily commuters
Huber and Brücker (2003)	Adjusted within-Austria commuter model (transition period until 2011)	90 minutes	Cross-border commuter figures based on within-country figures: 25%: 55,000, 33%: 73,000, 75%: 164,000

Source: Huber and Brücker (2003).

Brücker (2003), for instance, assumes that the cross-border commuter potential is one-third of the number of people commuting between Austrian districts. It is generally assumed that the maximum distance people are willing to commute is a distance they can cover within three hours per day. The potential of daily commuters is forecast to increase by between 40,000 and 160,000 persons (table 4).

4 Economic Effects of Immigration

4.1 Effects on the Labor Market – Theoretical Aspects

Theoretical models usually aim at assessing the effects immigration has on a country's *native-born* population (or on those who already live in the country)[13] – after all, the native majority population often fears that migrants will displace them or depress wage growth.

[13] Migrants may principally be expected to benefit from having taken the step to leave their home countries (provided it was a voluntary choice).

Welfare analyses show that, on the whole, immigration is (marginally) advantageous for the destination country's population. There are considerable distribution effects, though: Some win while others lose, which is why labor immigration is a contentious political issue.

To highlight these distribution effects, we can use the simplest theoretical model: a model based on perfect competition and two production factors, namely capital and a homogeneous labor force (i.e., native-born and immigrant workers are perfect substitutes). In such a setting, immigration leads to lower wages and higher employment (equal to the size of labor immigration), and producers' surplus increases faster than the income of the native-born workforce drops. The resulting welfare gains (immigration surplus) imply a redistribution of wealth from the native-born workforce to the capital owners. Appropriate economic policy measures could be used to compensate the losers for these losses.

It would be quite unrealistic to assume, however, that Austrian and immigrant employees are equally productive and qualified. Immigrants are on average less qualified than the citizens of most wealthy destination countries; this also applies to Austria (table 1).[14] If we extend the neoclassical basic model to contain three complementary[15] production factors (cap-ital, skilled and unskilled labor) and assume that immigrants are perfect substitutes for unskilled Austrian workers, the distributions effects are more complex: While unskilled domestic workers face income losses, capital owners and qualified workers benefit from welfare gains (Borjas, 1995 and 1999).

Winter-Ebmer and Zweimüller (1996) renounce the assumption of perfect competition and show in a dual labor market model that unskilled native-born workers do not necessarily experience wage losses. They can also profit from immigration (rent effects) – provided that they are (better paid) "insiders" and migrant workers make up the peripheral workforce ("outsiders") receiving no more than the agreed minimal wages. The higher the share of the immigrant workforce, the higher the probability that the "insiders" will lose their negotiation powers (threat effect). If the threat effect is dominant, they will suffer wage losses.

The theoretical models outlined above focus solely on the effect of immigration on wages, which are assumed to be perfectly flexible. This ensures full employment for both the native- and foreign-born workforce. If wage flexibility is limited, however, temporary unemployment may be another consequence of the inflow of foreign labor.

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[14] *There are considerable differences between destination countries (ECB, forthcoming). Still, immigrants mainly compete with low-skilled native-born workers in the labor market. This is attributable to two factors, among others: Qualifications acquired abroad are often not recognized in the destination countries, and in most countries, access restrictions are stricter for professions that require higher-level qualifications (see also Chiswick and Miller, 2007). As already mentioned, the fact that Austria will open its labor market at a relatively late point in time suggests that the inflow of highly qualified immigrant employees to Austria may be expected to be comparatively weak, as many of them will have emigrated to other EU countries.*

[15] *The assumption of complementary production factors means that a given production factor becomes more productive when the input of another factor is increased (the scale effect dominates the substitution effect).*

4.2 Macroeconomic Aspects

The economic literature on immigration is dominated by microeconomic and microeconometric studies. Immigration and its influence on classical macroeconomic issues are examined far less often, as Stephen Nickell observed recently in his contribution to a BIS conference (Nickell, 2007).

Nickell distinguishes between long-term and short-term macroeconomic effects. In general, immigration is expected to have no long-term influence on the equilibrium unemployment rate. Immigration will, however, cut the non-accelerating inflation rate of unemployment (NAIRU), if it reduces existing mismatches in the labor market (e.g. if immigrant workers take up jobs that native-born people do not want). In the short run, however, unemployment may be expected to rise.

As regards the short-term effects on inflation, they depend on the relative size and dynamics of the shock caused by immigration both on the supply side (additional labor) and the demand side (immigrants demanding domestic products). In light of the fact that immigrants tend to have a higher saving ratio (for remittances to their home countries) than the native-born population, immigration is likely to lower inflationary pressures. The destination country's institutional framework[16] may also be expected to play a role in this context, which means that the short-term effects of immigration have to be determined empirically.

4.3 Empirical Studies − Results

4.3.1 International Studies

Especially the U.S. literature contains numerous empirical studies on the effects of immigration on the domestic labor market. One often cited case is the Mariel Boatlift in the early 1980s, when more than 100,000 Cubans migrated from Cuba's Mariel harbor to the Miami region within just a few months. This wave of immigration had no substantial negative effects on employment and wages. Another often quoted case was the repatriation of the Algerian French after the Algerian war in the early 1960s. This incident led to an increase in the French labor supply by just under 2%, as a result of which wage growth slowed significantly and unemployment increased in the regions concerned.

These two examples show that the effects of immigration depend on the capacity of the economy to absorb the foreign labor force by expanding production capacities, that is, by creating new jobs. In other words, labor immigration does not translate directly into job losses for the native-born population (Cahuc and Zylberberg, 2006).

The institutional framework can be a key factor in explaining divergent developments in different countries. The empirical evidence in Angrist and Kugler (2003) indicates that the capacity to absorb immigration (so that the employment rate of the native-born population does not drop) is lower in countries with structural

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[16] *See Stiglbauer (2006) for an overview of the influence labor market institutions have on the labor market situation.*

rigidities than in others. Especially the regulation of product markets turned out to have a robust influence on that capacity (leading to lower employment of the native-born population).

In their overview study for the United Kingdom, Blanchflower et al. (2007) argue that over the last years immigration has probably reduced the equilibrium unemployment rate in the U.K. They also conclude that the inflow of EU-8 citizens has actually lowered inflationary pressures in recent years. This conclusion probably also applies to Austria – indeed even more so because EU-8 migrants may be expected to spend an even lower share of their income in Austria (given geographical proximity) than they do in the U.K., which implies a smaller increase in domestic demand than in supply.

In a simulation study, Barrell et al. (2007) calculate the immigration effects following the 2004 EU enlargement on Ireland, Sweden, and the U.K. (i.e., the three countries that opened their labor markets for workers from the EU-8 immediately). They find that GDP increases in all three countries compared to the baseline scenario, with the effect being strongest in the U.K. and Ireland, where immigration was highest in absolute (U.K.) and in relative terms (Ireland). Slightly dampening long-term effects on inflation are observed for all three countries. In particular in Ireland, unemployment rises rather sharply in the short run, but moderates in the medium term and even falls below the baseline level in the long run (2015 in this simulation).

4.3.2 Older Studies on Austria

In the mid-1990s, Winter-Ebmer and Zweimüller conducted empirical studies[17] on the effects of the then recent rapid increase of migrant labor in Austria and published the results in a number of scientific articles. They analyzed the influence a strong increase in the number of foreign employees had on the unemployment risk and wage growth of the native-born population. The results are summarized in Winter-Ebmer and Zweimüller (1996).

All in all, their findings suggest that the Austrian labor market absorbed the additional labor supply surprisingly well. On the aggregate level, unemployment increased only modestly and wage growth slowed but slightly. The effects varied across labor market segments, though: While for women the risk of unemployment did not rise and wage growth did not decline, for men the risk of unemployment generally increased somewhat. Wage-depressing effects were observed only for low-income males, whereas wage growth was stronger for higher-income males.

Hofer and Huber (2001) estimate a vector autoregressive model with the variables labor demand, the native-born workforce and new migrant workers from the first quarter of 1974 to the fourth quarter of 1999. On this basis, they simulate the effects of a one-off immigration wave bringing 20,000 additional immigrants into the nine Austrian provinces in the year after which the transition arrangements are lifted (presumably 2012). They find that most

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[17] The studies cover the period from 1988 to 1991.

provinces will adjust to immigration primarily through the creation of new jobs. The second-most important adjustment effect is that the labor participation rate of Austrians declines. In other words, immigration does not so much increase unemployment but rather causes some Austrian employees to withdraw from the labor market.

Focusing on the period from 1991 to 1994, Hofer and Huber (2002) observe slightly negative effects of immigration on the wage growth of male blue-collar workers, but none on that of male white-collar workers and women. An increase in the risk of unemployment following higher immigration was observed only for male blue-collar workers. The two authors also examine the effects of stronger foreign trade, which is another consequence of the 2004 EU enlargement. Austria's exports to the EU-8 have grown considerably, which had a favorable effect on wage growth and led to a marked decline in the risk of male unemployment (but produced no significant results for women).

5 Effects of Foreign Employment: Recent Data

The empirical analyses presented in this contribution use the most recent labor market data. First, we aim to clarify the effects the stronger presence of migrant workers has had on sectoral employment and unemployment in the recent past. Then we simulate the impact of increasing immigration on selected labor market aggregates, e.g. employment and unemployment.

5.1 Effects on Unemployment and Employment over the Past Decade

The main purpose of this exercise is to examine if and how the Austrian labor market has changed in recent years and how it reacts to increased immigration today. To this end, we use seasonally adjusted monthly data on employment and unemployment and the share of migrants (for each sector) for the period from January 1998 to June 2007 to estimate panel regressions of the following form.

$$\Delta \log Y_{it} = \alpha + \beta \Delta \log M_{it} + \gamma_i + \delta_t + \varepsilon_{it} \qquad (1)$$

where i denotes the cross-sectoral dimension and t the time dimension. Y_{it} stands for the dependent variable, for which we used several labor market aggregates (total employment, employed Austrians, total unemployment, unemployed Austrians, total labor force, Austrians participating in the labor force).[18]

Table 5 shows the coefficients of growth for the immigrant labor force and the respective p values. The coefficients indicate how much the dependent variable changes when labor immigration increases by 1 percentage point.

Unsurprisingly, the results indicate that labor immigration leads to a significant increase in total employment and total labor supply. Even though a slight rise is observed in total unemployment, it is not considered significant according to conventional significance levels. For the native-born population, we find no significant effects on either employ-

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[18] *This form includes both time- and sector-specific fixed effects (two-way panel). To avoid possible endogeneity problems, we used immigration figures lagged by 6, 12 and 18 months as a function of present-day immigration. Appropriate tests suggest that nonstationarity of the data series can be ruled out.*

Table 5

Labor Immigration: Effects on Unemployment, Employment, and Labor Supply by Sectors

Results of Two-Way Panel Regressions

Dependent variable	Coefficient of $\Delta \log M_{it}$	p value of the coefficient
Total employment	0.238	0.000
Employed Austrians	−0.008	0.916
Total unemployment	0.199	0.117
Unemployed Austrians	0.005	0.971
Total labor force participation	0.284	0.000
Total labor force participation of Austrians	0.115	0.101

Source: Austrian Federal Ministry of Economics and Labour, OeNB.

ment, unemployment or total labor force participation. On the aggregate level, migrant employment thus did not produce any observable adverse

effects on the labor market situation of the native-born population over the past ten years.

5.2 Simulating the Full Opening up of the Austrian Labor Market

The panel regressions presented above highlight the long-term influence of migrant employment. To quantify the dynamic effects of future migration on the Austrian labor market, we estimate a vector autoregressive model that is similar to the one presented in Hofer and Huber (2001). This allows us to simulate the effects of higher immigration on various aggregates of the Austrian labor market. Box 1 below presents the methodological details.

