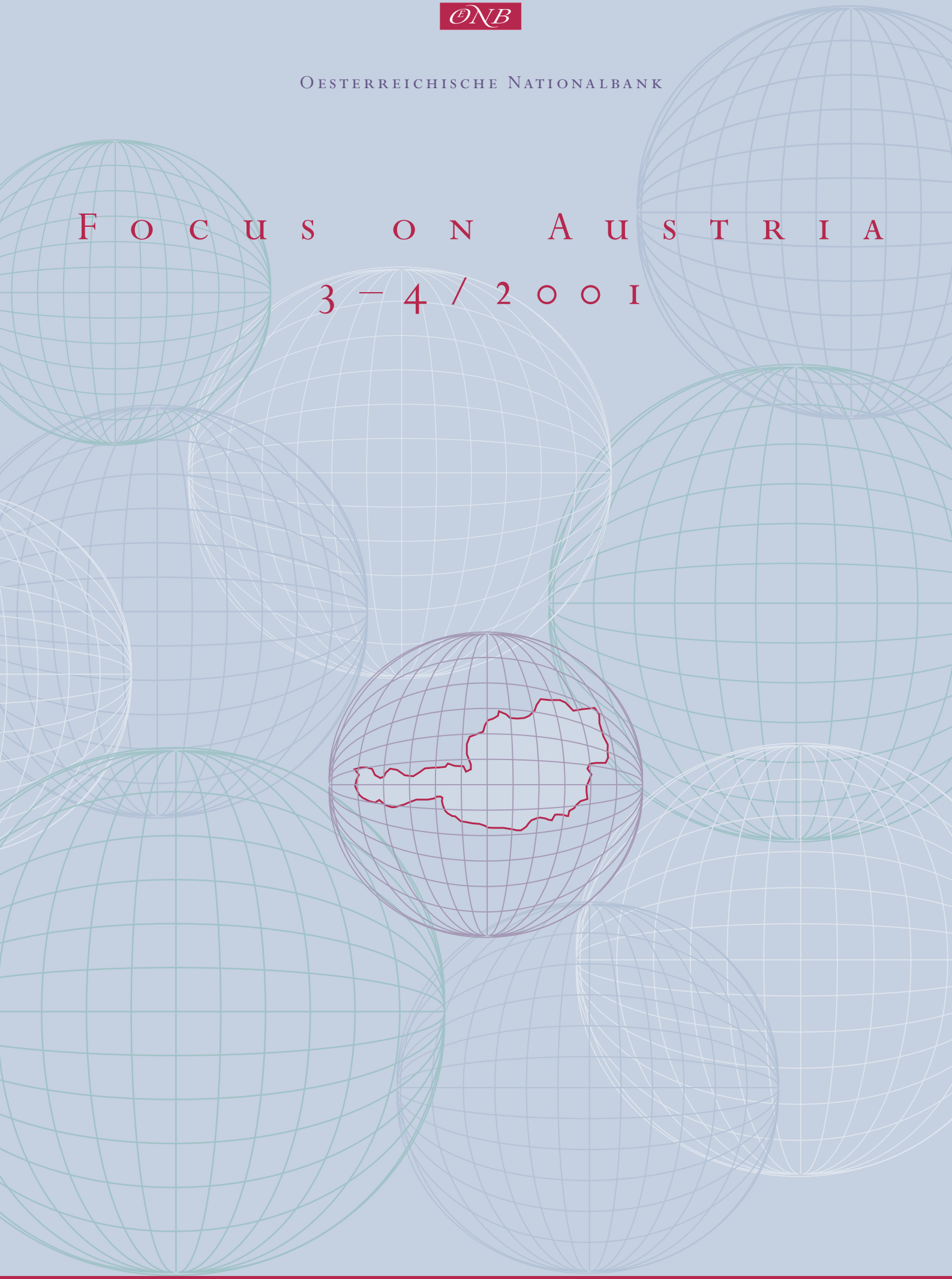
OESTERREICHISCHE NATIONALBANK

FOCUS ON AUSTRIA

3–4/2001



Oesterreichische Nationalbank

Focus on Austria

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Contents

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

Supplements

Editorial

The major goal of analyzing the monetary transmission mechanism is to improve the effectiveness of central bank policy. As the effects of monetary policy on the real economy work with long and varying lags, monetary policy has to be characterized by a forward-looking orientation. Sometimes this medium-term approach may be endangered by focusing too strongly on current data or on transitory financial market developments. Thus, a profound economic analysis of the effects of monetary policy decisions is valuable.

The analysis of the transmission mechanism is also relevant because it is linked to the policy aim of financial stability. If monetary policy has, contrary to prior beliefs, real effects on the economy, the question of how monetary policy decisions affect the financial position of different firms and banks is also of relevance for financial stability. As financial stability has moved into the center of policymakers' attention in recent years, the OeNB started to publish a semiannual *Financial Stability Report* in 2001.

What do we actually know about how the transmission mechanism works? There are several ways in which monetary policy decisions are transmitted to the real economy. In general, it is widely accepted that at least four channels exist: the interest rate channel, the asset price channel, the exchange rate channel and the credit channel. These channels are not mutually exclusive but are rather interlinked, and it is difficult to disentangle them. In practice they can operate simultaneously.

Whereas the first three channels have been extensively analyzed in the past, only recently has a large body of academic and policy analysis on the transmission mechanism begun to concentrate on the fourth channel. The credit channel view focuses on imperfections in capital and financial markets, such as asymmetric information and costly enforcement. In this framework, the characteristics of the financial system will determine to which extent a credit channel exists, and therefore how monetary policy will affect the real economy and financial stability. In countries with a liquid and deep capital market we expect monetary policy to have a smaller impact via the credit channel than in countries where firms rely heavily on bank loans.

The establishment of the European Monetary Union has strengthened the interest in the transmission mechanism of monetary policy. In particular, as the national financial systems within the Monetary Union have developed along different lines, there is an increasing interest in the possible asymmetric effects that monetary policy may have. The work of the Eurosystem Monetary Transmission Network (MTN), integrated by experts from participating national central banks whose main focus is the analysis of the credit channel, will be of crucial importance for the monetary policy strategy of the ECB. This research effort will culminate in an international conference at the ECB in December this year, the aim of which is to present the results of a number of studies done both at the euro area and country levels.

The purpose of this special volume of Focus on Austria is to present to an interested national and international public the results of recent research projects that lie at the heart of the work of a central bank. This issue of

Focus on Austria has an international orientation: it contains input from international contributors and studies drawn up by the Economic Analysis and Research Section of the OeNB. Addressing various questions related to the monetary transmission mechanism, this issue attempts to provide a comprehensive analysis of the transmission of monetary policy.

The first three articles by *Frederic S. Mishkin, Sylvia Frühwirth-Schnatter* and *Sylvia Kaufmann,* and *Maria Teresa Valderrama* deal with the traditional money and credit view of the transmission mechanism. The second set of papers focuses on the role that institutions play for the transmission mechanism. Finally, the last article looks into how this knowledge can be used by monetary policy makers.

The first contribution in this special issue was written by *Frederic S. Mishkin.* The focus of his survey article is the role of asset prices in the transmission mechanism. Mishkin presents the different mechanisms by which monetary policy affects the economy through changes in the prices of different assets, such as stocks, business assets, house prices and the exchange rate. Despite the crucial role of asset prices in the monetary transmission mechanism, this survey illustrates, on the basis of the recent experience from various countries, why central banks should not aim at targeting asset prices.

Since macroeconomic studies have failed to provide a coherent picture of cross-national differences, there has been an upsurge of microeconomic studies which focus on the role of economic and financial structures in monetary transmission.

The article by *Sylvia Frühwirth-Schnatter* and *Sylvia Kaufmann* analyzes the bank lending channel in Austria using individual bank data. The model used captures two asymmetric effects of monetary policy simultaneously. The first effect comes from the cross-sectional heterogeneous reaction of bank lending to monetary policy attributable to specific bank characteristics, the second dimension is the asymmetric effect that monetary policy can have over the business cycle. To complement the analysis of the credit channel in Austria, *Maria Teresa Valderrama* analyzes the real and distributional effects that monetary policy may have on firms' investment spending. The real effects are analyzed by investigating the effects of monetary policy on the financial position of the firms, whereas the distributional effects are analyzed by testing for the existence of a bank lending channel. Both articles find evidence that the credit channel is important in the transmission of monetary policy in Austria.

The next three articles take a look at the effect of monetary policy on the real economy from a rather different perspective than that usually related to the transmission mechanism. The focus of these three papers is on the role that institutions play for the transmission mechanism.

Arturo Estrella's paper concentrates on the role that changing financial institutions may play for the transmission of monetary policy on the real economy. He concentrates on the impact that financial deregulation, securitization and the increasing use of derivatives and risk management have on the transmission mechanism. The results of his analysis, although not conclusive, are compelling: there is strong reason to believe that

changes in the institutional framework do have significant effects on the monetary transmission mechanism. What is even more interesting about this study is that it contradicts the view that monetary policy is becoming ineffective, instead finding that the traditional channels of transmission may be weakened while other channels are becoming more important.

The article by *Markus Knell* and *Fabio Rumler* concentrates on the role that labor market institutions play for the monetary transmission mechanism. The authors carry out a rigorous cross-country study to analyze the asymmetric effects of monetary policy. Their hypothesis is that asymmetries across countries can be explained using several indicators that account for differences between labor market institutions. Their main finding is that differences between labor market institutions across countries help explain the asymmetric effect of monetary policy on the real economy.

The last article in this section by *Heinz Glück* deals with the interaction between fiscal policy and monetary policy. The main hypothesis of this survey is that, due to the strong interrelation between monetary policy and fiscal institutions, it is necessary to take into account the fiscal sector in an analysis of the transmission mechanism. To illustrate this point, the essay concentrates on the institutions established by the European Union and in particular on the effect that the Stability and Growth Pact may have on reinforcing or dampening the effect of the ECB's monetary policy. The author extends the Austrian model used in the 1995 BIS monetary transmission project to include a fiscal rule that should approximate the criteria introduced by the Stability and Growth Pact.

Because one of the main businesses of a central bank is to analyze the effect monetary policy decisions may have on the real economy, from a practicioner's point of view monetary transmission issues have to be linked to model building. The last article of this special issue by *Jack Selody* of the Bank of Canada exposes ten principles for model builders that should maximize the usefulness of mathematical models for policymakers.

Although this issue of Focus on Austria cannot claim to provide a complete answer to the question of how monetary policy affects the real economy, we hope it does provide the reader with a clearer picture of the transmission mechanism. We think three clear messages have emerged from these studies. First, it is shown that contrary to prior beliefs, monetary policy does have real effects on the economy. Second, the effects are asymmetric across time, firms and even countries due to different institutional arrangements. Finally, it is shown that for the Austrian case there seems to be compelling evidence for the existence of a credit channel.