Chart 1

The Impact of Immigration Shocks over 40 Quarters

persons

(a) Period changes

(b) Cumulated changes

— Labor demand
— Labor force participation of Austrians
— Labor force participation of migrants
— Total labor force participation
— Unemployment
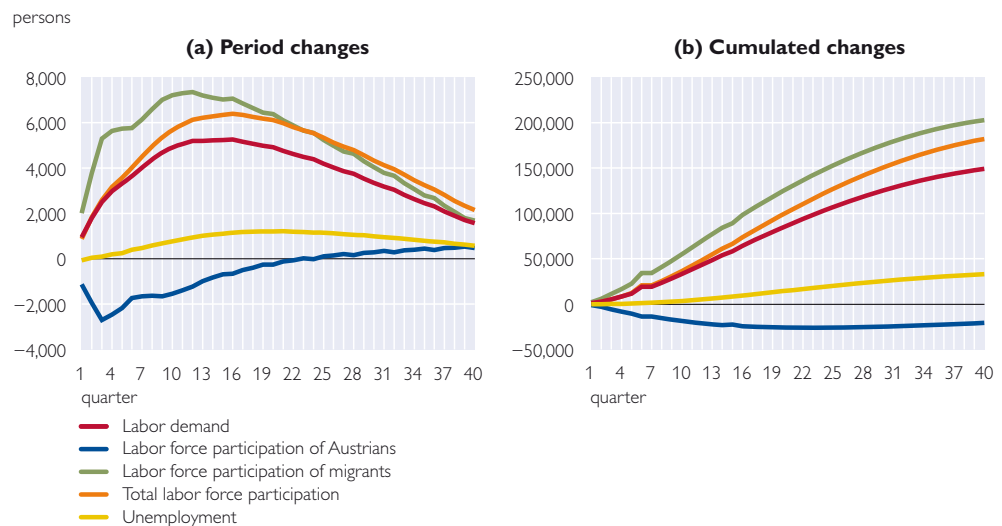
Source: OeNB.

The model consists of three equations:

$$\Delta L_t^D = \sum_{n=1}^{T} \left(a_{1n} \Delta L_{t-n}^D + b_{1n} \Delta L_{t-n}^{SN} + c_{1n} \Delta \sigma_{t-n}^F \right) + \xi_t^D$$

$$\Delta L_t^{SN} = \sum_{n=1}^{T} \left(a_{2n} \Delta L_{t-n}^{SN} + b_{2n} \Delta L_{t-n}^D + c_{2n} \Delta \sigma_{t-n}^F \right) + \xi_t^{SN} \qquad (2)$$

$$\Delta \sigma_t^F = \sum_{n=1}^{T} \left(a_{3n} \Delta \sigma_{t-n}^F + b_{3i} \Delta L_{t-n}^{SN} + c_{3n} \Delta L_{t-n}^D \right) + \xi_t^F$$

where L_t^D denotes the demand for labor (expressed in total payroll employment), L_t^{SN} stands for Austrians participating in the labor force (i.e., Austrian payroll employees and unemployed Austrians), and σ_t^F is the number of migrant workers in the Austrian labor market. ξ_t^i for $i = D, SN, F$ stands for the error terms in each equation. The model contains three endogenous variables. Changes in these variables are not only explained by their own past developments (like in a univariate time series analysis), but also by lagged changes in the other endogenous variables.

The resulting values can be used to calculate changes in the total labor supply and in total unemployment with the help of the following definitional equations.

$$\Delta u_t \approx \Delta L_t^S - \Delta L_t^D \qquad (3)$$

$$\Delta L_t^S \approx \Delta L_t^{SN} + \Delta \sigma_t^F \qquad (4)$$

The data set comprises the first differences in seasonally adjusted quarterly data on the labor force participation of Austrians, total payroll employment, and the foreign labor supply in absolute figures, covering the period from the first quarter of 1974 to the second quarter of 2007. The null hypothesis of unit roots in the respective time series was rejected in two common stationarity tests. The tests on cointegration between the individual original I(1) time series did not provide evidence of cointegrating relations in the equation system. In the next step, we estimated four VAR(p) models (p = 1...4) and compared them against Akaike's information criterion (AIC) and Bayes' information criterion (BIC). As expected, a VAR(1) model was favored by the BIC, while a VAR(4) model was supported by the AIC. We decided to use a VAR(4) model for our analysis, as the model's goodness of fit matters less in this case than its predictive power.

To examine the reaction of the labor market to an exogenous shock, we did not assume a one-off immigration shock at time 0 (like Hofer and Huber, 2001). Instead, we simulated generalized impulse responses (Pesaran and Shin, 1998) over 40 quarters and analyzed the resulting effects. In aggregate terms, this exercise produced an additional increase in the immigrant labor force by just under 203,000 people after 40 quarters, which corresponds roughly to the figure on the total immigrant labor force from all EU-8 countries postulated by Hofer and Huber (2001) and the baseline scenario predicted by Huber and Brücker (2003). In addition, our model assumes roughly the same immigration behavior as Huber and Brücker (2003), i.e., immigration rises first and then declines only gradually.

We postulated an inflow of some 200,000 payroll employees within ten years – which seems realistic in light of the discussion outlined in section 3.3. The charts below present the simulation results (impulse response functions). Chart 1 (a) shows the reactions in the variables for each quarter, while chart 1 (b) depicts the results cumulated over time.

Labor demand shows the strongest reaction, with the total number of payroll employees climbing by almost 150,000. The second-strongest impact is observed for the labor force participation of Austrians, which drops, but in the short run only. After some 4 quarters, the domestic participation rate slowly starts rising again. In the long run, however, the second-most important adjustment mechanism is the increase in unemployment. In the simulation period, the increase in unemployment affects some 33,000 people, which corresponds to a rise in the unemployment rate (national definition) by just under 0.6 percentage points. This is not excessively high for a ten-year period.[19]

Our results tend to confirm the older findings by Hofer and Huber (2001) – with one exception, though: Our simulation suggests a stronger increase in the unemployment rate in the medium term. While this type of analysis does not permit us to determine which groups will be affected by the rise in unemployment, our results (notably section 5.1) and the fact that unemployment is generally higher among immigrant workers (table 1)

suggest that immigration essentially leads to an increase in unemployment of the immigrant labor force itself.

6 Summary and Conclusions

Within the next few years, the Austrian labor market will be opened – probably gradually – to EU-8 citizens. It is unclear how many workers will migrate to Austria as a result. An inflow of around 200,000 workers within ten years, as established in this paper, seems to be a realistic estimate in light of the literature review. This would represent an increase in immigrant payroll employment by some 50% compared with today's level.

Immigration will probably have a neutral impact on the equilibrium unemployment rate or even lower it (if the immigrant workforce reduces imbalances in the domestic labor market). As to the impact of immigration on inflation developments in Austria, we expect the inflationary pressure to diminish, because immigrant employees from the EU-8 will spend part of their income in their countries of origin (given geographical proximity) so that only part of their income will increase domestic demand.

Some fear that a rise in immigrant employment will cause Austrian labor market conditions to deteriorate. Yet the literature reviewed and the empirical estimations presented in this contribution suggest that, at the aggregate level, immigration will have no or only negligible negative effects for the employment situation of Austrians – at least in the long run;

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[19] *We also simulated another scenario that assumes immigration at the aggregate level to be markedly higher (just under 350,000 persons within ten years). In this case, the cumulative increase in total labor supply is some 308,000 people, the number of payroll employees increases by 253,000, the domestic labor supply declines by 41,000 people, and the number of unemployed persons rises by 54,000 (which is equivalent to an increase in the unemployment rate by 0.9 percentage points).*

it seems likely that unemployment will rise slightly in the short run.

The literature also indicates that the effects of immigration may be highly varied for different labor market groups. Especially low-skilled, low-income employees (notably males) will face a higher risk of unemployment and slower wage growth, while better-educated, higher-income employees and capital owners will probably profit from labor immigration. In this respect, it would appear advisable to adopt active labor market policies and fiscal measures (e.g. cutting taxes on labor) to improve the employability of the high-risk labor force groups.

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The Competitiveness Challenge: EU Member States in International Trade

Antje Hildebrandt,
Maria Antoinette
Silgoner[1]

Given the increasing internationalization of trade, it is imperative for any country to ensure that its economy remains competitive. This study sheds light on trends in competitiveness in the EU Member States as made evident in an analysis of various indicators. Having lost their exchange rate autonomy by adopting the euro, the euro area countries face an additional constraint on national economic policy-making in the pursuit of competitiveness. In recent years, diverging unit labor cost developments have left their mark on competitiveness trends in individual euro area countries. Changes in competitiveness should not be interpreted in isolation, but rather against the background of a country's level of economic development, as evidenced in particular by the EU Member States in Central, Eastern and Southeastern Europe. For instance, long-term catching-up processes and equilibrium price adjustments have a major impact on price competitiveness indicators. The countries of this region managed to tap their potential for catching up and succeeded in withstanding international competition especially by raising product quality.

1 Introduction

A country's economic outlook is closely related to its competitiveness. Hence, it is not surprising that new data on a country's competitive position in the world are on the radar of both the media and policymakers[2],[3] Growing international trade integration raises the importance of competitiveness indicators even further. In the 1990s, world trade expanded more than twice as fast as real economic output. More and more goods and services are becoming tradable, and ever more companies and countries are opening up to foreign trade.

The principle of the international division of labor, which in a competitive environment leads to efficiency gains if every country makes use of its comparative advantages, lies at the heart of the importance of trade for growth. This helps raise a country's per capita income. International trade moreover helps spread technological progress faster, which in turn has a positive impact on potential output growth. The European Commission (2005) concludes that about 20% of the rise in living standards in EU Member States over the past 50 years is attributable to the opening up of the world economy. Similarly, other empirical studies (e.g. Frankel and Romer, 1999) corroborate the positive link between foreign trade and economic growth. This link is particularly relevant for the euro area given its high degree of openness. In the euro area, exports account for around 33% of GDP (United States: 8%, Japan: 14%).

Several factors influence a country's competitiveness: exchange rate

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[2] The European Council, for example, expressed its aim to turn the EU into the world's most competitive region by 2010. The corresponding strategy has since played a prominent role within the EU's political debate.

[3] The concept of competitiveness has, however, also been criticized (see among others Krugman, 1994).

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Walpurga Köhler-
Töglhofer, OeNB.

developments and the inflation differential vis-à-vis its main trading partners, with the latter largely depending on the relative development of unit labor costs (ULC), notably for tradable goods; the country's sectoral and regional trade structures, which determine whether its export activities are focused on more or less dynamic industries and regions; and finally, a number of location factors which have an impact on the country's attractiveness as an investment and business location. Depending on the nature of a country's locational disadvantages, the media are often quick to urge central banks, social partners and governments to promote competitiveness in a systematic way. In particular, they tend to call for short-term solutions like adjusting exchange rates or subsidizing crucial production factors, such as energy prices, rather than encouraging decision makers to uncover the structural causes of these deficits, which concern wage-setting processes, trade structures, research and education systems as well as the business and investment climate.

This study sheds light on the EU Member States' competitiveness in the past 10 to 15 years. Using a number of different measures described in section 2, we examine in section 3 which countries have gained or lost competitiveness in recent years. Subsequently, we analyze the role of exchange rate movements, wage policies, growth dynamics as well as sectoral and regional trade structures for the development of competitiveness.

Here, we focus in particular on the euro area countries as well as on the specific challenges for EU Member States in Central, Eastern and Southeastern Europe (CESEE).

2 Indicators of Competitiveness

The wide range of determinants and interpretations of competitiveness implies that it can be measured in many different ways. Basically there are two complementary approaches to gauge a country's competitiveness. The *result-oriented approach* focuses on the past performance of a country in international competition based on indicators, such as export growth, the market share in the global economy, the real exchange rate, real per capita income, the current account balance as well as the country's presence in high-technology sectors and comparative advantages. While these indicators capture a country's current and past performance in international competition, they do not lend themselves to forecasting future developments and often do not point to the sources of competitiveness. As a case in point, increased export growth might result exclusively from a global economic boom, rather than from improved competitiveness.

Determinant-oriented approaches, by contrast, assume that there is a correlation between specific determinants and a country's competitiveness. Such determinants include the costs for the production factors labor and capital, technology, the infrastructure and the business environ-

ment as well as other location characteristics.[4] So if determinants of competitiveness change, it is possible under this approach to draw conclusions about the future development of competitiveness. In other words, the determinant-oriented approach also has a predictive side to it.[5]

This study presents an analysis of the development of competitiveness of the 27 EU Member States over the past few years. We focus on the result-oriented approach for reasons of data availability for the greatest possible number of countries. In subsections 2.1 to 2.5, we describe the characteristics of the most important indicators. In section 3, we analyze these indicators in greater detail for the individual countries.

2.1 Effective Exchange Rates Based on Different Deflators

In the short run, a country's competitiveness is mainly driven by price and cost factors, which have an internal and an external component. The internal component is determined primarily by the development of factor costs. Wage and productivity growth rates, covered by the concept of unit labor costs, are particularly significant in this context. As wage policy — contrary to the decentralized price-setting behavior of businesses — is highly centralized in some countries, it plays a prominent role in the media. The more tightly a country's exchange rate is pegged to the currencies of its main trading partners, which entails that it can no longer be used to support competitiveness, the more wage policy turns into a political issue. This is true for the euro area countries but also for some other EU Member States.

The external component of price and cost competitiveness is measured by the exchange rate. While the news media often refer to bilateral exchange rates, e.g. the euro vis-à-vis the U.S. dollar, the concept of the *effective exchange rate* (EER), i.e. the bilateral exchange rates of a country vis-à-vis its main trading partners weighted according to their respective shares in foreign trade, represents a much more meaningful indicator.

So as to combine price, cost, and exchange rate information in a single indicator, the *nominal effective exchange rate* (NEER) is adjusted for a measure of relative prices and costs, which results in the *real effective exchange rate* (REER). The REER takes into account that it is not only the external value of its currency that determines a country's price competitiveness in

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[4] *The determinant-oriented approach also covers synthetic indicators of competitiveness, which are regularly published as country ratings by several international bodies, including the World Economic Forum, the International Institute for Management Development, the International Finance Corporation and the Bertelsmann Stiftung. Synthetic indicators are constructed as composite indices by combining and weighting a wide range of performance indicators. Data series used include macroeconomic data (growth prospects, price levels, tax ratios, employment rates, R&D ratios, etc.) as well as (soft) location factors (taxation, job protection regulations, administrative burden for business start-ups, wage-setting processes, infrastructure, qualification of labor, etc.). Variables are often selected ad hoc and without any firm theoretical or empirical foundation. For a discussion of advantages and disadvantages of different location rankings, see e.g. Heilemann et al. (2006) and Gundel and van Suntum (2007).*

[5] *The European Commission offers an alternative approach to evaluate a country's competitiveness: it holds a quarterly survey of around 20,000 industrial companies, in which they have to assess their own competitiveness within and outside the euro area. The European Central Bank (ECB, 2003) shows, however, that the survey indicator for competitiveness outside the EU is causally determined by the euro area's real effective exchange rate (REER). In the medium term, the exchange rate thus seems to play a decisive role in rating one's own competitiveness.*

foreign trade, but also the inflation differential vis-à-vis its main trading partners. In order to calculate the REER, we can use different deflators (see ECB, 2003).[6] The consumer price index (CPI) is most commonly used owing to high data availability and quality. As this inflation measure also includes groups of nontradable goods, its information value might be limited, particularly in the case of catching-up economies, where the prices of tradable and nontradable goods often exhibit divergent trends. In addition, changes in indirect taxation and export subsidies can distort the CPI. The same disadvantages apply to the GDP deflator, which, moreover, tends to undergo frequent revisions. The producer price index (PPI) comprises primarily tradable goods which are exposed to international competition. Yet, if exporters trying to keep their prices stable in the export market currencies absorb short-term fluctuations in production costs and/or exchange rates by reducing profit margins (pricing-to-market strategy), the PPI no longer reflects real costs and therefore distorts the competitiveness picture. To capture the cost side, it is better to use ULC growth as deflator, although this measure does not consider the costs of capital, of imported raw materials and of energy.

In light of the advantages and disadvantages of the various REER approaches, the ECB publishes price and cost competitiveness indicators of the euro area on the basis of different deflators (Buldorini et al., 2002). In addition to the 14 non-euro area Member States of the EU, the ECB includes the 10 (EER-24) and 30 (EER-44) most important trading partners outside the EU. As chart 1 shows, these indicators (for EER-24) are highly synchronized in the euro area aggregate. Even the NEER mirrors the REER measures, as inflation in the euro area and its main trading partner countries has developed along similar lines.[7]

Within the euro area, exchange rate fluctuations are a thing of the past. Yet, domestic producers are still exposed to competition within the euro area, both when trading directly with other euro area countries and when trading in third markets. Although indicators of national competitiveness have become insignificant for monetary policymaking within the euro area, they are still important yardsticks for income and structural policymaking, two areas which have remained national responsibilities. Since the beginning of 2007, the ECB has therefore been publishing *Harmonised Competitiveness Indicators* (HCIs) for individual euro area countries.[8] The group of trading partners includes the 44 external export markets comprised in EER-44 and the other euro area countries. For the time being, these indicators are only available on the basis of the Harmo-

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[6] For more information on the availability of indicators of price and cost competitiveness in Austria and a comprehensive comparison of the advantages and disadvantages of different approaches, see Köhler-Töglhofer et al. (2006).

[7] Ca'Zorzi and Schnatz (2007) analyzed whether the different indicators published by the ECB could be used to forecast export developments in the euro area. They conclude that none of the indicators consistently outperforms the others in all selected criteria.

[8] In the past, the national central banks (NCBs) published similar measures based on a broadly harmonized methodology. For further details on the Austrian indicator calculated by the OeNB in cooperation with the Austrian Institute of Economic Research (WIFO), see Köhler-Töglhofer et al. (2006).

Chart 1

ECB: Real and Nominal Effective Exchange Rates

Index (1999 Q1 = 100), 24 trading partner countries

Legend:
- REER − CPI deflated
- REER − deflated by GDP deflator
- REER − ULC (total economy) deflated
- REER − PPI deflated
- REER − ULC (manufacturing) deflated
- NEER
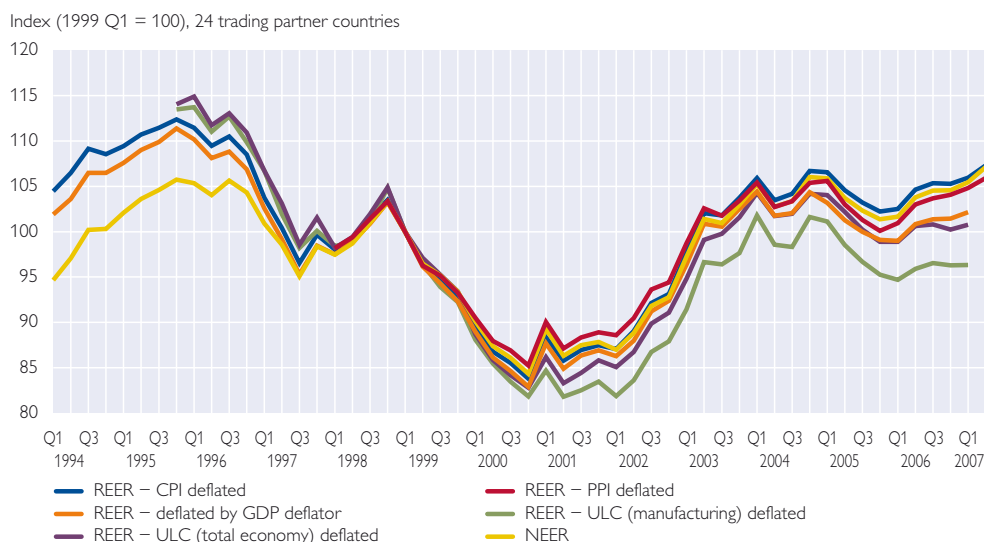
Source: ECB.

nised Index of Consumer Prices (HICP) (ECB, 2007a).

Other international organizations also regularly publish data on price and cost competitiveness. The Bank for International Settlements (BIS) provides monthly CPI-based data for all EU Member States (except Cyprus, Luxembourg and Malta) as well as PPI-based data for 13 EU Member States. The data for the individual euro area countries also reflect competition within the monetary union. Up until the beginning of 2006, ULC-deflated series were available for 14 EU Member States. In section 3, we analyze these data at greater length. The Organisation for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF) likewise offer monthly CPI-based data for many EU Member States. In addition, the IMF offers ULC-based data for selected countries.

2.2 Terms of Trade

The *terms of trade (ToT)* – defined as the ratio of export to import price indices – measure the *price competitiveness* of a country. If the ToT rise, a country can import more goods while keeping its exports at an unchanged level. In other words, ToT fluctuations exert an impact on real income. Many factors, including a country's exchange rate developments or exogenous factors like higher oil prices, influence the ToT.[9] Country-specific factors, such as the development of ULC or the price-setting behavior of businesses, impact on the ToT as well. Higher export prices – and thus more favorable ToT – may, however, also be attributable to improvements in product quality or reputation.

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[9] As export and import deflators are expressed in the domestic currency, a direct link between the import deflator and exchange rate movements can be assumed.

2.3 Balance of Trade

The *balance of trade*, which reflects export and import growth, is one of the most commonly used national competitiveness indicators. For the members of a monetary union, the external trade balance is of particular importance as they can no longer use their exchange rates to adjust for any imbalances. Although the balance of trade might develop favorably even in times of an economic slowdown given low import growth – in which case we would not be able to draw any conclusions about competitiveness – balance of trade development is still useful for assessing the competitive position of a country when combined with other indicators (such as ULC development).

2.4 Market Shares

The development of a country's *market share* in its most important export markets is a clearer gauge of competitiveness. Whether or not a country loses market share or manages to withstand international competition in the medium and long term depends largely on its price competitiveness but also very much on structural factors. Here, a country's exposure to competition from emerging economies in the manufacturing of export goods against the backdrop of global demand dynamics plays a key role. Yet, what is equally important is how fast a country can react to changes in demand, whether its exports target growth markets, whether it improves product quality and whether its manufacturing sector is switching from simple labor-intensive to more sophisticated capital-intensive products. All these factors are especially important in the euro area countries and in countries whose currencies are pegged to the euro.

We have to bear in mind though that a high market share could also result from subsidization or other price distortions.

2.5 Foreign Direct Investment

Moreover, changes in market shares may also be traceable to *foreign direct investment* (FDI), which serves as an indicator of a country's integration in international trade and its attractiveness as a business location. Initially, FDI can have positive effects on the investing country's competitiveness, notably in the case of vertical investment, which is aimed at realizing cost advantages (as opposed to horizontal investment, which is aimed at opening up new markets). So, by shifting parts of its production abroad and by importing intermediate products, the investing country can reduce costs and consequently step up its competitiveness. In addition, FDI can improve the host countries' competitiveness thanks to positive technology- and productivity-related effects, which are eventually bound to be echoed in rising exports.

3 Competitiveness in the EU – Key Aspects

In this section we analyze the development of the EU Member States' competitiveness, using the measures described in section 2; subsequently, we discuss a few specific issues. Our main focus lies on the challenges for member countries of a single currency area as well as on the specific situation of countries catching up economically.

3.1 External Components of Competitiveness Trends in EU Member States

Initially, we analyze how competitiveness has developed in the indi-

vidual EU Member States since the mid-1990s by examining REER data released by the BIS.[10] As described in subsection 2.1, the BIS publishes CPI-based REER data for almost all EU Member States. The currency basket comprises 52 countries, which together account for more than 90% of world trade. The index is standardized in such a way that the year 2000 corresponds to a value of 100. For the sake of international comparability, the CPI-based REER is used for the entire group of countries, even though it is not the indicator of choice for the EU Member States in Central, Eastern and Southeastern Europe, given that the currencies of economies in transition tend to be undervalued initially. In the course of the catching-up process, the exchange rate approaches the equilibrium exchange rate, while the real equilibrium exchange rate might still be on an upward trend.

Charts 2a to 2e cluster the countries in five subgroups. Each chart also includes the REER of the euro area. The euro area series, however, do *not* represent the weighted average of the national series of euro area countries. As to the euro area as a whole, the set of trading partners covers exclusively countries outside the monetary union. In the case of individual euro area countries, the indicators also account for competition within the euro area.

Up until mid-1997, competitiveness within the euro area improved markedly. In this period, the currencies of the two main trading partners of the then still hypothetical currency area – the U.S. dollar and the pound sterling – were depreciating. In the

third quarter of 1997, the economic crisis in Asia triggered a massive depreciation of Asian currencies of up to 40%. Despite the relatively small weight Asian countries have in international trade, the flagging Asian currencies led to a noticeable drop in the competitiveness of the euro area countries. Between the end of 1998 and the end of 2000, the euro area countries clearly caught up again, as the euro depreciated against the major currencies. Next came a phase during which the euro area's competitiveness decreased again in conjunction with the euro's appreciation. Yet, as the euro area experienced less pronounced price and wage increases than its main trading partners, the negative effects of a stronger euro could partly be absorbed. Since the beginning of 2004, the REER has remained broadly stable.