Martin Schürz
Maria Teresa Valderrama

REPORTS

Banking Holidays in Austria in the Year 2002

Banks will be closed in all EU countries on January 1, April 1, May 1 as well as December 25 and 26 because those days are TARGET closing days. On all other holidays, banks will keep their systems open for limited operations (payment systems, foreign exchange trading desk, etc.).

The TARGET system will also be closed on March 29, 2002.

January 1	New Year's Day
April 1	Easter Monday
May 1	Labor Day
May 9	Ascension Day
May 20	Whitmonday
May 30	Corpus Christi Day
August 15	Assumption Day
November 1	All Saints' Day
December 24	Christmas Eve
December 25	Christmas Day
December 26	St. Stephen's Day

Apart from bank holidays, banks are closed Saturdays and Sundays in Vienna and other cities. The above list does not include holidays that fall on a Saturday or Sunday. On March 29 and December 31, 2002, payment systems will be open only for limited domestic operations. Furthermore, the Oesterreichische Nationalbank's St. Pölten branch office will be closed on November 15, a regional holiday of the Land of Lower Austria.

Calendar of Monetary and Economic Highlights

Austria

September 2001

17 *Base rate and reference rate cut:* Following the monetary policy decisions taken by the Governing Council of the ECB on September 17 to cut the interest rate for the *deposit facility* by 0.50 percentage point to 2.75% and the interest rate for the *marginal refinancing facility* by 0.50 percentage point to 4.75% as of September 18, 2001, the following adjustments take effect in Austria on September 18, 2001, as required by the first euro-related amendment to civil legislation (Federal Law Gazette Part I No. 125/1998) and as specified in the corresponding regulation (Federal Law Gazette Part II No. 27/1999): The base rate is reduced to 3.25% and the *reference rate* to 5.00%, which constitutes a reduction by 0.50 percentage point in both cases.

European Union

September 2001

13 The *U.S. Federal Reserve* and the *ECB* agree on a swap arrangement to facilitate the functioning of financial markets in the wake of the terrorist attacks in the U.S.A. and to provide liquidity in dollars. Under the agreement, the ECB would be eligible to draw up to USD 50 billion (EUR 55.2 billion or ATS 759 billion) and to make these dollar deposits available to national central banks of the Eurosystem, thus ensuring the liquidity of the banks in the Eurosystem. This swap line expires in 30 days.

17 The *Governing Council of the ECB* lowers the minimum bid rate on the *main refinancing operations* of the Eurosystem by 0.50 percentage point to 3.75%. This change in the minimum bid rate is effective starting from the operation to be settled on September 18. The interest rates on the *marginal lending facility* and the *deposit facility* are reduced by 0.50 percentage point to 4.75% and 2.75%, respectively, with effect from September 18, 2001. The rationale for the interest rate cuts is that recent events in the U.S.A. were likely to weigh adversely on confidence in the euro area, reducing the short-term outlook for domestic growth.

In reaction to the ECB's decision, *Sveriges Riksbank* cuts its key interest rate by 0.5 percentage point to 3.75%.

18 *Danmarks Nationalbank* lowers its official rate by 0.50 percentage point to 3.75%.

The *Bank of England* lowers its official rate by 0.25 percentage point to 4.75%. Both banks cite the terrorist attacks of September 11, 2001, in the U.S.A. and the steps taken by other central banks as reasons for their decision.

21–23 During the meeting of the informal *Ecofin Council* in Liège, the ministers of finance and central bank governors discuss topics revolving around the terrorist incidents in the U.S.A. In its assessment of the economic situation, the informal Ecofin Council states that the EU economy was influenced more strongly than

expected by the downturn in the U.S.A. However, the EU's economic fundamentals were solid due to the successful implementation of budget consolidation measures so far.
Additional topics raised were combatting the financial activities of terrorist facilities and globalization issues. The EU Commission is given a mandate to prepare a report on the above-mentioned globalization issues and on cooperation development.
The frontloading of euro cash to banks and retailers is proceeding according to schedule. The informal Ecofin Council points out, however, that further efforts need to be made to provide information especially to the general public and to small and medium-sized enterprises. The Council emphasizes that the euro conversion not just by the public sector, but also by the private sector was to have a neutral effect on prices. A European network to promote the flow of information about the cash changeover would be set up.

Economic Outlook for Austria from 2001 to 2003 (Fall 2001)

Gerhard Fenz,
Martin Schneider
Martin Spitzer

Editorial close:
November 30, 2001

1 Summary

In its fall forecast the OeNB expects GDP growth to slow down notably in 2001 and 2002 before regaining momentum in 2003. Real GDP growth is predicted to come to 1.2%, 0.9% and 2.3%, respectively, in 2001 to 2003, which marks a major downward revision of the spring forecast. The current modest growth outlook for 2001 and 2002 can be attributed first to the marked cooling of the global economy and second to faltering domestic demand.

This projection assumes that the bottom of the economic cycle was reached in the second quarter of 2001 (chart 1). External demand, which is expected to gradually pick up in early 2002, and favorable (external) financing conditions are expected to support Austrian businesses' investment activities. Since private consumption is also projected to improve slightly, GDP growth will start bottoming out in the first quarter of 2002. The upswing will accelerate in the second half of 2002 and gather more momentum in 2003.

Table 1

OeNB Fall 2001 Forecast for Austria – Key Results

	2000	2001	2002	2003
	Annual change in % (real)			
Economic activity				
Gross domestic product (GDP)	+ 3.3	+1.2	+0.9	+2.3
Imports, total	+ 7.5	+3.1	+3.0	+5.0
Exports, total	+10.3	+4.1	+2.9	+5.0
Private consumption	+ 2.7	+1.4	+1.4	+2.1
Government consumption	+ 0.6	−0.5	−0.6	+0.9
Gross fixed capital formation	+ 3.4	−0.4	+0.8	+3.4
	% of nominal GDP			
Current account balance	− 2.8	−2.8	−2.9	−2.8
	Percentage points of GDP			
Contribution to real GDP growth				
Domestic demand (excl. changes in inventory)	2.2	0.7	1.0	2.1
Net exports	1.3	0.5	0.0	0.1
Changes in inventory	− 0.2	0.0	0.0	0.0
	Annual change in %			
Prices				
Harmonized Index of Consumer Prices (HICP)	+ 2.0	+2.3	+1.3	+1.3
Personal consumption expenditure deflator	+ 1.9	+2.6	+1.4	+1.3
Unit labor cost in the whole economy	− 0.3	+1.9	+1.4	+0.8
Compensation per employee (at current prices)	+ 2.2	+2.8	+2.4	+2.6
Productivity in the whole economy	+ 2.5	+0.9	+1.0	+1.7
Compensation per employee (at 1995 prices)	+ 0.3	+0.2	+0.9	+1.3
Import prices	+ 5.1	+2.4	+0.7	+1.2
Export prices	+ 2.4	+1.9	+0.4	+1.1
Terms of trade	− 2.6	−0.5	−0.3	−0.1
	%			
Labor market				
Unemployment rate (Eurostat definition)	3.7	3.8	3.9	3.8
	Annual change in %			
Employment	+ 0.9	+0.3	+0.0	+0.5
	% of nominal GDP			
Budget				
Budget balance	− 1.5	−0.2	−0.3	−0.3

Source: OeNB fall 2001 forecast.

The terrorist attacks of September 11, 2001, further increased already prevailing uncertainties about when the economy would recover. This projection leaves from the assumption that in the euro area, business and consumer confidence has been dented only temporarily. It assumes that the events of September 11, 2001, have somewhat delayed the upswing in investment in Austria, but are unlikely to perceptibly affect consumers' behavior.

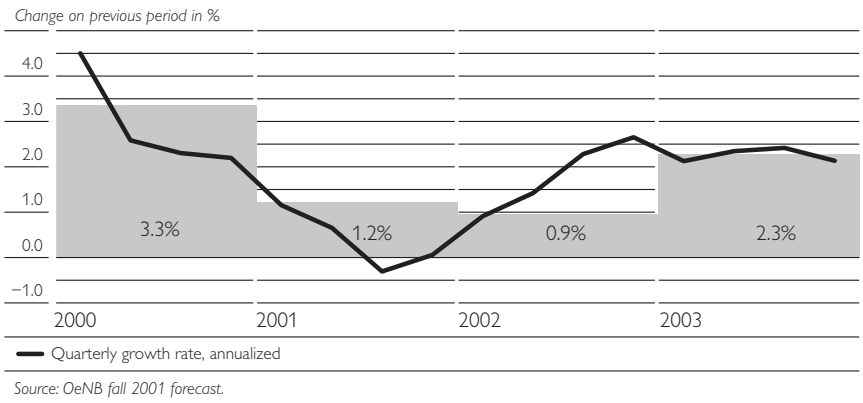
Compared to the forecasts released by the other institutions before editorial close, the OeNB's outlook paints a more pessimistic picture of growth prospects, especially for 2002, primarily because it assumes that the global economy, and thus external demand, will recover more slowly in the course of 2002.

In the first two years of the forecast horizon, the slowdown in the growth of real disposable income is expected to significantly dampen private consumption. In 2001, this can be ascribed to unexpectedly high inflation rates, triggered by oil price hikes and fiscal consolidation measures, whereas in 2002, an expected stagnation in employment is considered to be the underlying reason. Consumption in 2001 and 2002 will only rise – if moderately, by 1.4% each – if consumers' propensity to save diminishes. In 2003, higher employment growth and lower inflation will accelerate private consumption growth to 2.1% and push up the saving rate. Fiscal consolidation measures caused government consumption to contract in 2001 and 2002; 2003, however, will see an increase.

The continuing recession in construction and weak growth in investment in plant and equipment, reflecting the economic slowdown, are expected to bring down overall investment by 0.4% in 2001. As export prospects will be improving, investment activities are forecast to pick up (+0.8%) in the course of 2002 and to accelerate further in 2003 (+3.4%).

Chart 1

Real GDP Growth in Austria



Source: OeNB fall 2001 forecast.

The price competitiveness of Austrian exporters, which went up notably in 2000, is expected to slightly cushion the effects of the global slowdown on export demand in 2001 and 2002. Hence, exports did fairly well in the first half of 2001 but are calculated to have shrunk in the third quarter. In the

course of 2002, export growth is forecast to continuously pick up speed. Empirical evidence shows that domestic imports develop more or less in parallel with domestic exports. The impact of the global economic cooling on Austrian net exports is therefore small, at least for the time being. Since import growth is projected to remain subdued – owing to weak domestic demand – net exports are expected to contribute a remarkable 0.5 percentage point to GDP growth in 2001. In 2002, net exports will not contribute to overall growth, but in 2003, 10% of GDP growth will be attributable to net export growth.

Owing to the deteriorating income balance (sharply increasing portfolio investment income outflows), the current account deficit is projected to widen slightly (2001: –EUR 6.0 billion, 2002: –EUR 6.2 billion, 2003: –EUR 6.2 billion). In terms of nominal GDP, the current account balance is forecast to remain somewhat below 3% over the entire forecast horizon.