The country subgroups 1 and 2 shown in charts 2a and 2b comprise 11 euro area countries plus Denmark that fits in nicely with the others given its fixed exchange rate policy within the framework of the European exchange rate mechanism II (ERM II). While the REER developed quite similarly in all 11 euro area countries, the dynamics of recent years differ between subgroup 1 and subgroup 2. Both subgroups have in common that their REER was on a steady decrease in the second half of the 1990s, which was also true for the euro area as a whole. This trend is much more pronounced in the countries in chart 2a, whose competitiveness increased strongly, above all in the first few years of the single monetary policy, when the euro depreciated markedly. Some of the countries

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[10] *The indicator used here has been available since 1994. Series for Cyprus, Luxembourg and Malta are not available.*

in chart 2b started from a more favorable level though: While all countries of chart 2a, except Finland, had overcome the 1992–93 crisis of the European Monetary System (EMS) without massive depreciations, Italy, Portugal and Spain devalued their currencies markedly in the wake of this crisis, subsequently gaining a short-term competitive edge. Greece, which became a member of the euro area only in 2001, devalued its currency several times in the 1990s.

During the euro's rally between mid-2002 and 2005, the REER also went up in all countries. While the REER increased to a lesser extent than the NEER in subgroup 1, subgroup 2 experienced a much greater loss in competitiveness. Ireland's development is particularly striking as its REER has risen sharply since the year 2000. Inflation has remained at a relatively high level in all countries in recent years, which – as discussed in further detail in subsection 3.2 – is mainly attributable to ULC dynamics. Subgroup 2 has thus suffered competitiveness losses against subgroup 1 in recent years. In subsection 3.2, we look at the issue of preserving competitiveness and at the significance of wage policy within a single currency area.

Charts 2c and 2d comprise those CESEE EU Member States that have not yet introduced the euro. As already mentioned, the CPI-based REER does not particularly lend itself to analyzing the competitiveness of catching-up economies. In the case of these countries, the increase of a CPI-based REER is generally overestimated compared with that of a PPI-based or ULC-based REER. As the CPI-based exchange rate includes tradable and nontradable goods and services, the Balassa-Samuelson effect[11] is ignored. Moreover, the CPI-based REER also considers adjustments of regulated prices, which is particularly relevant when the catching-up process is accompanied by gradual price deregulation. Differing deflators notwithstanding, REERs tend to move in the same direction.[12]

It is evident from charts 2c and 2d that the currencies of the country subgroups 3 and 4 experienced a strong real effective appreciation in the period under review, which can be attributed to the fact that these currencies had been substantially undervalued at the beginning of the transformation process. In the second half of the 1990s, the currencies of most of these countries tended to appreciate in real terms,[13] which is largely ascribable to price level adjustments but also to higher capital inflows. In the Baltic states (chart 2c) the REER has largely remained stable since 2000.

This development results partly from these countries' euro peg (and the euro's gain against the U.S. dol-

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[11] Catching-up economies usually experience significantly higher productivity growth in the tradable goods sector than in the closed services sector. If productivity growth determines wages in the open sector and wages of both sectors converge due to workforce mobility, ULC grow faster in the services sector, in turn driving up service price inflation. Inflation in catching-up economies therefore tends to be higher than in more advanced countries. This is referred to as the Balassa-Samuelson effect.

[12] See e.g. Belovič (2005) for Slovakia, the IMF (2006) for Romania, and Burgess et al. (2004) for the Baltic states. In Lithuania, CPI-based and PPI-based REERs develop in sync, provided that oil prices are not taken into account as the energy sector is very important for Lithuanian foreign trade.

[13] The currencies of Bulgaria and Romania started to appreciate only in the wake of the 1996—97 currency crisis and the ensuing massive real depreciation.

Chart 2a

Comparison of Real Effective Exchange Rates

CPI-based, broad index: 52 trading partner countries

- - - Euro area — Germany — Denmark — France
— Finland — Austria — Belgium
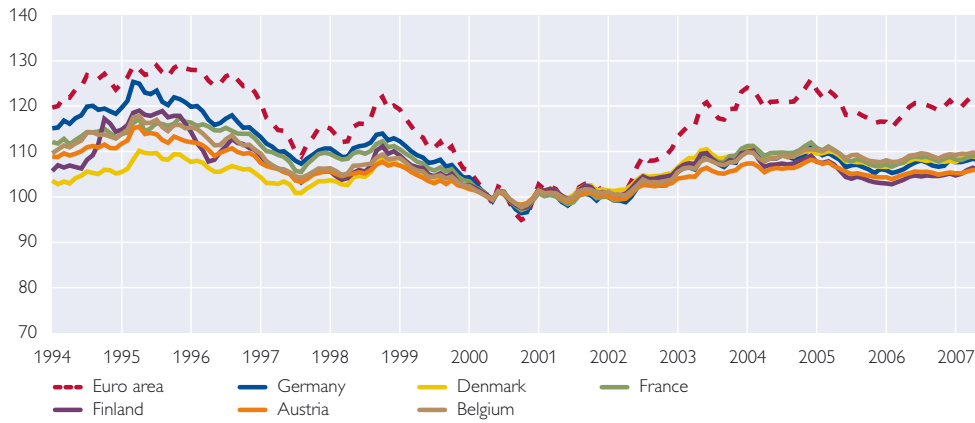
Chart 2b

CPI-based, broad index: 52 trading partner countries

- - - Euro area — Italy — Portugal — Greece
— Netherlands — Spain — Ireland
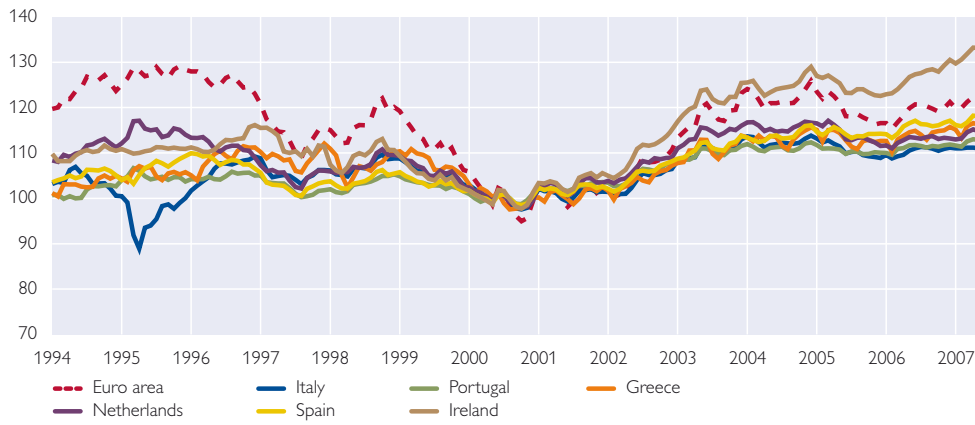
Chart 2c

CPI-based, broad index: 52 trading partner countries

- - - Euro area — Poland — Estonia — Latvia — Lithuania
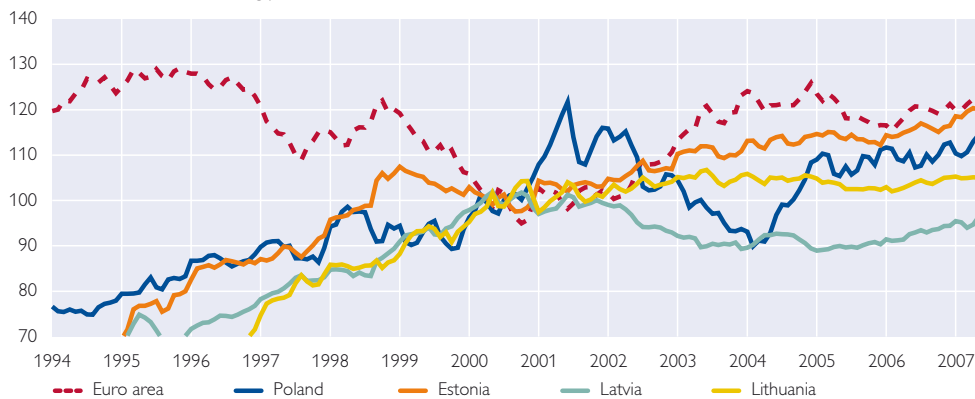
Source: BIS.

Chart 2d

Comparison of Real Effective Exchange Rates (Continuation)

CPI-based, broad index: 52 trading partner countries

Legend: Euro area, Hungary, Slovakia, Czech Republic, Romania, Bulgaria
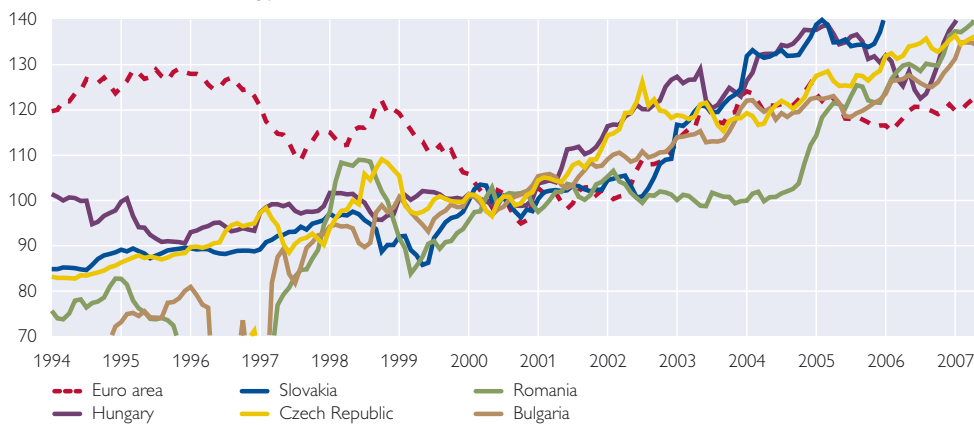
Chart 2e

CPI-based, broad index: 52 trading partner countries

Legend: Euro area, Slovenia, Sweden, United Kingdom
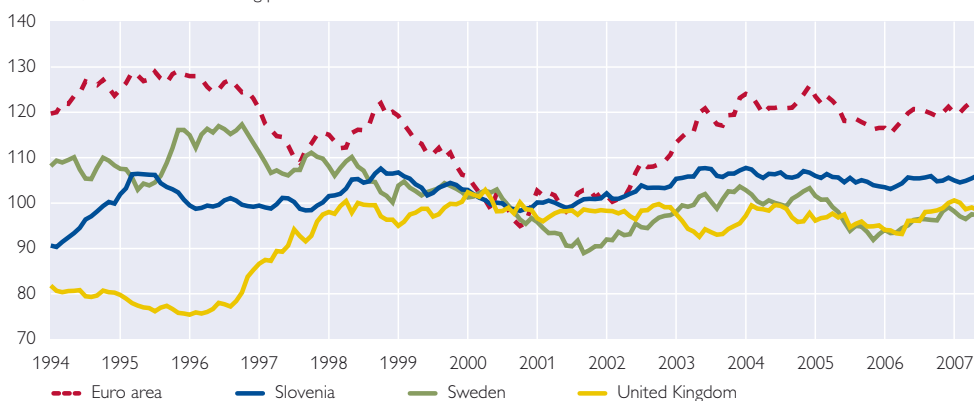
Source: BIS.

lar), partly from the relatively moderate price increases in the first years of the decade (Estonia, Lithuania). Following a substantial depreciation of the zloty in 2003 as a consequence of falling real interest rates and uncertainties about the country's fiscal policy stance, Poland's exchange rate has remained stable since 2005. In the countries of subgroup 4 (chart 2d), the appreciation trend of the CPI-based REER continued. The Romanian leu only started to appreciate in real terms from mid-2004 onwards, when Romania adopted a

more flexible exchange rate regime and liberalized capital movements in 2005, which also had an impact on the country's competitiveness; in this respect the comparatively high increase in ULC is also worth mentioning.

Chart 2e shows the two EU Member States Sweden and the United Kingdom, neither of which has introduced the euro or has pegged its currency to the euro within ERM II. Following the EMS crisis, the United Kingdom also started off with a competitive advantage, which diminished

gradually during the second half of the 1990s. As the REER has stabilized since then, the U.K. has a competitive edge over the euro area. The main reason is that the pound sterling has remained relatively stable against the U.S. dollar since 2002, when the euro again appreciated against the U.S. currency. Sweden's economy is well positioned, too: it is the only EU Member State in which the current REER lies below the 1994 level. In addition, chart 2e plots the development of the REER in Slovenia, which joined the euro area at the beginning of 2007. In the period under review, Slovenia's REER remained relatively stable.[14]

As already discussed in section 2, other price and cost performance indicators likewise provide information about the development of competitiveness in the EU-27. We hence continue to briefly present the development of the ToT, and deal with ULC developments in subsection 3.2.

The ToT of the euro area and of the aggregated EU-27 have deteriorated since the beginning of Economic and Monetary Union (EMU), yet with marked differences from country to country. While in Germany, for example, the ToT improved on average between 2002 and 2006, France, Italy and Portugal suffered significant losses. The CESEE EU Member States, by and large, managed to improve their ToT. As already discussed, many factors may have an impact on the ToT. Germany's higher ToT might be attributable to quality improvements of its export goods, which went hand in hand with higher export prices (despite decreasing or only slightly increasing ULC in the industrial sector). France, Italy and also Portugal apparently felt the impact of the introduction of the euro, which had brought an end to exchange rate targeting. This put a stop to their relatively high export prices and their ToT deteriorated. In France, for instance, ULC picked up relatively sharply in manufacturing, while export price growth was significantly weaker or even negative during the period under review.

In CESEE, the ToT generally increased over the past ten years owing to exchange rate developments (lower import prices resulting from currency appreciations) and structural changes in these economies. At the beginning of the transformation, exports were characterized by fairly poor quality and relatively low value added. As the economies were catching up and implemented fundamental structural changes, both quality and value added improved, which in turn lifted export prices. In this context, robust FDI inflows to these countries played a crucial role as they had a positive effect on export structures. Let us also briefly refer to the ToT against the backdrop of ULC developments. In Romania, for example, ULC in manufacturing rose sharply as did export prices and the ToT. Yet, the improved ToT notwithstanding, this development possibly points to a loss in competitiveness, which is also mirrored in the country's trade balance (see also subsection 3.3).

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[14] *In the case of Slovenia, the REER seems to be generally in line with fundamentals (IMF, 2005). Moreover, Slovenia started from a relatively high GDP per capita level and its catching-up process was more gradual than in most other transition economies.*

Chart 3

Terms of Trade in CESEE EU Member States

and in Selected Euro Area Countries

Annual change in %, five-year average

■ 1997 to 2001 ■ 2002 to 2006
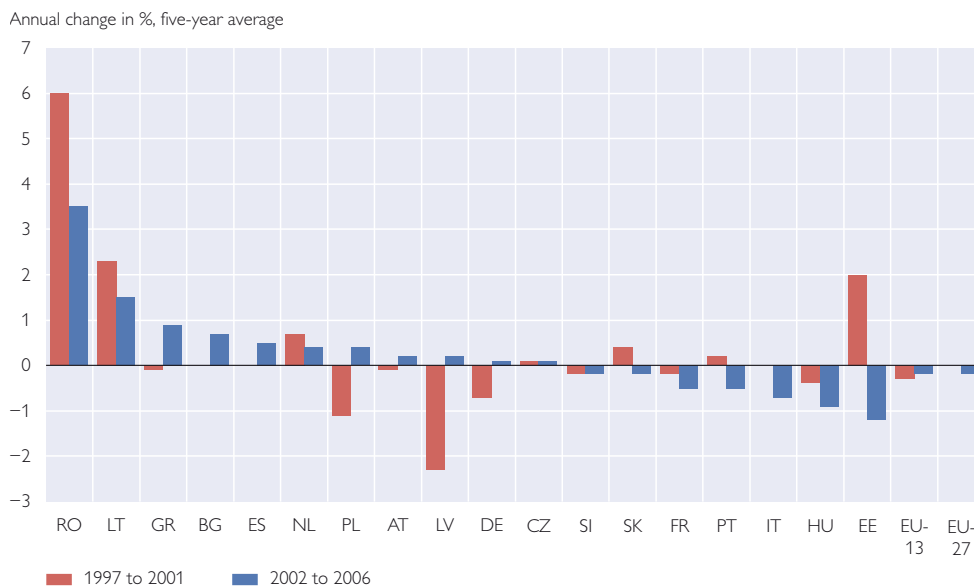
Source: European Commission.

3.2 Wage Policies Are Central to Preserving Competitiveness within a Monetary Union

When it comes to preserving or regaining competitiveness, the members of a monetary union face a stiff challenge in conducting their national economic policies given the loss of exchange rate autonomy. It is thus particularly important to observe indicators of competitiveness. Losses in competitiveness might point to structural rigidities in the wage- and price-setting mechanisms or to a lack of competition.

As bilateral exchange rates are irrevocably fixed within a monetary union, inflation differentials play a crucial role for country-specific REER developments. Angeloni and Ehrmann (2004) show that although inflation dispersion decreased mark-edly within the euro area in the 1990s, equaling approximately the level observed in the U.S.A. (14 Metropolitan Statistical Areas), it is still significantly higher than within Germany, Spain or Italy.

Whether or not high inflation countries are less competitive within a monetary union depends on the origins of the price increases. Inflation differentials that result for example from the Balassa-Samuelson effect and are thus an equilibrium phenomenon, do not necessarily diminish competitiveness. Similarly, price level convergence induced by intensified intra-euro area competition might also generate inflation differentials.[15] Also, high inflation rates might be a normal and necessary response to an overheated economy, with a tight labor market quickly driving up wages.

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[15] *Fischer (2007) explicitly analyzes whether developments in the competitiveness of the euro area countries can be attributed to equilibrium phenomena.*

Chart 4

Unit Labor Costs and Competitiveness in Euro Area Countries

Real effective exchange rate (ULC-based, narrow index: 26 trading partner countries; 1999 = 100)

Belgium   France   Italy   Spain
Germany   Greece   Netherlands
Finland   Ireland   Austria
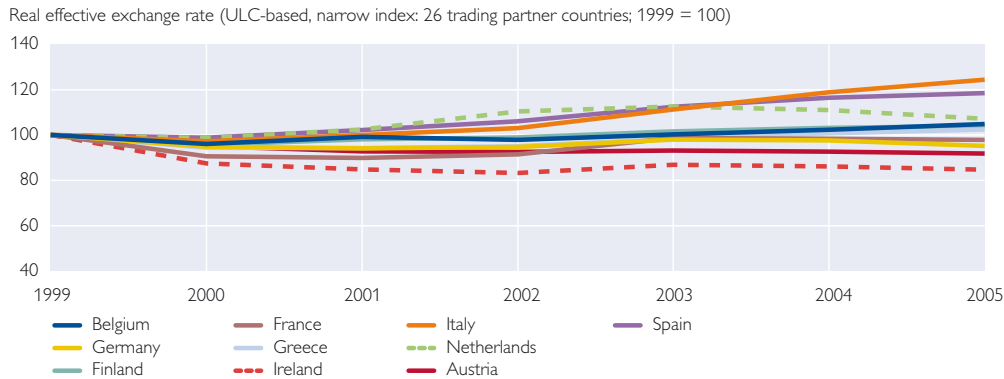
Source: National central banks.

Yet, if high wage growth is a permanent phenomenon that is not linked to the business cycle, the concomitant loss in competitiveness directly impacts on economic growth and employment. Arpaia and Pichelmann (2007) show, for example, that in some euro area countries the cyclical reaction of ULC is more pronounced if the economy expands above the growth rate of potential output. The services sector is the main source for this asymmetry, as it is less exposed to the regulating forces of international markets. Different elasticities depending on the position in the economic cycle can delay ULC adjustments and aggravate cyclical fluctuations.

Angeloni and Ehrmann (2004) show that inflation differentials are highly persistent in the euro area. As the single monetary policy cannot act on inflation developments in individual euro area countries, the economic policy areas still managed nationally, first and foremost structural and wage policies, are key to counteracting any loss in competitiveness. This adjustment process can be time-consuming and painful.

Chart 4 highlights the development of the REER deflated by ULC in manufacturing in ten euro area countries from 1999, the start of EMU, to 2005.[16] Since 2000, some euro area countries have suffered continuous losses in competitiveness (see also chart 2), above all Italy, Spain and Greece. The inflation rates of these countries, which are above the euro area average, may thus be attributed to dynamic ULC developments.

Chart 5 sheds more light on the underlying causes and displays growth differentials of the HICP, wages and productivity in selected euro area countries against the euro area average between 1999 and 2006. It is evident that Spain's and Italy's high ULC growth is primarily the result of negative productivity dynamics, whereas in Greece — despite its weak economy —

[16] At the beginning of 2006, the BIS ceased to publish the ULC-based REER series, which, for Portugal, were available only up to 1998.

this factor is amplified further by extremely dynamic wage growth.[17]

Although the Netherlands, Germany and France posted substantial losses in competitiveness (as the euro appreciated sharply vis-à-vis the U.S. dollar until 2003), they managed to offset some of these losses later on. Particularly the Netherlands had to radically alter their wage policies to reverse the downward trend. This group of countries is characterized by wage moderation, and Germany and the Netherlands recently even registered a decline in ULC. Like Austria, Germany benefited from EU enlargement, as it facilitated cost reduction by outsourcing production steps to CESEE EU Member States. The fact that Austria's competitiveness has continuously picked up since the start of EMU is mainly the result of its highly positive productivity growth differential vis-à-vis the euro area.

Ireland presents an interesting picture: In ULC terms, the country's competitiveness developed favorably; this, however, seems to contradict the massive losses in competitiveness evident from chart 2b. We should bear in mind though that chart 4 merely shows the development of ULC in manufacturing – a sector characterized by extremely strong productivity growth in recent years, which is why the rapid wage growth in Ireland resulting from tight labor market conditions was not reflected adequately in ULC dynamics.[18] ULC developments were determined primarily by the chemicals and information technology sectors. As the services sector lacks this dampening effect, wage developments sharply boosted prices in this sector in recent years. Consequently, Irish service prices are currently more than 20% above the EU-15 average (Cassidy and O'Brien, 2007). This is not insignificant for competitiveness, as more and more services become tradable (tourism, but also finance and information technology services) and as many nontradable services are important input factors for production processes in manufacturing. Moreover, recently (i.e. post-2006), manufacturing has also inevitably undergone a normalization process, which is linked with a certain loss in competitiveness.

Developments in recent years have thus shown that domestic effects, such as ULC movements, crucially determined diverging trends in competitiveness indicators (see also European Commission, 2007a; ECB, 2007c). According to the European Commission (2007a), countries suffering losses in competitiveness within the euro area also tend to perform less well outside the monetary union – so, there is a strong correlation between a country's intra- and extra-euro area export growth.

Chart 6 provides additional information, plotting the PPI-deflated REER for nine euro area countries. As discussed in subsection 2.1, most of the goods included in the PPI are tradable and exposed to international

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[17] Based on ULC developments, Dullien and Fritsche (2007) show that since the beginning of the 1980s Portugal's and Greece's competitiveness has never been less favorable than at the moment. Spain's competitiveness has likewise dropped to a level last seen prior to the exchange rate adjustment of 1992. As to Italy, the country still holds a better competitive position than between 1988 and 1992. This cannot really be explained by the Balassa-Samuelson effect.

[18] Between 1999 and 2006, wages in Ireland rose on average 5.9%, while they increased by only 3% in the EU-15 (Cassidy and O'Brien, 2007).

Chart 5

Growth Differentials of Key Indicators against the Euro Area

1999 to 2006 average
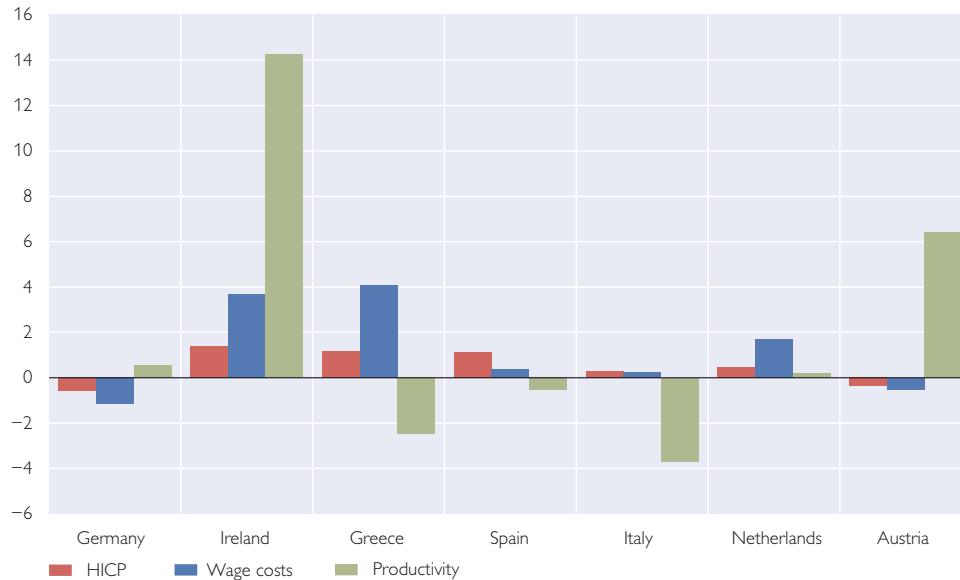
Source: Eurostat, ECB.

competition, which enables us to draw conclusions about the role of pricing for the development of competitiveness.