Cyclical developments have determined the conditions on the labor market. The unemployment rate (Eurostat definition) is set to climb from 3.8% in 2001 to 3.9% in 2002, before dipping to 3.8% in 2003.

Inflation will be on the decline in 2002 and 2003 (2001: +2.3%, 2002: +1.3%, 2003: +1.3%). Price growth as measured by the Harmonized Index of Consumer Prices (HICP) climbed to an annual high of 2.9% in July 2001, but decreased to 2.5% by October. Since the price effects of fiscal measures implemented in 2000 are going to peter out over the next few months and energy prices are currently also on the decline, inflation is expected to recede perceptibly.

The OeNB reckons that unexpectedly high tax receipts towards the end of the year helped achieve an almost balanced central government budget already in 2001 (–0.2%). Yet, due to cyclical developments, the budget balance is likely to deteriorate moderately in 2002. Although the outlook for 2003 is brighter, the budget balance will not improve owing to anticipated noncyclical effects.

2 Conditioning Assumptions

The OeNB compiled this forecast in cooperation with the European Central Bank and the other national central banks of the euro area. To ensure the consistency of the individual forecasts, they are all conditioned on the same underlying assumptions about the global economic developments in the years ahead. The forecast – based on quarterly data – takes into account also intra-year trends, with the forecast horizon reaching from the third quarter of 2001 to the fourth quarter of 2003. It was not possible to incorporate the latest revision of national accounts data (GDP growth 2000: 3.0% instead of 3.3%) in the forecast, since at editorial close, the revision on a quarterly basis was not available. The cut-off date for data was November 20, 2001.

2.1 Global Economic Developments

The world economic outlook has deteriorated sharply since the spring 2001 forecast was compiled. While the world economy still expanded by 4.7% in 2000, annual growth is expected to decline to 2.0% in 2001 and to 1.5% in 2002 in the wake of the recession in the U.S.A. and in Japan. A global

economic recovery, first to be felt in the U.S.A., is forecast to take shape not before mid-2002. Growth is projected to accelerate to 3.7% in 2003. Global trade will develop along similar lines. Hefty growth (+12.5%) in 2000 is set to be followed by a contraction starting from early 2001, resulting in a decline in global trade volumes in 2002. It is only thanks to the high growth rate recorded at the beginning of the year (the statistical carry-over effect[1]) at the end of 2000 was 2.8%) that the annual growth in global trade came to a positive 0.9% in 2001. The upswing starting in the first quarter of 2002 will not have an effect before 2003, when the annual growth rate is expected to climb to 6.1%.

Against this backdrop, euro area exports are projected to increase only moderately. After reaching a record value of 11.4% in 2000, Austrian export markets are expected to grow by a mere 3.3% in 2001. From the first quarter of 2002, real import demand on Austria's export markets will pick up considerably.

Economic developments in the United States continue to constitute a significant forecast risk. According to preliminary figures, U.S. overall growth came to –0.4% (compared to the previous quarter and annualized) in the third quarter of 2001. As expected, corporate investment was key to the decline in the first half of 2001, whereas private consumption and net exports were still doing well. However, private consumption had already been faltering, and – not least due to the tragic events of September 11, 2001 – is forecast to decline sharply in the second half of 2001. The U.S. emergency fiscal package of USD 40 billion (some 0.4% of GDP) can be considered the sole pillar of growth in the third and fourth quarters of 2001. On balance, U.S. economic growth will come to 1.1% in the year 2001. Despite increased government spending (as mentioned above) and additional monetary easing, growth will continue to be only slightly positive in the first quarter of 2002 and gather fresh momentum not before the second half of 2002. All in all, the low growth rate projected for early 2002 and a hesitant upswing in the first half will result in a modest annual growth rate of 0.1% for the entire year 2002. The fact that U.S. households transferred almost the entire gains from the tax cuts enacted in the summer of 2001 on savings accounts, thus pushing up the personal saving rate from 1.1% to 3.8% of disposable income in the third quarter of 2001, underpins the forecast. A gradual return to potential growth is scheduled for 2003, when real GDP growth will come to 0.7%. The impact of the events of September 11, 2001, on consumer and business confidence, however, is still uncertain. If negative effects on confidence do not turn out to be temporary, recession may be more severe and linger longer than assumed in this projection. The low inflation rates prevailing – also thanks to low oil prices – are an encouraging sign; they give policymakers more leeway in their monetary and fiscal decisions.

The events of September 11, 2001, caught Japan in a particularly difficult situation: Continuous structural drawbacks are the reason why the

1 *The statistical carry-over effect is defined as the difference in percent between the year-end figures and the annual averages in a seasonally and calendar adjusted time series (see ifo Schnelldienst 27/99).*

global slowdown has such a severe impact on the Japanese real economy. A range of economic indicators such as corporate profits, order intake or capital spending plans suggests that the Japanese economy is undergoing another vigorous correction period. Between the fourth quarter of 2000 and the second quarter of 2001, private sector real investment shrank by 3.8%. Moreover, weak industrial production will further dampen investment. The anticipated – and, from today's point of view, necessary – correction in inventories in the wake of diminishing international demand has not been started yet. This is especially true of the information and communications technologies (ICT) sector, where a correction in inventories is expected to take place in the coming quarters. Small increases in disposable income and heightened uncertainty on the labor market will also dampen private consumption, which has so far been the pillar of growth. All these signs prompted economists to revise downward their growth forecasts; they now assume that Japan slipped into a sustained recession in 2001 that will last throughout 2002. As the global economic situation is expected to improve and domestic structural reforms will become effective in 2003, Japan's economy will expand by 1.3%. Despite this bleak outlook, there are still downside risks to the forecast for the Japanese economy. First, international demand for ICT products might recover later than presumed; second, the cost of structural reforms, especially in the banking sector and in the context of fiscal consolidation, might be much higher than predicted, thus reducing domestic demand.

The Asian countries excluding Japan can basically be divided into two groups: the emerging economies, which have been hit hard by the international falloff in demand for ICT products, on the one hand; and the largely closed economies like India and China, which are much less dependent on international demand, on the other. Net inflows into the entire Asian economic area excluding Japan are expected to diminish from USD 60.5 billion in 2000 to some USD 38.1 billion. Net foreign direct investment will edge up from USD 52 billion in 2000 to USD 53 billion in 2001. This decrease in capital inflows can be attributed to international investors' heightened caution, especially in the wake of the financial crisis in Argentina. At 3.4% and 3.1%, GDP growth in this region is forecast to be significantly lower in 2001 and 2002, respectively, than in 2000. As international demand will start to rise in 2003, growth will climb to more than 6%.

Thanks to healthy domestic demand, GDP growth in the Central and Eastern European countries (CEECs) remained fairly stable in a deteriorating external environment. However, the slowdown in the euro area is now starting to feed through to the CEECs via international trade links. Russia's economy is likely to be the least affected; it is forecast to still grow by a solid 3.4% in 2002. Conversely, the EU accession countries will be hit hardest: Forecast growth in these countries is expected to slip from 3% in 2001 to 2.7% in 2002.

The development of the Latin American economies largely mirrors the global economic development. Growth for the entire region is projected to come to 1.4%, 1.1% and 3.3%, respectively, in the years from 2001 to 2003. The cooling of economic activity across the globe is the main cause

for this slowdown. The recession in Argentina is unlikely to persist beyond 2001, when GDP shrank by 1.6%. Still, there are downside risks to the forecast for this region – like for the rest of the world – as the economy is predicted to pick up only hesitantly from the first quarter of 2002. Especially the events of September 11, 2001, and their impact on financial markets may delay the upswing.

Last but not least, growth forecasts for the euro area were also in for another downward revision. While real GDP growth still came to 3.4% in 2000, the Eurosystem's latest projections expect it to slow down in 2001. A further cooling of economic activity in 2002 cannot be ruled out. France and Spain have been the pillars of growth in the euro area. Germany, Austria's major trading partner, recorded much slower growth in 2001. Net exports, which contributed more than 1 percentage point to real GDP growth in 2001, are unlikely to add to growth in 2002.

Table 2

Conditioning Assumptions

	2000[1])	2001	2002	2003
	Annual change in % (real)			
GDP				
World	+4.7	+2.0	+1.5	+3.7
U.S.A.	+4.1	+1.1	+0.1	+2.7
Japan	+1.5	−0.6	−0.4	+1.3
United Kingdom	+2.9	+2.3	+1.7	+2.5
Transformation countries	+6.3	+3.9	+3.0	+3.7
EU accession countries	+3.9	+3.0	+2.7	+4.0
Asia excluding Japan	+7.2	+3.4	+3.1	+6.4
External trade				
Imports of goods and services				
World	+12.5	+0.9	+0.4	+6.1
Non-euro area countries	+13.2	+0.2	−0.5	+6.4
Prices				
Oil prices (USD per barrel)	28.3	24.4	18.7	19.2
Three-month interest rate in %	4.4	4.24	3.34	3.34
Long-term interest rate in %	5.45	4.99	4.6	4.57
EUR/USD exchange rate	0.923	0.895	0.888	0.888
Nominal effective exchange rate	85.7	86.9	86.2	86.2

Source: ECB.
[1]) Realized values.

2.2 Technical Assumptions

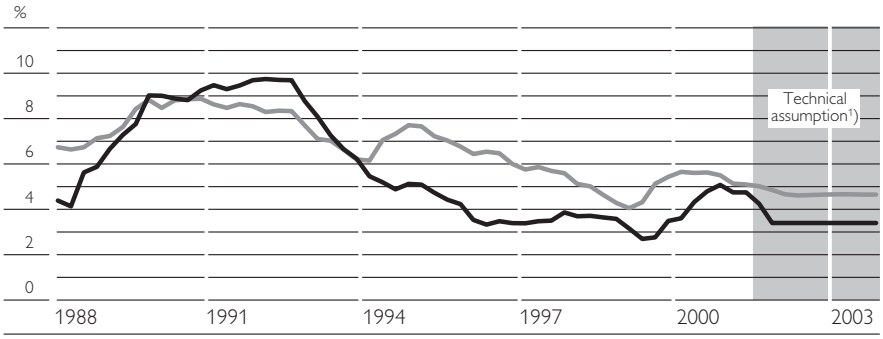
With a view to forecasting economic developments under unchanged monetary policy conditions, a technical assumption is made that both short-term interest rates and exchange rates will remain constant over the entire forecast horizon. The short-term interest rate assumed for the forecast horizon is based on the three-month Euribor (3.34%[1])). On this basis, and taking into consideration actual Euribor rates from January to October 2001, the annual average for 2001 is 4.24% (table 2). Long-term interest rates are oriented on market expectations for long-term government bonds with a maturity of 10 years; they are assumed to stand at 4.99% in 2001,

1 *This corresponds to the overnight rate average of six settlement days exactly prior to and including November 16, 2001.*

4.60% in 2002 and 4.57% in 2003. Compared with the spring 2001 forecast, this means a lowering of the long-term interest rate level by 15 to 59 basis points. The assumption adopted for the further development of the exchange rate of the euro against the U.S. dollar, finally, is a rate of USD/EUR 0.888. Factoring in actual exchange rate developments to date averages up the rate for 2001 to USD/EUR 0.895, which is slightly below the assumption used in the spring forecast. The nominal effective exchange rate underlying the forecast is significantly above the figure for 2000 as it mirrors the appreciation registered in the first quarter of 2001 (chart 2).