As is evident from chart 6, in Ireland, just like in Finland, the REER steadily declined from 2002 to 2006, reaching a level well below that of the other countries. Prices of tradable goods are determined primarily by world market prices and by nominal exchange rate developments. Under a pricing-to-market strategy, cost increases are thus partly mitigated through cuts in profit margins (for more information on Ireland, see also Cassidy and O'Brien, 2007). Especially Finland, but lately also Ireland, is very active in the area of new technologies – a sector characterized by falling prices. According to this measure, Greece would be the biggest loser, followed by the Netherlands, where PPI-based data do not (yet) reflect recent changes in wage costs.

When interpreting these REER charts, we have to bear in mind that the trend movements are also connected to a country's level of competitiveness at the start of the single monetary policy. The level of competitiveness largely depended on the exchange rate that was irrevocably fixed prior to the adoption of the single currency and that reflected the level accepted by the market in the run-up to monetary union. If a country joined with an overvalued exchange rate, it might have had to undergo a time-consuming adjustment process based on wage moderation so as to regain a certain degree of its competitiveness. Most notably in the case of Germany, it has often been argued that an overvalued exchange rate – resulting from the real appreciation of the Deutsche mark following German unification – initially led to competitive disadvantages, which Germany managed to overcome only very

Chart 6

Competitiveness of Euro Area Countries in the Tradable Sector

Real effective exchange rate (PPI-based, broad index: 52 trading partner countries; 1999 = 100)

Legend: Belgium, Germany, Finland, France, Greece, Ireland, Italy, Netherlands, Portugal
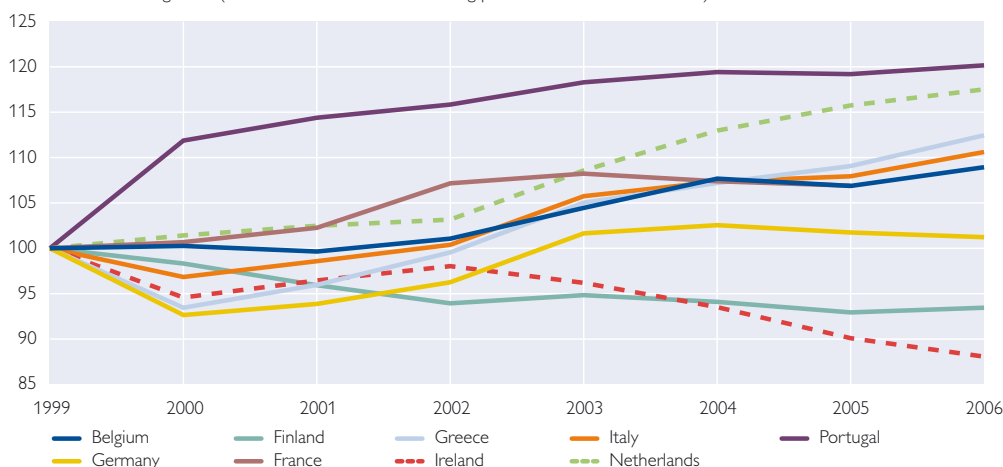
Source: BIS.

recently (see e.g. Alberola et al., 1999, or Fritsche et al., 2005). By contrast, countries like Spain or Italy benefited from comparatively low exchange rate levels owing to the depreciation of their currencies during the EMS crisis.

For those CESEE EU Member States which are to join the euro area in the years ahead, some of which have already anticipated the loss of exchange rate autonomy by pegging their currencies to the euro, wage policy remains one of the main challenges for the future. In some Central, Eastern and particularly Southeastern European countries ULC have increased markedly in recent years (on average more than in the euro area), which can be explained to a certain extent by the actual catching-up process. Nevertheless, the region has performed well in international competition, thus bearing testimony to the fact that other factors (like geographical and sectoral specialization or FDI) have a decisive impact on a country's competitive posi-

tion and may also compensate for losses in price and cost competitiveness (see subsection 3.3).

3.3 Macroeconomic Indicators and the Impact of Sectoral and Regional Specialization

Per capita income developments show that euro area countries whose competitiveness declined in recent years also recorded low income growth (Italy, France and Portugal). Portugal's GDP per capita (in terms of purchasing power parity), has, for instance, already dropped below the level of the Czech Republic. The CESEE EU Member States developed in line with the convergence hypothesis, according to which the region, where income levels are lower than in the euro area, grows much faster than the latter. Yet, this development also signals their improved competitiveness, as can be deduced from the trends in trade balances or market shares.

Another macroeconomic indicator for assessing competitiveness is the foreign trade position of a country

Chart 7

Balance of Trade in CESEE EU Member States

and Selected Euro Area Countries

% of GDP, five-year average

■ 1997 to 2001   ■ 2002 to 2006
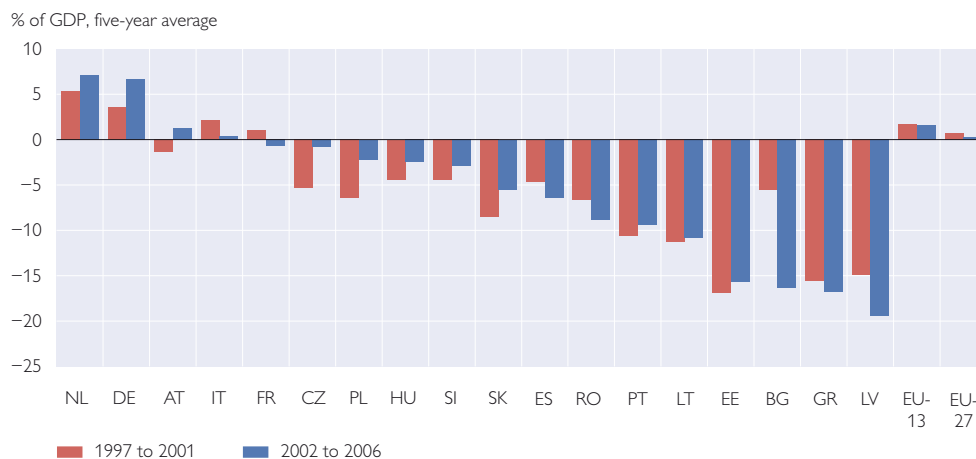
Source: European Commission.

which can be analyzed on the basis of its *balance of trade*. The aggregated trade balances of the EU-27 and the euro area are almost balanced, but there are significant differences among individual countries. Improvements or deteriorations of trade balances go to a certain extent hand in hand with the competitiveness trends already discussed. In Germany, for example, ULC improved and at the same time the country posted a surplus in its trade balance. In Greece, the deterioration of ULC was accompanied by a more pronounced trade balance deficit. Some Central and Eastern European EU Member States, such as Poland, Slovakia and the Czech Republic, reduced their trade balance deficits in recent years despite currency appreciations, which might signal their improved competitiveness. Other CESEE countries (such as Bulgaria, Romania and the Baltic states), however, posted very

high trade balance deficits, which may be ascribable largely to robust wage rises and strong credit growth. In some CESEE EU Member States, negative trade balances can still be attributed partly to the economic catching-up process as demand for consumer goods, intermediate products and capital goods remains strong. Trade balances may thus turn negative despite robust export growth (which is significantly higher than in the euro area). The development of trade balances is also influenced by other factors; it makes, for example, a difference whether exporters act as price takers or as price setters.

Trade balance movements partly reflect *market share* developments.[19] Since the early 1990s, basically all major economies have been losing ground in global competition in the face of catching-up transition economies and the accession of countries like China to the World Trade Orga-

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[19] *There are different methods to calculate market shares. For an in-depth discussion, see ECB (2005).*

nization (WTO). Yet, compared with the U.S.A. or Japan, the euro area's loss in global market share was, by and large, considerably less pronounced. CESEE countries have, by contrast, steadily expanded their market share in world exports.

In terms of *geographical specialization*, about one half of all exports from the EU-27 is on average destined for the euro area. Therefore an EU Member State's share of euro area imports plays a key role when it comes to assessing its competitive position. Although the euro area countries lost market share in manufacturing between 1999 and 2005, there are significant differences among individual countries. Whereas Germany and Austria managed to slightly expand their share in euro area imports, especially France and Italy lost ground. The CESEE EU Member States raised their profile as trading partners for the euro area despite the appreciation of their currencies, relatively weak demand and increased competition from China and other Asian countries. This exemplifies that, apart from price and cost competitiveness, other factors, such as sectoral specialization patterns as well as inflows and outflows of direct investment, are critical to succeeding in international competition in the medium and long term.

Furthermore, it becomes clear from the euro area's export performance that the dynamically expanding CESEE economies[20] account for a large share of the foreign trade of countries like Germany or Austria,[21]

which benefited from the opening up of eastern Europe and EU enlargement (for Austria, see e.g. Breuss, 2006). For this reason, these countries managed to expand or at least maintain their shares in euro area exports. Countries with more traditional and less dynamic trading partners, by contrast, tended to lose market shares (e.g. France and Italy). Given its strong trade links with the U.S.A., Ireland, in turn, has been particularly affected by the euro's appreciation in recent years.

Sectoral specialization is another important driver of a country's export performance. The euro area still mainly exports medium-tech goods, while exports worldwide are more and more dominated by high-tech products. On the whole, the specialization in the medium-tech sector has underpinned the euro area's export growth as global demand has remained relatively stable in this sector; demand for high-tech products has been more dynamic but also more volatile. High-tech goods account for one fifth of euro area exports and one third of world exports (ECB, 2005). Among the euro area countries, there are significant differences in terms of export specialization. The exports of Italy, Greece and Portugal are concentrated in low-tech industries (such as the manufacture of textiles), which is why these countries are exposed to increasing competitive pressure from Asian countries (ECB, 2007b). In terms of sectoral specialization, the Member States which joined the EU in 2004 have been moving away from

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[20] *In 2006, year-on-year real GDP growth averaged 6% in CESEE, whereas the euro area grew only by 2.9%.*

[21] *In 2006, almost 14% (1999: almost 10%) of Austrian exports went to the countries which joined the EU in 2004; Germany's respective export share reached around 9% (1999: almost 5%). The other euro area countries posted markedly smaller export shares (except for Finland given its geographical proximity to the Baltic states).*

Chart 8

Shares in Euro Area Imports of CESEE EU Member States[1]
and Selected Euro Area Countries

% of total imports (manufacturing) of the euro area

■ 1999   ■ 2005
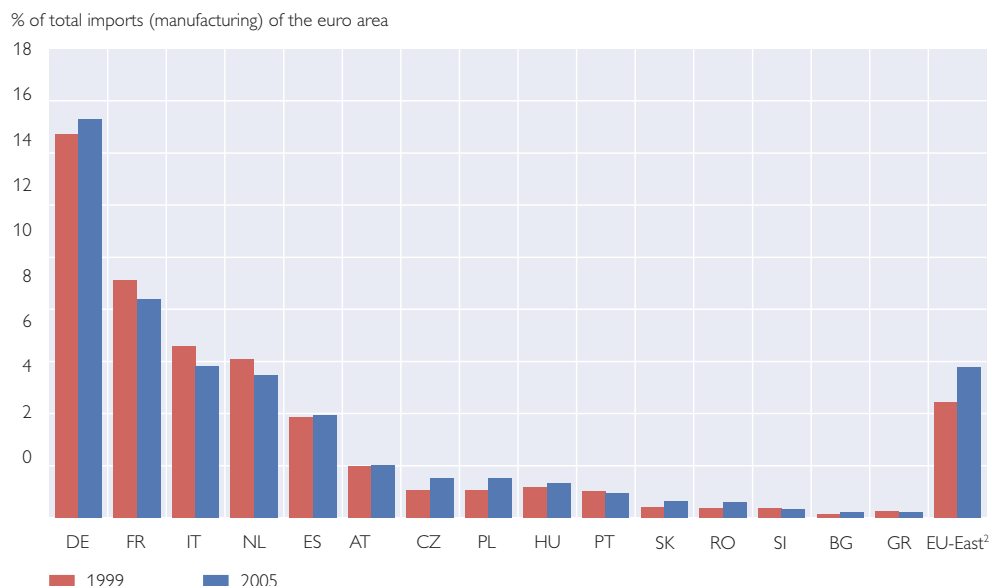
Source: UNO.

[1] As the Baltic states only hold a small market share, they are not displayed in this chart.
[2] CESEE EU Member States.

labor-intensive to capital-intensive medium- and high-tech industries (automotive and transportation, other machinery and equipment). This trend is pushed further as in particular western European companies are outsourcing production units to CESEE. Strengthening currencies notwithstanding, especially Poland, the Czech Republic and Hungary have experienced a significant shift towards higher quality and technology exports that entailed dynamic export growth and gains in market shares (Fabrizio et al., 2007; Landesmann and Wörz, 2006).

As to *foreign direct investment (FDI)*, countries such as Germany, the Netherlands and Austria have been particularly active in CESEE in recent years, what with this region's ongoing privatization projects, (prospective) EU membership and low wage levels.

By outsourcing parts of the production to these countries and by importing intermediate products, companies were able to reduce costs, improve production efficiency and in turn enhance their competitiveness. Greece and Italy, in contrast, have not built up substantial FDI stocks, which might have had unfavorable effects on their competitiveness (see also ECB, 2005). In relation to their GDP, the CESEE Member States record markedly higher stocks of direct investment than any of the old EU Member States. Privatization projects are undoubtedly the main reason for these high FDI stocks, yet they also highlight the region's advanced integration into the globalized economy. Most CESEE countries managed to improve product quality and implement technology-intensive production methods at a relatively fast pace,

mainly thanks to privatization and re-structuring combined with high FDI inflows. In the future, it might, however, become more difficult for CE-SEE countries to gain market shares on the back of improved quality and more sophisticated technologies as there is less potential for increasing the range of products and technologies (see also Fabrizio et al., 2007).

4 Summary

This study sheds light on the development of EU Member States' competitiveness from different perspectives: from the angle of price and cost competitiveness indicators, under the aspect of sectoral and regional specialization of trade patterns as well as against the backdrop of the macroeconomic environment (exchange rate policies, catching-up processes). We will now briefly summarize our findings.

In the case of the *euro area*, losses in competitiveness can largely be attributed to country-specific factors (e.g. higher ULC). Therefore, only those countries benefited which were able to counterbalance such disadvantages through pricing-to-market strategies. Given the loss of exchange rate autonomy, the preservation of competitiveness represents a major challenge for national economic policymakers, and the euro area countries have developed different strategies to cope with this challenge.

Germany and Austria, for example, have been able to improve their competitiveness in recent years. Thanks to their moderate wage policies, their geographical location and their historic ties with the CESEE, Austria and to a lesser degree also Germany have greatly benefited from EU enlargement. According to the European Commission's economic outlook

(2007b), Germany is likely to again catch up with the more dynamic Austrian growth rates in 2008. A favorable regional and sectoral setup supported export developments in these countries. *France* has also been able to improve its competitiveness in recent years, albeit to a lesser degree than Germany, given its unfavorable geographical specialization of exports. *Finland's* competitiveness has risen since its exports are concentrated in the telecommunications sector, which in recent years has been characterized by plummeting prices. The *Netherlands*, in turn, are the only country that – by turning around its wage policy – has been able to compensate for high losses in competitiveness it had initially incurred in light of the stronger euro.

Although the euro area countries in southern Europe, i.e. *Greece, Portugal, Spain and Italy*, had started from a favorable level after the EMS crisis, they have gradually lost this competitive advantage as a consequence of relatively high inflation rates and strong ULC growth. The unfavorable sectoral specialization in low-tech sectors, i.e. in sectors where they are faced with stiff competition from Asian and eastern European countries, has amplified their losses in competitiveness. *Ireland* has suffered disproportionally from the strengthening of the euro in recent years, given its strong trade links with the U.S.A. and the United Kingdom. This negative effect and the dynamic wage developments were partly absorbed by high productivity gains in manufacturing and targeted pricing-to-market strategies.

Changes in competitiveness cannot be assessed in isolation, but should rather be viewed against the background of the development level of an

economy. Here, the *CESEE EU Member States* are a case in point. Long-term catching-up processes and equilibrium price adjustments have a major impact on the indicators of price competitiveness. The CESEE countries generally recorded high income growth and gained market shares even though some of them were burdened with increased ULC and currency appreciations. This bears testimony to the fact that the region has successfully tapped its potential for catching up, especially by improving product quality and by increasing the technological intensity of production, and that it has been able to withstand international competition. In the future, it might, however, become more difficult for them to gain market shares by means of quality or technology improvements, as they might have already fully exploited their potential for privatization and restructuring.

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Highlights

International Trade & Domestic Growth: Determinants, Linkages and Challenges

Lukas Reiss

On September 27, 2007, the Oesterreichische Nationalbank (OeNB), The Vienna Institute for International Economic Studies (wiiw) and the Austrian Federal Economic Chamber held a one-day workshop entitled "International Trade & Domestic Growth: Determinants, Linkages and Challenges." The workshop aimed at providing a forum for an in-depth discussion of the growth effects of increasing internationalization from theoretical, empirical and institutional perspectives. A number of renowned experts from Austria and abroad participated in the workshop.

By way of introduction, *Peter Mooslechner (OeNB)* emphasized how relevant the topic was against the background of progressive European integration and globalization; he drew special attention to the welfare effects of foreign trade. *Ralf Kronberger (Austrian Federal Economic Chamber)* noted that Austrian exports had risen sharply since 1995. Growth has remained strong in the first half of 2007, with Austrian deliveries abroad advancing by 10% and exports to Central, Eastern and Southeastern Europe as well as Asia surging even more. Kronberger went on to review Hans-Werner Sinn's "bazaar economy" hypothesis. The speaker identified the reduction of nontariff trade barriers as one area requiring a great need for action. Moreover, Austria should work on becoming a leading location for high-level services, which would require more investment in both education and R&D.

Michael Landesmann (wiiw) introduced keynote speaker *David Greenaway (University of Nottingham)*. With his presentation, entitled "New Perspectives on Exporting and Productivity," Greenaway provided a comprehensive overview of the newest theoretical and empirical findings about foreign trade and productivity. Greenaway is one of the proponents of the New New Trade Theory, which stresses the importance of firm heterogeneity. Neither the "classical" theory of international trade (Heckscher-Ohlin model) nor the New Trade Theory (represented above all in the work of Paul Krugman: Increasing Returns, Monopolistic Competition, and International Trade, Journal of International Economics, 1979) take account of the concept of firm heterogeneity. The classical theory does not even define the boundaries of firms, and the New Trade Theory assumes that firms are symmetric. Greenaway cited the contribution by Marc Melitz (The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity; Econometrica, 2003) as an outstanding theoretical work of New New Trade Theory. The speaker advocated a review of foreign trade between dissimilar countries as an important extension of Melitz's model; this would allow for the introduction of comparative advantages according to Heckscher and Ohlin by taking into account countries' heterogeneous endowments with production factors. Greenaway pointed out that it would also be necessary to analyze firms' choice of either exports or direct investment as alternative or

complementary strategies and to look at in- and outsourcing in this context.

At the empirical level, Greenaway drew attention to the positive correlation of exports and growth at the macroeconomic level. A similar correlation can be identified at the firm level, namely between firms' productivity and their export activities. In this connection, Greenaway presented newer studies that examine the cause and effect relationship between firm productivity and firm exports. Nearly all of these studies conclude that more productive firms are more likely to self-select into the export market. Firms from smaller and hence less competitive markets are most likely to experience learning effects after entering export markets and to make use of these learning effects to raise productivity. Overall, though, the empirical evidence is mixed. Other factors in addition to productivity are also relevant for export market entry: agglomeration effects; firm size; human capital; general export intensity (all of which enter the equation with a positive sign) and factors specific to the respective industry (e.g. the amount of sunk costs). Most of these factors are also decisive for potential export market exits, in this case with a reversed sign. Firms' chances of survival in foreign trade are very high. Greenaway pointed out what implications the results of this work had for trade policymaking, where widespread consensus about the positive effects of export activities can be observed both at the national and at the multilateral level. The positive impact of firm size and agglomeration on export market entry suggests that targeted subsidies for small and medium-sized enterprises and for investment

in infrastructure might be beneficial. Conversely, the benefits of general export subsidies might be questionable.

Additionally, the speaker noted that multinational firms that pursued foreign direct investment activities appear to be more productive than exporting firms that did not. Further empirical research would be necessary, in particular on the heterogeneity of learning effects and self-selection, and for the evaluation of foreign trade policy measures. Further headway in disentangling the effects of globalization and technological progress as well as in measuring firm productivity would also be important. Finally, Greenaway noted that more consideration needed to be given to where exports come from and where they go.

Michael Landesmann (wiiw) opened Session 1 on "Theory and Empirical Evidence." In a joint work with Robert Stehrer (wiiw), Landesmann analyzed the changing structure of world trade and drew attention to the resurgence of North-South trade from the mid-1990s, which is attributable above all to the enormous rise in trade between some Southeast Asian countries (the Asian tigers, India and China) and the EU-15, the U.S.A. and Japan. Moreover, EU-15 trade with Central, Eastern and Southeastern Europe has grown at an above-average rate. Additionally, there is empirical evidence of large discrepancies in the convergence of productivity in different sectors. The authors used a model based on these observations to analyze the change in the relative competitive advantages of countries and sectors caused by productivity catching-up coupled with incomplete adjustment of factor wages. Under such conditions, international outsourcing leads

to positive growth effects in all regions concerned and speeds up structural change.

Continuing, *Gabriel Felbermayr (University of Tübingen)* attempted to explain whether and how firms access foreign markets. To this end, he used a theoretical model he developed together with Benjamin Jung (University of Tübingen). His presentation began with an overview of firm exports in Germany. Although only about 4% of exporters make foreign direct investments, sales via these exporters' affiliates abroad represent over half of Germany's export revenue. Some 40% of export revenue comes from sales via third-party agents, while direct sales account for the remainder. Just under half of all firms choose either third-party agents or direct sales as their export mode. The authors exclude direct sales, the least important export channel, from their model, and concentrate on the two other export modes. In their New New Trade Theory model, the establishment of local subsidiaries abroad, which causes high fixed costs, pays off only for firms which have a relatively high competitive advantage. Somewhat weaker firms can always choose to sell through a third-party agent. This option entails higher variable costs than sales on the domestic market, though, because it is difficult to find sales partners abroad. These two export channels are not available, however, to firms which suffer from a relative competitive disadvantage and which just barely survive on the domestic market. These theoretical results are consistent with Greenaway's statement about the empirical evidence of productivity differences between multinationals, firms engaged in exporting without direct investments abroad and firms that only do

domestic business. In the context of this model, Felbermayr analyzed the impact of the changes in fixed and variable costs of access to foreign markets.

Julia Wörz (wiiw) presented the results of her joint research with Joseph Francois (Centre of Economic Policy Research – CEPR, University of Linz), according to which the importance of services as production input has risen. Moreover, the intensity of service use exhibits a positive correlation with the level of economic development. According to Wörz, international service trade has risen since the mid-1980s, especially as a result of technological progress and the greater fragmentation of production. Trade in the category of services supplied through any type of business establishment of one country in the territory of another (i.e. foreign direct investment) has grown especially sharply at least since the mid-1990s. According to the four modes of the supply of services described in the General Agreement on Trade in Services (GATS), such services fall under "mode 3" services (commercial presence). However, compiling data from this category is very problematic. The analysis of the effect of imports of various services by sectors showed that services have a particularly strong impact on manufacturing value added, exports and employment. The impact is positive in technology-intensive sectors and negative in labor-intensive sectors. Furthermore, Wörz and Francois found a rather low competitiveness for Austria in production-related services and pointed out fairly large barriers to FDI in the service sector. Moreover, barriers to international service trade, in particular to transportation services trade, are high in many countries.

Session II, entitled "Empirical Analysis for Austria," was opened with a presentation by *Gerhard Fenz (OeNB)*, who reported on an analysis drawn up with Martin Schneider (OeNB) of the transmission of German business cycle shocks to Austria. By way of introduction, Fenz explained that the volatility of the global business cycle has decreased and that particularly the integration of Central, Eastern and Southeastern European countries into the EU has reduced the importance of Germany as a trade partner for Austria. While Germany's contribution to Austrian exports and imports of goods as a percentage of GDP has continued to rise since 1990, its share in foreign trade has fallen. Likewise, Austrian FDI in Germany rose as a share of GDP, but its share in total outward FDI dropped. But the continued fairly constant correlation of both countries' business cycles can be seen as evidence of the continued strong influence of the German economy on Austria. However, a spectral analysis pointed out that the German economy led the Austrian economy by one quarter at the beginning of the 1980s, but currently exhibits a lag of one quarter. An estimation of a two-country Vector Autoregressive (VAR) model of the periods from 1972 to 1989 and from 1990 to 2005 showed that the strength of transmission of German supply shocks to Austria remained roughly of the same order, whereas that of monetary shocks increased and that of demand shocks weakened. As the volatility of shocks in Germany diminished over time, though, the effects transmitted to Austria also declined. Nevertheless, there was no evidence of a decoupling of Austria from the German business cycle.