Chart 2

Long- and Short-Term Interest Rates in Austria

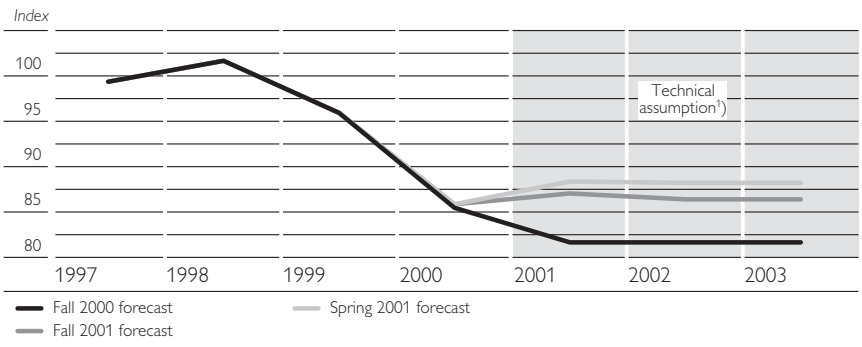


Quelle: OeNB fall 2001 forecast.
[1]) Technical assumption on the change in short- and long-term interest rates over the forecast horizon.

Crude oil prices are currently highly volatile. This forecast of oil prices is based on the development of forward rates for crude oil. At USD 24.4 (2001), USD 18.7 (2002) and USD 19.2 (2003) assumed per barrel, the current outlook is based on much lower prices than the spring forecast.

Chart 3

Nominal Effective Exchange Rate of the Euro



Quelle: OeNB fall 2001 forecast..
[1]) Technical assumption on the change in the nominal effective exchange rate over the forecast horizon.

3 External Sector

Thanks to high productivity gains, moderate pay hikes and, subsequently, shrinking unit labor cost, as well as to the euro's low exchange rate, Austrian exporters notably improved their price competitiveness in 2000. While goods and services export prices climbed by merely 2.4% (as measured by the export deflator), the prices of competitors on the Austrian export markets surged by 10.3% in the same period. The strengthening of price competitiveness will continue to yield further market gains in 2001 and 2002. This effect will somewhat offset the impact of faltering international economic activity and a subsequent contraction of export demand. Against this backdrop, real exports of goods and services are projected to advance by only 4.1% in 2001 compared to 10.3% in 2000 (table 3). The trough of export growth can be expected for the third quarter of 2001, when exports even decreased slightly. Assuming that external demand will recover, however, the OeNB predicts that export growth will resume in the first quarter of 2002 and gather additional momentum in the course of the year. As a result of the slump in exports in the second half of 2001, the annual growth rate in 2002 will be significantly lower at 2.9% than in 2001. With global growth prospects set to improve in 2003, export growth is expected to accelerate further in 2003 (+5.0%).

Table 3

Growth and Price Developments in Austrian External Trade

	2000	2001	2002	2003
	Annual change in % (real)			
Exports				
Real import demand on Austria's export markets	+11.4	+3.3	+2.6	+5.7
Competitors' prices on Austria's export markets	+10.3	+1.2	−0.3	+0.7
Export deflator	+ 2.4	+1.9	+0.4	+1.1
Austrian exports of goods and services (real)	+10.3	+4.1	+2.9	+5.0
Imports				
International competitors' prices on the Austrian market	+ 7.6	+1.0	−2.3	+2.1
Import deflator	+ 5.1	+2.4	+0.7	+1.2
Austrian imports of goods and services (real)	+ 7.5	+3.1	+3.0	+5.0
Terms of trade	− 2.6	−0.5	−0.3	−0.1

Source: OeNB fall 2001 forecast, ECB.

Austrian real exports developed more or less in parallel with real imports in the past few years (chart 4). Likely causes of this interlinkage are the high share of imported intermediate goods in exports and international transit trade. This structural relation is assumed over the entire forecast horizon. Owing to weak domestic demand, import growth (+3.1%) lagged behind export demand (+4.1%) in 2001.

The contribution of net exports to real GDP growth has been positive since 1996; in 2000 it reached a new high of 1.3 percentage points, before shrinking to 0.5 percentage point in 2001. External trade's contribution to GDP growth will be back in the positive only in 2003.

Chart 4

Exports, Imports and Investment in Austria

Source: OeNB fall 2001 forecast, Statistics Austria.

The strong increase in import prices, triggered chiefly by hefty oil price hikes and the euro's low exchange rate, and the modest rise in Austrian export prices resulted in a marked deterioration of the terms of trade in 2000 (–2.6%). Even though prices of imported goods and services increased more slowly in 2001 (+2.4%), they will continue to climb a little more rapidly than export prices over the entire forecast horizon. At the same time, the terms of trade are projected to deteriorate further, if not as strongly, i.e. by –0.1% in 2003.

Thanks to the moderate growth in imports, the net position of goods and services in the Austrian current account is predicted to improve notably (to –EUR 1.3 billion) in 2001 (against –EUR 1.9 billion in 2000). Yet, a deterioration to –EUR 1.6 billion has to be expected in 2002 and 2003 (table 4). A regional breakdown of imports and exports in the current account shows that as a consequence of weak global demand in 2001 and 2002, export growth outside the euro area will markedly lag export growth within the euro area.

Table 4

Austria's Current Account

	2000	2001	2002	2003
	EUR billion (nominal)			
Goods and services	− 1.9	− 1.3	− 1.6	− 1.6
Exports of goods and services[1])				
Intra-euro area exports	57.1	58.6	60.7	63.7
Extra-euro area exports	45.9	46.5	47.7	50.0
Imports of goods and services[1])				
Intra-euro area imports	67.0	68.0	70.4	73.5
Extra-euro area imports	37.9	38.5	39.7	41.6
Income	− 2.4	− 3.2	− 3.1	− 3.1
Current transfers	− 1.5	− 1.5	− 1.5	− 1.6
Current account total	− 5.8	− 6.0	− 6.2	− 6.3
Current account in % of nominal GDP	− 2.8	− 2.8	− 2.9	− 2.8

Quelle: OeNB fall 2001 forecast.
[1]) According to the balance of payments.

The income account in particular is expected to trend downward from 2001 on. Large portfolio investment inflows (especially bonds and notes) in the past few years have accounted for the sharp increase in capital income from portfolio investment abroad since the first half of 2001. Net current transfers are projected to stagnate at –EUR 1.5 billion until 2002 before

slipping to –EUR 1.6 billion in 2003. Overall, the OeNB predicted a continuous, if only moderate, widening of the current account deficit from EUR 5.8 billion in 2000 to EUR 6.3 billion in 2003. In terms of GDP, the current account balance is set to remain slightly below 3% over the entire forecast horizon.

4 Prices, Wages and Costs

4.1 Prices

Turning to the inflation outlook over the forecast horizon, price growth is expected to decelerate continually until the third quarter of 2002 and to remain at a low level until the end of 2003. HICP inflation is projected to average 2.3% in 2001, 1.3% in 2002 and 1.3% in 2003. In July 2001, inflation peaked at 2.9%, which was attributable to a confluence of fiscal measures that became effective in the first months of 2001 (increase in the price of highway toll stickers in January, introduction of outpatient copayments in April) and indirect effects triggered by the sharp rise of import and crude oil prices in the course of 2000. Tourism, for instance, saw particularly marked price increases (especially for package holidays), which was at least partly traceable to indirect effects of oil price hikes.

Inflation has been on the decline since July 2001, chiefly because the fiscal measures that came into effect in 2000 (introduction of electricity surcharge, increase of the tobacco tax) ceased to push up inflation, oil prices were decreasing and the liberalization of the electricity market began to have an effect on prices. Apart from temporary price reductions in July and August (especially for fruit and vegetables), prices of unprocessed food have been stagnating since May. The introduction of tuition fees effective as of October 2001, however, slightly drove up inflation.

With the economy in general gathering pace and subsequently rising household incomes, heightened demand is expected to raise inflation a little in the second half of 2003.

4.2 Wages

The outlook for wages over the forecast horizon is conditioned on a continuation of wage restraint in the Austrian export industries with a view to staying internationally competitive. The 2.8% wage increase (in nominal terms) projected for 2001 is deemed moderate, considering the favorable economic conditions prevailing in 2000, which have, of course, influenced wage settlements. Due to considerably lower inflation rates and an easing of productivity growth in 2001, wages should increase by 2.4% (in nominal terms) in 2002. As the economic outlook is projected to brighten in 2003, wages are expected to grow faster (+2.6%).

The high productivity growth rates recorded for the whole economy in 2000 are unlikely to be attained in 2001 and 2002. Substantial productivity gains are expected to be reported not before 2003. This factor – together with wage growth – is projected to cause unit labor cost to surge temporarily in 2001 and 2002.

4.3 Economic Deflators

A comparison of price deflators for economic aggregates confirms a convergence of developments: Price growth started to slow in mid-2001. Similar to 2000, the oil price is shaping the development of the private consumption expenditure deflator. In 2002 and 2003 the upward pressure on prices exerted by import and oil prices is expected to ease. A pass-through of oil price increases has generated moderate upward pressures on export and capital investment goods, as a result of which the GDP deflator is expected to rise to 1.5% in 2001 (table 5). With indirect effects tapering off, the GDP deflator will decrease to 1.0% in 2002, just to climb to 1.3% in 2003 as private demand will be creating weak price pressures. Corporate profits, which have been declining since late 2001, are not expected to be back in the positive growth bracket before the end of 2002, when the utilization of production capacities will be improving.

Table 5

Selected Price Indicators for Austria

	2000	2001	2002	2003
	Annual change in % (real)			
Private consumption expenditure (PCE) deflator	+1.9	+2.6	+1.4	+1.3
GDP deflator	+1.2	+1.5	+1.0	+1.3
Investment deflator	+1.5	+1.8	+1.2	+1.2
Import deflator	+5.1	+2.4	+0.7	+1.2
Export deflator	+2.4	+1.9	+0.4	+1.1
Unit labor cost	−0.3	+1.9	+1.4	+0.8
Productivity	+2.5	+0.9	+1.0	+1.7

Source: OeNB fall 2001 forecast, Statistics Austria.

5 Domestic Economic Developments

5.1 Consumption

Private consumption is projected to be a pillar of growth in Austria over the entire forecast horizon. However, since growth of real disposable incomes shrank from +3.1% in 2000 to +0.7% in 2001, consumption lost considerable momentum in the course of 2001. This slowdown can be traced to a range of factors (table 6): Compensation of employees as well as mixed income of the self-employed and investment income rose fairly moderately in 2001 compared to the previous year. Taking into account fiscal consolidation measures, growth of disposable household income (in nominal terms) is projected to come to only 3.3% in 2001, down from 5.0% in 2000. The unexpectedly high inflation rate for 2001 has acted as a dampener on real disposable incomes. In 2001 and 2002 the disposition of consumers to smooth their consumption behavior should take some sting out of the temporary burdens as households dip into their savings more strongly. Household consumption expenditure thus augmented by 1.4% in 2001, while the saving rate – which still came to almost 12% in 1995 – has been declining continuously. It is projected to hit a low of 7.0% in 2002, to climb back to 7.3% in 2003.

The terrorist attacks of September 11, 2001, have not had a perceptible impact on Austrian consumers' sentiment so far. The European Commission's consumer confidence indicator is currently the only indicator available

allowing to draw conclusions on the effects the terrorist attacks had on consumer sentiment. The October index was one point lower than the September index, which had been calculated before the terrorist attacks. Compared to the 11 point decline in consumer confidence between May and September, which was prompted by the general cooling of economic activity, the recent dropping off is very moderate and can be considered to be within statistical tolerance limits.

Table 6

Determinants of Private Consumption in Austria

	2000	2001	2002	2003
	Annual change in % (nominal)			
Compensation of employees	+3.5	+3.3	+2.4	+3.2
Mixed income of the self-employed (net) and investment income	+6.0	+5.1	+2.3	+4.9
Transfers excl. direct taxes[1])	+1.5	−0.5	−2.6	−0.4
Transfer payments received by households	+4.6	+2.9	+3.6	+3.0
Transfer payments made by households	+3.3	+2.6	+2.1	+2.3
Direct taxes	+2.0	+6.7	+4.2	+4.6
	Contribution to growth of disposable household income in percentage points (nominal)			
Compensation of employees	+3.0	+2.7	+2.0	+2.7
Mixed income of the self-employed (net) and investment income	+1.8	+1.5	+0.7	+1.5
Transfers excl. direct taxes[1])	+0.2	−1.0	−0.1	−0.5
Transfer payments received by households	+1.8	+1.1	+1.4	+1.2
Transfer payments made by households	−1.2	−0.9	−0.7	−0.8
Direct taxes	−0.4	−1.2	−0.8	−0.9
	Annual change in %			
Disposable household income (nominal)	+5.0	+3.3	+2.6	+3.7
Consumption deflator	+1.9	+2.6	+1.5	+1.3
Disposable household income (real)	+3.1	+0.7	+1.1	+2.4
Private consumption (real)	+2.7	+1.4	+1.4	+2.1
Saving ratio in % of disposable household income	7.9	7.3	7.0	7.3

Source: Statistics Austria, OeNB fall 2001 forecast.

[1]) Negative values denote an increase in (negative) transfers excl. direct taxes, positive values denote a decrease.

In 2002, household income growth will be dampened mainly by the expected stagnation of employment. Thanks to higher net transfers to households (child-rearing benefits), the general government has hardly contributed to a reduction in disposable household income. Easing inflation and another slight decrease in the saving rate help real private consumption grow by 1.4%.

Owing to renewed economic activity and positive employment growth, the OeNB expects nominal disposable income to rise by 3.7% in 2003. Since inflation is also on the decline, there is scope for real private consumer demand to increase by a hefty 2.1% and for the saving rate to climb by 0.3 percentage point.

The fiscal consolidation efforts have led to a reduction in real government consumption by –0.5% in 2001 and –0.6% in 2002; an increase by 0.9% is projected for 2003.

5.2 Investment

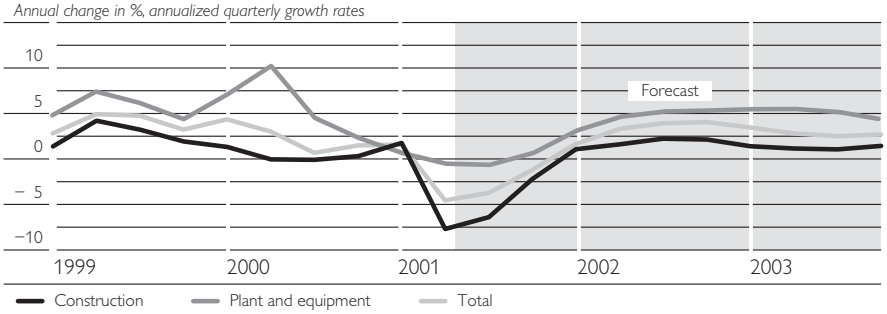
After gross fixed capital formation went up by 3.4% in 2000, investment activity is set to diminish by 0.4% in 2001. The overall economic slowdown, the recession in construction and hesitant general government investment are key to this development. Already in the second quarter of 2001, real gross capital formation declined by 1.1% on the previous quarter. The OeNB expects investment activity to continue to shrink in the third and fourth quarters, before a moderate recovery of demand for Austrian exports in the first half of 2002 will mark the onset of the next investment cycle. Chart 4 shows that for years there has been a relatively stable relationship between exports and gross capital formation in Austria. Owing to decreasing investment activity in the second half of 2001, annual growth will be rather feeble at +0.8% in 2002. However, investment is projected to rise by 3.4% in 2003. The individual components of gross capital formation developed along different lines in the past two years (chart 5).

Growth of investment in plant and equipment was still vigorous in 2000 but is forecast to decelerate (to +1.6%) in 2001, as Austrian businesses' production and export expectations have deteriorated in the wake of the economic downturn. The most recent business survey conducted by the Austrian Institute of Economic Research (WIFO) in October 2001 supports this projection. Compared to the year 2000, all relevant indicators pointed downward. Businesses' assessment of order books yielded an average +12% in 2000 (balance of positive and negative responses in percent of all responses); by October 2001, this value had shrunk to –18%. Production and order books expectations show similar trends for the next six months. Capacity utilization was also on the decline, shrinking from 83.6% in 2000 to 81.6% in October 2001.

Corporate profit margins were on the up throughout 2000 but have been diminishing since the end of the year. Having advanced by 1.4% in 2000, they are projected to decrease by 0.4% each in 2001 and 2002, before picking up again in 2003 (+0.4%). One reason for the decline is unit labor cost that has increased fairly sharply as overall productivity growth has remained weak. Moreover, growing international competition has been

Chart 5

Investment Activity in Austria



Source: OeNB fall 2001 forecast, Statistics Austria.

exerting pressure on businesses' selling prices. Corporates' self-financing capacity is projected to deteriorate in 2001 and 2002. However, the subsequent negative effects on investment activity will be partly offset by (external) financing conditions that have become more favorable not least because of the Eurosystem's interest rate cuts over the past few months.

According to the OeNB, rising external demand, favorable (external) financing conditions and the need to catch up on investment after the slump recorded in 2001 will cause investment in plant and equipment to grow by 2.6% in 2002 and by 5.2% in 2003.

The downturn in total gross capital formation projected for 2001 is attributable chiefly to the slump in construction investment that started in the second quarter. The construction sector has been mired in crisis for some time. Both the low figure of the European Commission's construction confidence indicator and the sharp increase in unemployment in this sector imply that the crisis in construction and, subsequently, the reduction in excess capacity will persist throughout 2002. Since demand for new homes has been plummeting, building construction has been particularly severely hit by the crisis; at present, only demand for office buildings is still running high. Local authorities' fiscal consolidation efforts may have slightly harmed the civil engineering sector, which, however, is still doing better than building construction. Real construction investment is projected to drop by 2.0% and 0.8% in 2001 and 2002, respectively, before rising by 1.5% in 2003.

6 Labor market

Rising by an average 0.6% in the first three quarters of 2001, overall employment remained relatively unaffected by the economic downturn. Yet, trends in monthly figures already mirrored the slowdown in economic activity. The development of employment shows that many employers refrain from cutting jobs in response to their recent experience of qualified labor shortages. It can be assumed, however, that this strategy is not sustainable as the economy will not bottom out as swiftly as anticipated. Therefore, the OeNB expects total employment to stagnate at the end of 2001 and throughout 2002, and to rise moderately (at +0.5%) toward the end of the forecast horizon in 2003.

Corporate profits are one key factor in the stagnation of employment in 2002; in 2001 and 2002, profit margins are expected to deteriorate for the first time since the recession of 1993, mostly because employment did not decrease in tandem with diminishing capacity utilization in 2001. As a consequence, productivity growth has been weakening and unit labor cost has been on the rise. At the same time it would be wrong to assume that the wage settlements for 2001 and 2002 were well above productivity growth rates because negotiators had abandoned the policy of wage moderation; rather, the wage settlements are the product of the real wage decrease of the recent past (as measured by the national consumer price index). Propping up household incomes, the lagged reaction of employment temporarily mitigates the negative effects of the economic downturn, but,

consequently, earnings prospects deteriorate, harming investment and employment.

As to the number of public-sector employees, the OeNB forecast largely corresponds to the federal government's plans. The number of self-employed is expected to continue its year-long downward trend. However, it is likely that a range of government measures – like the abolition of premium-free coverage by the national health plan for nonworking childless spouses or the introduction of tuition fees – encourages people to enter the labor market, often as free-lancers.

Table 7

Determinants of Labor Supply in Austria

	2000	2001	2002	2003
	Annual change in %			
Labor supply	+0.2	+0.4	+0.1	+0.3
Total employment	+0.9	+0.3	−0.0	+0.5
Public-sector employees	−0.8	−0.4	−0.4	−0.4
Self-employed	−0.8	−0.2	−0.1	−0.0
Payroll employment	+1.3	+0.5	+0.0	+0.7
Unemployment rate, Eurostat definition, in %	3.7	3.8	3.9	3.8
Productivity	+2.5	+0.9	+1.0	+1.7
Profit margins	+1.4	−0.4	−0.4	+0.4
Unit labor cost	−0.3	+1.9	+1.4	+0.8
GDP deflator	+1.2	+1.5	+1.0	+1.3

Source: Statistics Austria, OeNB fall 2001 forecast.

Labor supply is projected to rise by 0.4%, 0.1% and 0.3% in 2001, 2002 and 2003, respectively (table 7). This development can be largely attributed to Austria's typically very flexible labor supply on the one hand and to fiscal consolidation measures and structural labor market reforms on the other hand, whereas demographic factors are expected to play a minor role over the forecast horizon. The flexibility of Austria's labor supply manifests itself in the slightly lagged reaction to current employment trends and in high real wage flexibility. For this reason, negative growth trends did not impact on labor supply before the end of 2001. Accordingly, the upswing projected for the first half of 2002 will affect labor supply only toward the end of the forecast horizon. At the same time, the Austrian federal government's structural labor market reforms and fiscal consolidation measures of the past few years are expected to contribute to a modest increase in labor supply over the next few years. Raising the minimum age for early retirement and abolishing early retirement due to impaired earning capacity were the most important steps taken in this context. As a result, the labor force participation rate among 55- to 59-year-old women and 60- to 64-year-old men is expected to increase. Other reforms include the abolition of premium-free coverage by the national health plan for nonworking childless spouses and the introduction of tuition fees. The effect of each measure by itself is of course limited, but taken together they are projected to raise labor supply by some 0.1%.