In the next presentation, *Thomas Reininger (OeNB)* examined the import demand of selected new Central and Northeastern European Member States (Estonia, Lithuania, Poland, Slovakia, Slovenia, the Czech Republic and Hungary) by means of cointegration analysis employing the DOLS (dynamic ordinary least squares) method. To this end, Reininger used quarterly data from the mid-1990s onward. In nearly all countries, long-run import elasticities are largest in relation to exports and smallest in relation to consumption. The long-run import elasticity of fixed investment lies between that of exports and that of consumption. Slovakia represents an exception; here, the long-run import elasticity is highest with respect to consumption. The total of all three elasticities is just over 1 for most countries.

Additionally, Reininger determined a strong influence of EU-15 imports on the imports of the countries reviewed, in particular on the Czech Republic and on Hungary, with elasticities of approximately 1. This strong impact reflects advanced economic integration.

Discussant *Andreas Wörgötter (OECD)* drew attention to possible problems in identifying shocks in Fenz and Schneider's work and to data problems in Reininger's analysis. According to Wörgötter, the results of Reininger's analysis signal that the countries reviewed already belonged to the group of developed economies. In his opinion, both studies reflect the growing competitive pressure and the increasing structural change to which Austria is subjected. Therefore, changes in the educational system (especially in apprentice training), further deregulation measures and the provision of a stable macro-

economic framework through economic policymaking will be necessary. Wörgötter cited further increases in the labor market participation rates as another important goal.

Session III dealt with "Trade Policy and Growth" and was opened by *Przemyslav Kowalski (OECD)* with a survey of various studies on the welfare effects of growing trade liberalization. Kowalski attributed the large fluctuations of the results to different assumptions on technology and on the structure of goods and labor markets, apart from differences in the data and methods used. Most studies conclude that in absolute figures, liberalization results in larger increases of value added for developed countries. In addition, the estimated values are generally fairly low compared with the total output of the countries examined, which, according to Kowalski, is partly ascribable to the fact that the productivity-increasing impact of foreign trade was barely taken into account in most studies.

In his presentation, *Joseph Francois (CEPR; Johannes Kepler University, Linz)* underlined that on average countries with relatively open markets do better in economic terms. However, a comparison between Southeast Asia and Sub-Saharan Africa shows that a high foreign trade share alone does not guarantee a good growth performance. On the other hand India's and China's share of foreign trade in total economic activity rose when these economies began to boom. Moreover, just before the boom, the share of development aid declined in both countries, raising doubts about the usefulness of such benefits. The literature is unanimous in confirming that sustainable economic policy makes a positive contribution to eco-

nomic growth. By way of conclusion, Francois presented an overview of the strengths and weaknesses of Applied General Equilibrium (AGE) models in analyzing the impact of trade liberalization. The speaker saw a need for action inter alia in the evaluation and structural estimation of such models, taking into account firm heterogeneity, the measurement of trade policy measures and investment modeling.

In her discussion of the two presentations in Session III, *Nora Dihel (European Commission)* noted that, above all, the results on the welfare effects of liberalization in services are very diverse. *Michael Landesmann (wiiw)* emphasized that such studies should take the impacts on particular groups (e.g. households with a particular profile) more into account.

The sessions were followed by a panel discussion with panelists *Nora Dihel (European Commission), Manfred Schekulin (Federal Ministry of Economics and Labour), Rudolf Payer (RHI AG) and Werner Raza (Chamber of Labour)* on the implications of globalization for trade and economic policy. Dihel noted that, above all, low-skilled workers range among the globalization losers. She also explained the European Commission's position on globalization, pointing in particular to the Lisbon strategy. Schekulin clarified that Austria pursues a policy of "prudent globalization" and that it is important to take into account the losers of trade liberalization. Therefore, trade adjustment policies such as labor market activation policies are required to buffer adverse effects. According to Schekulin, one reason to exercise caution in liberalization is the growing importance of sovereign wealth funds. Payer presented a large enterprise's view of globalization. He called for legislative changes

in Austria on CO_2 emissions and the issuing of visa as well as for an EU-wide uniform execution of the VAT regulations. Raza noted that internationalization is not an end in itself. Arguing on the basis of the drop in unit labor costs and the decline in the wage share of GDP in Austria, Raza called for an increase in real wages, which had been stagnating lately.

Moreover, he emphasized the importance of investment in infrastructure and R&D. Finally, Raza criticized Austrian foreign trade policy because it allowed for structural current account surpluses and the concentration of export promotion on large enterprises. The workshop closed with a discussion of the issues introduced by Raza.

Notes

Abbreviations

ARTIS	Austrian Real Time Interbank Settlement (the Austrian real time gross settlement system)
A-SIT	Secure Information Technology Center – Austria
ASVG	Allgemeines Sozialversicherungsgesetz – General Social Security Act
A-Trust	A-Trust Gesellschaft für Sicherheitssysteme im elektronischen Datenverkehr GmbH (accredited certification service provider)
ATX	Austrian Traded Index
BCBS	Basel Committee on Banking Supervision (BIS)
BIC	Bank Identifier Code
BIS	Bank for International Settlements
BOP	balance of payments
BSC	Banking Supervision Committee (ESCB)
CACs	collective action clauses
CEBS	Committee of European Banking Supervisors (EU)
CEE	Central and Eastern Europe
CEECs	Central and Eastern European country (countries)
CESEE	Central, Eastern and Southeastern Europe
CESR	Committee of European Securities Regulators
CIS	Commonwealth of Independent States
CPI	consumer price index
EBA	Euro Banking Association
EBRD	European Bank for Reconstruction and Development
EC	European Community
ECB	European Central Bank
Ecofin	Economic and Financial Affairs Council (EU)
EEA	European Economic Area
EFC	Economic and Financial Committee (EU)
EIB	European Investment Bank
EMS	European Monetary System
EMU	Economic and Monetary Union
EONIA	Euro OverNight Index Average
ERM II	exchange rate mechanism II (EU)
ERP	European Recovery Program
ESA	European System of Accounts
ESAF	Enhanced Structural Adjustment Facility (IMF)
ESCB	European System of Central Banks
ESRI	Economic and Social Research Institute, Dublin
EU	European Union
EURIBOR	Euro Interbank Offered Rate
Eurostat	Statistical Office of the European Communities
FATF	Financial Action Task Force on Money Laundering
FDI	foreign direct investment
Fed	Federal Reserve System (U.S.A.)
FMA	Austrian Financial Market Authority
FOMC	Federal Open Market Committee (U.S.A.)
FSAP	Financial Sector Assessment Program (IMF/World Bank)
FWF	Fonds zur Förderung der wissenschaftlichen Forschung – Austrian Science Fund
GAB	General Arrangements to Borrow
GATS	General Agreement on Trade in Services
GDP	gross domestic product
GNP	gross national product
GSA	GELDSERVICE AUSTRIA Logistik für Wertgestionierung und Transportkoordination GmbH (Austrian cash logistics company)
HICP	Harmonised Index of Consumer Prices
HIPC	Heavily Indebted Poor Countries
IBAN	International Bank Account Number
IBRD	International Bank for Reconstruction and Development
ICT	information and communication technology
IDB	Inter-American Development Bank
IFES	Institut für empirische Sozialforschung GesmbH – Institute for Empirical Social Research, Vienna
ifo	ifo Institute for Economic Research, Munich

IHS	Institut für Höhere Studien und Wissenschaftliche Forschung – Institute for Advanced Studies, Vienna
IIF	Institute of International Finance
IIP	international investment position
IMF	International Monetary Fund
ISO	International Organization for Standardization
IWI	Industriewissenschaftliches Institut – Austrian Institute for Industrial Research, Vienna
JVI	Joint Vienna Institute
LIBOR	London Interbank Offered Rate
M3	broad monetary aggregate M3
MFI	monetary financial institution
MRO	main refinancing operation
MoU	memorandum of understanding
NACE	Statistical Classification of Economic Activities in the European Community
NCB	national central bank
OeBS	Oesterreichische Banknoten- und Sicherheitsdruck GmbH (Austrian banknote and security printing works)
OECD	Organisation for Economic Co-operation and Development
OeKB	Oesterreichische Kontrollbank (Austria's main financial and information service provider for the export industry and the capital market)
OeNB	Oesterreichische Nationalbank (Austria's central bank)
OPEC	Organization of the Petroleum Exporting Countries
ÖBFA	Österreichische Bundesfinanzierungsagentur – Austrian Federal Financing Agency
ÖNACE	Austrian Statistical Classification of Economic Activities
POS	point of sale
PRGF	Poverty Reduction and Growth Facility (IMF)
R&D	Research & Development
RTGS	Real-Time Gross Settlement
SDR	Special Drawing Right (IMF)
SDRM	Sovereign Debt Restructuring Mechanism (IMF)
SEPA	Single Euro Payments Area
SPF	Survey of Professional Forecasters
STEP2	Straight-Through Euro Processing system provided by the Euro Banking Association
STUZZA	Studiengesellschaft für Zusammenarbeit im Zahlungsverkehr G.m.b.H. – Austrian Society for Payment System Research and Cooperation
S.W.I.F.T.	Society for Worldwide Interbank Financial Telecommunication
TARGET	Trans-European Automated Real-time Gross settlement Express Transfer
Treaty	Treaty establishing the European Community
UCIT(s)	undertaking(s) for collective investment in transferable securities
ULC	unit labor cost
UN	United Nations Organization
UNCTAD	United Nations Conference on Trade and Development
VaR	value at risk
WBI	Wiener Börse Index (all-share index of the Vienna stock exchange)
WEF	World Economic Forum
WIFO	Österreichisches Institut für Wirtschaftsforschung – Austrian Institute of Economic Research
wiiw	Wiener Institut für internationale Wirtschaftsvergleiche – The Vienna Institute for International Economic Studies
WKÖ	Wirtschaftskammer Österreich – Austrian Federal Economic Chamber
WTO	World Trade Organization

Legend

x   =   No data can be indicated for 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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Addresses
of the Oesterreichische Nationalbank

	Postal address	Telephone	Telex
Head Office			
Otto-Wagner-Platz 3	PO Box 61	(+43-1) 404 20-6666	114669 natbk
1090 Vienna, Austria	1011 Vienna, Austria	Fax: (+43-1) 404 20-2398	114778 natbk
Internet: www.oenb.at			
E-mail: oenb.info@oenb.at			

Branch Offices

Western Austria Branch Office

Innsbruck

Adamgasse 2	Adamgasse 2	(+43-512) 594 73-0
6020 Innsbruck, Austria	6020 Innsbruck, Austria	Fax: (+43-512) 594 73-99

Southern Austria Branch Office

Graz

Brockmanngasse 84	PO Box 8	(+43-316) 81 81 81-0
8010 Graz, Austria	8018 Graz, Austria	Fax: (+43-316) 81 81 81-99

Klagenfurt

10.-Oktober-Straße 13	10.-Oktober-Straße 13	(+43-463) 576 88-0
9020 Klagenfurt, Austria	9020 Klagenfurt, Austria	Fax: (+43-463) 576 88-99

Northern Austria Branch Office

Linz

Coulinstraße 28	PO Box 346	(+43-732) 65 26 11-0
4020 Linz, Austria	4021 Linz, Austria	Fax: (+43-732) 65 26 11-99

Salzburg

Franz-Josef-Straße 18	PO Box 18	(+43-662) 87 12 01-0
5020 Salzburg, Austria	5020 Salzburg, Austria	Fax: (+43-662) 87 12 01-99

Representative Offices

Oesterreichische Nationalbank	(+44-20) 7623-6446	
London Representative Office	Fax: (+44-20) 7623-6447	
Gracechurch Street 48, 5th floor		
EC3V 0EJ London, United Kingdom		

Oesterreichische Nationalbank	(+1-212) 888-2334	(212) 422509 natb ny
New York Representative Office	(+1-212) 888-2335	
745 Fifth Avenue, Suite 2005	Fax: (+1-212) 888-2515	
10151 New York, U.S.A.		

Permanent Representation of Austria to the EU	(+32-2) 285 48-41, 42, 43
Avenue de Cortenbergh 30	Fax: (+32-2) 285 48-48
1040 Brussels, Belgium	

Permanent Representation of Austria to the OECD	(+33-1) 53 92 23-39
Rue Albéric-Magnard 3	(+33-1) 53 92 23-44
75116 Paris, France	Fax: (+33-1) 45 24 42-49