Since the government has been pursuing a restrictive immigration policy, it can be assumed that migration effects will be negligible. The past few years' trend of rising women's labor participation rates is predicted to

abate – not least because of the bleaker economic outlook – thus contributing only marginally to the growth of labor supply over the forecast horizon. At the same time, it is still difficult to assess the overall effect generated by the introduction of child-rearing benefits. On the one hand, labor supply is set to diminish because parents are entitled to the newly created child-rearing benefits for a longer period than they were for parental leave pay under the old regime; on the other hand, the permission to earn more money during parental leave than previously may reverse this trend to some extent. Since returning to the labor market after parental leave is intrinsically linked with the availability of child-care facilities, the OeNB expects the overall effect of the introduction of child-rearing benefits to be slightly negative. Also, the number of part-time jobs is set to increase.

The forecast development of employment and labor supply will push up the unemployment rate (Eurostat definition) to 3.8% in 2001 and to 3.9% in 2002; the jobless rate will start to fall only toward the end of the forecast horizon. Productivity growth declined from 2.5% in 2000 to 0.9% in 2001 and is not expected to improve substantially in 2002; in 2003, however, productivity is projected to rise by 1.7%.

7 Risks to the Forecast, Alternative Scenarios, Comparison of Forecasts

7.1 Risks to the Forecast

The risks to the present forecast are extraordinarily high. In the near future, business sentiment on the economic outlook at home and abroad and the subsequent investment decisions will be crucial to the overall economic development. If, for instance, the upswing starts a quarter later than projected, economic growth will be 0.4 percentage point lower than anticipated (table 8). This reflects the uncertainty of a forecast with a starting point close to a cyclical turning point.

Apart from that, developments in the U.S.A. influence the risk to the forecast to a large extent. From today's perspective, it is impossible to predict for how long and to what extent consumer and, in particular, business sentiment will remain depressed and how strongly the U.S. economic performance depends on this confidence effect. Similarly, the impact of loose monetary and fiscal policies in the U.S.A., which could speed up the recovery of the U.S. economy, is currently difficult to assess. The terrorist attacks of September 11, 2001, shattered consumer confidence and business sentiment so that forecasts had to be revised downward shortly afterwards. It should also be noted that economic developments in the past decade were marked by an extraordinarily high degree of convergence, which suggests that international implications could be more far-reaching than assumed in the past. One of the underlying reasons of this development could be the fact that the typical transmission channels have been supplemented by new ones, such as the globalization of international financial markets and the key role of multinational corporations, that are represented on all major markets in the world via foreign direct investment.

Furthermore, the recently high volatility of oil prices poses another risk to the forecast. Given the weaker global growth prospects, it seems likely that oil prices continue their downward slide. The most recent OPEC decisions also indicate that the situation on the oil market will ease further. Judging from the latest forward rates, however, an agreement between OPEC and non-OPEC producers is presently deemed more likely than a price war. The implications of a higher oil price resulting from such an agreement are discussed in detail in Scenario III.

A domestic risk factor is the Austrian saving rate's projected decline to a historic low in the course of 2002. The OeNB assumes that like in the past, households will respond to the modest increase in real household incomes in 2001 and 2002 by running down their savings to maintain their consumption level. Given the uncertain economic environment, this assumption may prove too optimistic if uncertainties on disposable income grow further. Also, the projected development of net exports' contribution to growth can be rated optimistic. In the past, real exports rarely posted higher growth rates than real imports (according to the national accounts). If exporters fail to translate gains in price competitiveness attained in 2000 into market share gains in 2001 and 2002, growth prospects will have to be revised downward.

On the whole, given the highly uncertain starting point and shape of the upswing projected for the first half of 2002, the risks to the growth forecast for 2002 point toward a further cooling of the economy; the risks to the forecast for 2003, however, seem to be more balanced.

7.2 Alternative Scenarios

To account for the major forecast risks, three alternative scenarios were calculated: The first scenario assumes a deeper recession in the U.S.A. than imputed in the baseline scenario, the second scenario a speedier recovery of the U.S. economy, and the third a faster growth of oil prices. Each alternative scenario starts in the first quarter of 2002. The changed external framework conditions were determined in cooperation with the ECB on the basis of NIGEM, the global econometric model.

Scenario I: Deeper Recession in the U.S.A.

This scenario is based on the attempt to depict the extent to which the evening out of the imbalances that have developed in the U.S.A. in the course of the past decade may affect the course of the Austrian economy. It is assumed that the U.S. current account deficit (in percent of GDP), the saving rate and the price/earnings ratio of shares quoted on the U.S. stock markets return to the level of the first half of the 1990s. Three major transmission channels have been identified. The first two channels are familiar: international trade links and the U.S. dollar's recession-induced depreciation against the euro. The third channel attempts to capture the transmission of international confidence effects and financial globalization: The decreasing price/earnings ratio on U.S. stock markets is simulated by an increase in the risk premium in the U.S.A. Subsequently, it drives up the

cost of capital also in Europe, including, of course, Austria, and reduces the wealth of households.

Compared to the baseline forecast, real GDP in Austria contracts by 0.8% by 2003, with 60% of the decline being attributable to weak global trade, 30% to a higher risk premium, and only 10% to the depreciation of the U.S. dollar. The lower growth rates projected for Austria can be traced to declining real exports owing to weak external demand and to comparably modest investment owing to higher capital cost.

The exchange rate channel is the most important transmission channel for prices, which are set to increase by 0.35% as measured by the HICP. The depreciation of the U.S. dollar and the resulting lower energy prices reduced consumer prices both directly and indirectly.

Scenario II: Speedier Recovery in the U.S.A.

This scenario looks at the effects of an expansive fiscal shock in the U.S.A. It is assumed that after the terrorist attacks of September 11, 2001, the U.S. government pumps additional funds totaling 1% of GDP into the economy; this measure is expected to feed through to the first two quarters of 2002.

For Austria, this temporary measure implies a direct increase in external demand. As a consequence, real GDP growth in Austria goes up by some 0.2 percentage point in 2002 and remains stable in 2003. Demand-induced inflation at about the same scale ensues with a lag of several quarters. Overall effects are significantly smaller than in scenario I.

Scenario III: Higher Oil Prices

The oil price used in the forecast comes to slightly more than USD 18/barrel at the end of 2002. Given this very low value, price hikes within the forecast horizon until end-2003 seem likely. Scenario III examines the effects of a permanent (approximately) 40% price increase starting from the first quarter of 2002, which marks a return to the center of the price band targeted by OPEC.

Higher energy prices unleash substantial price pressures by driving up import prices, which then pass through to export prices, wages and consumer prices with a time lag. In this scenario, HICP inflation rises by 0.5 percentage point in 2002 and by 0.9 percentage point in 2003. Real

Table 8

Key Results of the Alternative Scenarios

Scenario	2002 GDP	2003	2002 HICP	2003
	Deviation from baseline scenario in %			
Deeper recession in the U.S.A.	−0.44	−0.80	−0.10	−0.35
thereof via transmission channel:				
Global trade	*−0.25*	*−0.48*	*−0.02*	*−0.12*
Exchange rates	*−0.05*	*−0.07*	*−0.08*	*−0.18*
Risk premium	*−0.14*	*−0.24*	*0.00*	*−0.05*
Speedier upswing in the U.S.A.	0.17	0.20	0.10	0.20
Higher oil prices	−0.14	−0.27	0.52	1.38

Source: OeNB fall 2001 forecast.

import and export growth remains below the baseline scenario; GDP growth diminishes by some 0.1 percentage point each in 2002 and 2003 compared to the baseline scenario.

7.3 Comparison of Forecasts

The OeNB's forecast for real GDP growth in 2001 and 2002 ranges – at least partly – notably below the estimates other economic research institutes have come up with. Moreover, the OeNB expects the growth setback to continue into 2002 and does not reckon with an economic revival before 2003. The differences between the forecasts of the OeNB and other institutions are attributable to a significantly more pessimistic assessment of external conditions on the one hand and to the slow economic upswing projected for 2002 on the other hand. This development mirrors the global confidence shock caused by the terrorist attacks of September 11, 2001, which delayed the projected upturn. The differences in external assumptions become most obvious in particular in the development of global trade (table 9).

Table 9

Comparison of Current Economic Forecasts for Austria

	OeNB November 2001			WIFO September 2001		IHS September 2001		OECD November 2001			IMF October 2001		EU Commission November 2001			Euroframe November 2001	
	2001	2002	2003	2001	2002	2001	2002	2001	2002	2003	2001	2002	2001	2002	2003	2001	2002
	Annual change in %																
Key results																	
GDP, real	+1.2	+0.9	+2.3	+1.3	+1.9	+1.4	+1.7	+1.2	+1.5	+2.7	+1.6	+2.6	+1.1	+1.2	+2.4	+1.3	+1.5
Private consumption, real	+1.4	+1.4	+2.1	+1.5	+1.9	+1.5	+1.7	+1.5	+1.8	+2.4	×	×	+1.4	+1.6	+2.3	×	×
Gross fixed capital formation, real	−0.4	+0.8	+3.4	−0.9	+0.5	+0.3[1])	+2.1[1])	−0.5	+0.3	+3.6	×	×	−0.2	+0.8	+3.5	×	×
Exports, real	+4.1	+2.9	+5.0	+4.6	+4.6	+4.8	+4.4	+5.3	+3.8	+7.0	×	×	+5.3	+4.0	+7.5	×	×
Imports, real	+3.1	+3.0	+5.0	+4.2	+4.1	+3.7	+4.0	+4.6	+3.3	+6.3	×	×	+4.4	+3.3	+7.6	×	×
GDP deflator	+1.5	+1.0	+1.3	+1.4	+1.6	+1.9	+1.6	+2.0	+1.8	+1.9	+1.7	+1.5	+1.4	+1.5	+1.0	×	×
CPI	×	×	×	+2.6	+1.9	+2.6	+1.6	×	×	×	+2.3	+2.0	×	×	×	×	×
HICP	+2.3	+1.3	+1.3	×	×	×	×	×	×	×	×	×	+2.4	+1.7	+1.8	+2.6	+1.7
Unit labor costs	+1.9	+1.4	+0.8	+1.9	+1.0	×	×	×	×	×	×	×	+1.3	+0.9	+0.5	×	×
	%																
Unemployment rate[2])	3.8	3.9	3.8	3.8	3.8	3.8	4.0	4.8	5.3	5.1	3.7	3.6	3.9	4.3	4.2	3.8	3.9
	% of GDP																
Current account	−2.8	−2.9	−2.8	−2.6	−2.5	−2.4	−2.1	−2.5	−1.9	−1.5	−2.9	−2.6	−2.7	−2.4	−2.7	×	×
Government deficit	−0.2	−0.3	−0.3	−0.7	−0.3	−0.7	−0.2	0.0	−0.4	0.1	−0.7	0.0	−0.2	−0.4	0.4	−0.8	−0.4
External assumptions																	
Oil price in USD/barrel[3])	24.4	18.7	19.2	28.0	28.0	25.0	25.0	24.6	21.5	25.0	26.8	24.5	×	×	×	23.7	21.0
USD/EUR[3])	0.9	0.89	0.89	0.9	0.95	0.91	0.96	×	×	×	0.92	0.89	×	×	×	×	×
	Annual change in %																
Real GDP, U.S.A.	+1.1	+0.1	+2.7	+1.0	+2.0	+1.0	+2.3	+1.1	+0.7	+3.8	+1.3	+2.2	+0.9	+0.5	+3.4	+1.0	+1.0
Real GDP, world	+2.0	+1.5	+3.7	×	×	×	×	×	×	×	+2.6	+3.5	+2.1	+2.2	+3.7	+2.0	+2.2
Global trade	+0.9	+0.4	+6.1	+5.0	+5.6	+2.5	+7.0	+0.3	+2.0	+8.7	+3.6	+5.3	+0.9	+1.8	+6.1	+0.3	+2.3

Source: OeNB fall 2001 forecast, WIFO, IHS, European Commission, IMF, OECD, Euroframe.

[1]) *Gross capital formation.*

[2]) *Eurostat definition; for OECD: OECD definition.*

[3]) *OeNB: external assumption of the ECB.*

Annex

Table 10

Demand Components (Real Prices)

at 1995 prices

	2000	2001	2002	2003	2000	2001	2002	2003
	EUR million				*Annual change in %*			
Private consumption	109,411	110,963	112,540	114,911	+ 2.7	+1.4	+1.4	+2.1
Government consumption	37,514	37,341	37,130	37,477	+ 0.6	−0.5	−0.6	+0.9
Gross fixed capital formation	45,358	45,159	45,522	47,058	+ 3.4	−0.4	+0.8	+3.4
Domestic demand (excl. changes in inventories)	192,283	193,463	195,193	199,446	+ 2.4	+0.6	+0.9	+2.2
Exports, total	96,077	99,982	102,859	108,038	+10.3	+4.1	+2.9	+5.0
Imports, total	92,896	95,811	98,669	103,573	+ 7.5	+3.1	+3.0	+5.0
Net exports	3,182	4,171	4,190	4,466	×	×	×	×
Gross domestic product	195,385	197,777	199,656	204,185	+3.3	+1.2	+0.9	+2.3

Source: OeNB fall 2001 forecast.

Table 11

Demand Components (Current Prices)

	2000	2001	2002	2003	2000	2001	2002	2003
	EUR million				*Annual change in %*			
Private consumption	116,735	121,419	124,931	129,185	+ 4.6	+4.0	+2.9	+3.4
Government consumption	40,013	40,773	41,202	42,434	+ 2.3	+1.9	+1.1	+3.0
Gross fixed capital formation	48,948	49,633	50,638	52,993	+ 4.9	+1.4	+2.0	+4.7
Domestic demand (excl. changes in inventories)	205,696	211,826	216,771	224,613	+ 4.2	+3.0	+2.3	+3.6
Exports, total	100,362	106,383	109,855	116,652	+12.9	+6.0	+3.3	+6.2
Imports, total	101,459	107,120	111,051	117,983	+13.0	+5.6	+3.7	+6.2
Net exports	− 1,097	− 737	− 1,196	− 1,331	×	×	×	×
Gross domestic product	206,040	211,758	215,837	223,544	+ 4.5	+2.8	+1.9	+3.6

Source: OeNB fall 2001 forecast.

Table 12

Demand Components (Deflators)

	2000	2001	2002	2003	2000	2001	2002	2003
	1995 = 100				*Annual change in %*			
Private consumption	106.7	109.4	111.0	112.4	+1.9	+2.6	+1.4	+1.3
Government consumption	106.7	109.2	111.0	113.2	+1.7	+2.4	+1.6	+2.0
Gross fixed capital formation	107.9	109.9	111.2	112.6	+1.5	+1.8	+1.2	+1.2
Domestic demand (excl. changes in inventories)	107.0	109.5	111.1	112.6	+1.7	+2.4	+1.4	+1.4
Exports, total	104.5	106.4	106.8	108.0	+2.4	+1.9	+0.4	+1.1
Imports, total	109.2	111.8	112.5	113.9	+5.1	+2.4	+0.7	+1.2
Terms of trade	95.6	95.2	94.9	94.8	−2.6	−0.5	−0.3	−0.1
Gross domestic product	105.5	107.1	108.1	109.5	+1.2	+1.5	+1.0	+1.3

Source: OeNB fall 2001 forecast.

Table 13

Labor Market

	2000	2001	2002	2003	2000	2001	2002	2003
	Number				*Annual change in %*			
Total employment	4,045,508	4,059,032	4,058,541	4,080,351	+0.9	+0.3	−0.0	+0.5
Private sector employment	3,473,508	3,489,102	3,491,157	3,515,175	+0.7	+0.4	+0.1	+0.7
Paid employment according to the national accounts	3,279,809	3,294,676	3,294,767	3,316,734	+1.3	+0.5	+0.0	+0.7
	%							
Unemployment rate (Eurostat definition)	3.7	3.8	3.9	3.8	×	×	×	×
	1995 = 100							
Unit labor costs, whole economy[1])	99.0	100.9	102.3	103.2	−0.3	+1.9	+1.4	+0.8
	at 1995 prices in EUR 1,000							
Total labor productivity	48.3	48.7	49.2	50.0	+2.5	+0.9	+1.0	+1.7
Real wages per employee[2])	30.5	30.5	30.8	31.2	+0.3	+0.2	+0.9	+1.3
	at current prices in EUR 1,000							
Gross wages per employee	32.5	33.4	34.2	35.1	+2.2	+2.8	+2.4	+2.6
	at current prices in EUR million							
Gross wages, total	106,639.8	110,114.2	112,725.9	116,387.1	+3.5	+3.3	+2.4	+3.2

Source: OeNB fall 2001 forecast.
[1]) Gross wages as a ratio of GDP.
[2]) Gross wages divided by the GDP deflator.

Table 14

Current Account

	2000	2001	2002	2003	2000	2001	2002	2003
	EUR million				*% of nominal GDP*			
Current account	−5,771.0	−5,995.4	−6,205.0	−6,169.6	−2.8	−2.8	−2.9	−2.8

Source: OeNB fall 2001 forecast.

Table 15

Quarterly Changes of Forecast Results

	2000	2001	2002	2003	2000				2001				2002				2003			
					Qu. 1	Qu. 2	Qu. 3	Qu. 4	Qu. 1	Qu. 2	Qu. 3	Qu. 4	Qu. 1	Qu. 2	Qu. 3	Qu. 4	Qu. 1	Qu. 2	Qu. 3	Qu. 4
	Annual change in %																			
Prices, wages, costs																				
HICP	+ 2.0	+2.3	+1.3	+1.3	+1.8	+1.9	+2.1	+2.1	+2.0	+2.7	+2.6	+2.0	+1.8	+1.3	+1.1	+1.1	+1.0	+1.2	+1.4	+1.6
HICP (excl. energy)	+ 1.1	+2.4	+1.7	+1.4	+1.0	+1.1	+1.1	+1.2	+1.7	+2.4	+2.9	+2.7	+2.2	+1.9	+1.4	+1.3	+1.1	+1.3	+1.4	+1.6
Private consumption	+ 1.9	+2.6	+1.4	+1.3	+1.3	+1.7	+2.1	+2.3	+2.4	+2.6	+2.7	+2.6	+2.2	+1.6	+1.1	+0.9	+1.0	+1.2	+1.4	+1.5
Gross fixed capital formation	+ 1.5	+1.8	+1.2	+1.2	+1.4	+1.4	+1.5	+1.8	+2.1	+2.1	+1.8	+1.4	+1.1	+1.1	+1.2	+1.3	+1.4	+1.3	+1.2	+1.0
GDP deflator	+ 1.2	+1.5	+1.0	+1.3	+0.7	+0.2	+2.9	+0.9	+1.8	+1.2	+1.6	+1.6	+0.9	+1.3	+0.9	+0.8	+0.8	+1.2	+1.5	+1.6
Unit labor cost	− 0.3	+1.9	+1.4	+0.8	−0.2	−0.2	−0.5	−0.2	+0.9	+1.6	+2.3	+2.7	+2.4	+1.9	+1.0	+0.3	+0.4	+0.6	+1.0	+1.4
Compensation per employee, nominal	+ 2.2	+2.8	+2.4	+2.6	+2.1	+2.2	+2.2	+2.3	+2.5	+2.8	+2.9	+3.0	+2.8	+2.5	+2.2	+2.1	+2.2	+2.5	+2.7	+2.9
Productivity	+ 2.5	+0.9	+1.0	+1.7	+2.4	+2.4	+2.7	+2.4	+1.6	+1.1	+0.6	+0.2	+0.3	+0.6	+1.2	+1.7	+1.8	+1.9	+1.7	+1.5
Compensation per employee, real	+ 0.3	+0.2	+0.9	+1.3	+0.8	+0.4	+0.1	+0.0	+0.1	+0.2	+0.2	+0.4	+0.6	+0.8	+1.0	+1.2	+1.2	+1.2	+1.3	+1.4
Import deflator	+ 5.1	+2.4	+0.7	+1.2	+5.5	+7.7	+2.9	+4.5	+4.0	+3.0	+1.9	+0.7	+0.1	+0.4	+1.0	+1.1	+1.4	+1.3	+1.0	+1.2
Export deflator	+ 2.4	+1.9	+0.4	+1.1	+2.2	+2.7	+3.7	+1.0	+2.0	+2.4	+2.0	+1.2	+0.2	−0.0	+0.4	+0.8	+0.8	+1.0	+1.2	+1.4
Terms of trade	− 2.6	−0.5	−0.3	−0.1	−3.1	−4.7	+0.8	−3.4	−1.9	−0.6	+0.1	+0.4	+0.1	−0.4	−0.5	−0.3	−0.6	−0.2	+0.2	+0.2
	at 1995 prices, annual change and quarterly change in %																			
Economic activity																				
GDP	+ 3.3	+1.2	+0.9	+2.3	+1.1	+0.6	+0.6	+0.5	+0.3	+0.2	-0.1	+0.0	+0.2	+0.4	+0.6	+0.7	+0.5	+0.6	+0.6	+0.5
Private consumption	+ 2.7	+1.4	+1.4	+2.1	+0.8	+0.5	+0.5	+0.4	+0.4	+0.2	+0.2	+0.2	+0.3	+0.5	+0.6	+0.7	+0.5	+0.4	+0.4	+0.5
Government consumption	+ 0.6	-0.5	−0.6	+0.9	+0.1	−0.1	−0.2	−0.3	+0.0	−0.0	−0.1	−0.3	−0.2	−0.1	−0.0	+0.0	+0.3	+0.4	+0.4	+0.4
Gross fixed capital formation	+ 3.4	−0.4	+0.8	+3.4	+1.1	+0.8	+0.2	+0.4	+0.4	−1.1	−0.9	−0.3	+0.4	+0.8	+1.0	+1.0	+0.9	+0.7	+0.6	+0.7
Investment in plant and equipment	+ 6.3	+1.6	+2.6	+5.2	+1.7	+2.4	+1.1	+0.6	+0.1	−0.1	−0.2	+0.2	+0.8	+1.1	+1.3	+1.3	+1.3	+1.3	+1.2	+1.1
Construction investment	+ 1.3	−2.0	−0.8	+1.5	+0.3	−0.0	−0.0	+0.1	+0.4	−2.0	−1.6	−0.6	+0.3	+0.4	+0.5	+0.5	+0.3	+0.3	+0.3	+0.3
Exports	+10.3	+4.1	+2.9	+5.0	+2.7	+2.2	+1.8	+1.5	+1.2	+0.6	−0.5	+0.2	+0.7	+1.3	+1.4	+1.4	+0.8	+1.3	+1.5	+1.5
Imports	+ 7.5	+3.1	+3.0	+5.0	+1.5	+1.6	+1.3	+1.1	+1.0	+0.8	−0.7	+0.1	+0.8	+1.5	+1.5	+1.4	+0.8	+1.2	+1.3	+1.5
	Contribution to real GDP growth in percentage points																			
Domestic demand	+ 2.2	+0.7	+1.0	+2.1	+0.6	+0.4	+0.2	+0.3	+0.2	+0.2	−0.1	−0.0	+0.2	+0.4	+0.6	+0.6	+0.5	+0.5	+0.5	+0.5
Net exports	+ 1.3	+0.5	+0.0	+0.1	+0.6	+0.3	+0.3	+0.2	+0.1	−0.1	+0.1	+0.0	+0.0	−0.1	−0.0	+0.0	−0.0	+0.1	+0.1	+0.0
Changes in inventories	− 0.2	+0.0	−0.0	+0.0	−0.1	−0.0	+0.0	+0.0	+0.0	−0.0	−0.0	−0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
	annual change and quarterly change in %																			
Labor market																				
Unemployment rate (Eurostat definition)	3.7	3.8	3.9	3.8	4.0	3.7	3.6	3.6	3.7	3.8	3.9	4.0	4.0	3.9	3.9	3.9	3.9	3.8	3.7	3.6
Total employment	+ 0.9	+0.3	−0.0	+0.5	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1	−0.0	−0.0	−0.1	+0.0	+0.0	+0.1	+0.1	+0.2	+0.2	+0.2
thereof private sector	*+ 0.7*	*+0.4*	*+0.1*	*+0.7*	*+0.0*	*+0.1*	*+0.1*	*+0.1*	*+0.2*	*+0.2*	*+0.1*	*−0.0*	*−0.1*	*−0.0*	*+0.0*	*+0.1*	*+0.2*	*+0.2*	*+0.3*	*+0.3*
Payroll employment	+ 1.3	+0.5	+0.0	+0.7	+0.2	+0.3	+0.2	+0.2	+0.2	+0.1	−0.1	−0.1	−0.0	+0.1	+0.1	+0.1	+0.2	+0.2	+0.3	+0.3
Additional variables																				
Disposable household income, real	+ 3.1	+0.7	+1.1	+2.4	+0.8	+0.8	+0.7	+0.5	+0.1	−0.2	−0.4	−0.1	+0.4	+0.6	+0.7	+0.7	+0.6	+0.5	+0.5	+0.5
Household saving rate in %	7.9	7.3	7.0	7.3	7.6	7.9	8.1	8.1	7.9	7.5	7.0	6.7	6.9	7.1	7.1	7.1	7.2	7.2	7.3	7.4
Output gap in % of GDP	1.1	0.3	−0.5	−0.2	1.1	1.1	1.1	1.1	1.0	0.5	0.1	−0.3	−0.5	−0.6	−0.6	−0.4	−0.3	−0.2	−0.1	−0.1

Source: OeNB fall 2001 forecast.

Gerhard Fenz,
Martin Schneider

Editorial close:
November 30, 2001

1 Overview

Austrian economic growth lost considerable momentum in the course of 2001, with no sign of an imminent recovery at this point in time. After real GDP had still expanded by 2.6% year on year in the first quarter of 2001, growth slipped to just 0.9% in the second quarter. The slowdown was caused both by consumer spending, which has decelerated noticeably in the wake of anemic real income advances, and by capital outlays, which in fact contracted in the second quarter. The more sluggish real income growth can be pinpointed to the surge in consumer prices and fiscal consolidation measures. Government consumption has been on the decline since the end of 2000, also on account of consolidation efforts. Foreign trade, which had been highly animated in 2000, subsided perceptibly in the course of 2001. Nominal merchandise exports temporarily bottomed out at –2.5% in May. The deficit on current account (on a cash basis) improved by EUR 0.62 billion to –EUR 3.85 billion in the first nine months of 2001. Austria's economy is now feeling the full brunt of the slowing pace of business activity across the globe. On the average of the first three quarters of 2001, the economy stagnated at the 2000 level and even contracted in the second quarter of 2001.

Companies' assessment of the economic outlook for the fourth quarter of 2001 as gauged by the business survey of the Austrian Institute of Economic Research (WIFO) had clearly become more pessimistic, above all business sentiment on order books. The most recent results of the European Commission's October survey confirm entrepreneurs' uncertainty following the terrorist attacks of September 11. The construction sector has been grappling with serious problems since the beginning of 2000, with no end to the sharp slide in sight.

Price growth heated up in the first half of 2001. In May and July, inflation as measured by the Harmonized Index of Consumer Prices (HICP) climbed to annual highs of 2.9%. With energy prices diminishing and the impact of the fiscal measures of the first half of 2000 on inflation coming to an end, inflation has been easing again since July. The cyclical downturn is now affecting also the labor market. Since May, year-on-year unemployment figures have been climbing steadily. Seasonally adjusted unemployment stood at 4.0% (Eurostat definition) in October, up from 3.9% in September. The national seasonally unadjusted unemployment rate rose to 5.8%, 0.6 percentage point higher than in October 2000. While employment has still been expanding year on year, the rate of increase is diminishing.

2 Flagging Output Growth

Industrial output growth in Austria slackened continuously from month to month in 2001 from an initial increase of 6.9% in 2000. While production was still advancing by 5.6% in the first quarter, it posted a decline of 1.2% in the second and a fall by 1.9% in the third quarter. The September reduction of 5.9% was especially severe. Total output in the first nine months of 2001 only marginally outpaced the comparable result of 2000 (+0.6%).

A breakdown by categories in the first three quarters reveals that the production of consumer durables (–3.5%) and capital goods (–1.8%) was hardest hit by the cooling economy. The production of nondurable consumer goods also edged down (–0.9%) in 2001. Nevertheless, the manufacturing sector's order books still look quite good. At the end of August, companies had 12.9% more orders (in nominal terms) on their books than in 2000. However, the pace of incoming orders weakened considerably at last count (August: +4.5%).

After construction had boomed in 1997 and 1998, growth suffered setbacks from 1999. By 2000, building output was diminishing by 0.3%. The construction output index (including the auxiliary construction business) still succeeded in augmenting by 4.5% in the first quarter of 2001, but in the two quarters after that, it shrank by –2.9% and –2.7%, respectively. The development of building and civil engineering output is quite disparate. Whereas civil engineering output was still advancing by 4.5% in the third quarter, building construction contracted by 5.4% in the same period. A more detailed analysis indicates that the positive performance of civil engineering could be pinpointed to the areas industrial and engineering construction and tunnel construction, while the negative trend in housing construction and renovation continued. At the end of August, construction orders at +3.3% (in nominal terms) were still somewhat above the year-earlier value, but incoming orders were already on the decline at –7.0% year on year.

Trade and repairs, where turnover had risen by 2.7% in real terms in the year 2000, suffered a setback of –1.5% in the first eight months of 2001. Wholesale trade was hardest hit (–2.1%). Motor vehicle sales, too, could not shake off the doldrums. After falling by 2.1% in 2000, sales plummeted by 2.0% from January through August 2001. Weakening consumer demand caused retail sales to stagnate at +0.1%. New vehicle registrations also reflected tepid demand, lessening by 5.5% in the first ten months of 2001 compared to a reduction by 1.7% in 2000.

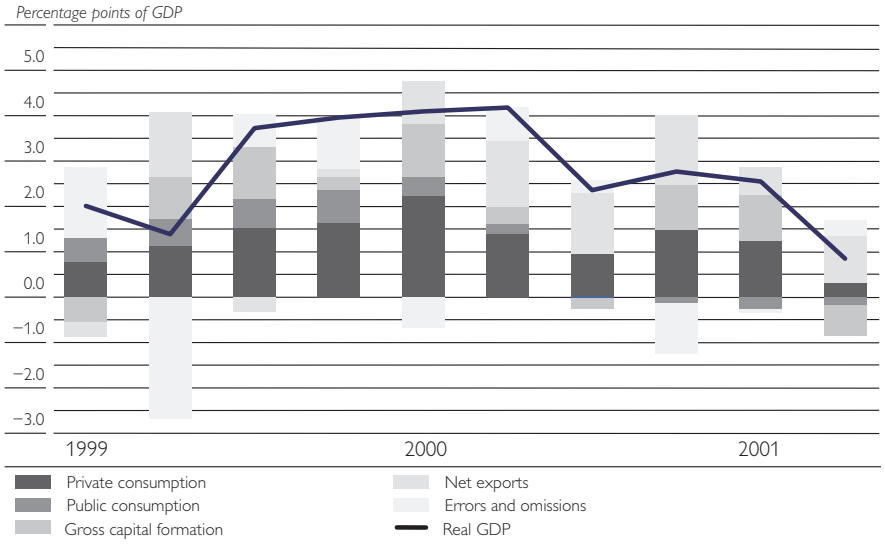
3 Weak Domestic Demand in the Second Quarter of 2001

Austria's economy is now feeling the full impact of the international cooling of economic activity. The latest national accounts data covering the second quarter 2001 is clear evidence of the slowdown of growth in Austria. Real GDP inched up by a mere 0.9% year on year, down from 2.6% in the first quarter of 2001. Whereas consumer demand had been the mainstay of growth in recent years up to and including the first quarter of 2001, conditions changed in the second quarter. Growth was carried primarily by external trade. Despite the cloudier international outlook, above all the slowdown in Germany, Austria's main trade partner, net exports contributed a hefty 1.0 percentage point to GDP growth (chart 1).

Growth in private consumption was dampened perceptibly by the fiscal consolidation measures and a slightly increased inflation rate, with its contribution to GDP expansion down at a mere 0.3 percentage point. Gross capital formation diminished in the second quarter, causing GDP growth to decelerate by 0.7 percentage point. The decline is traceable to the slump in

Chart 1

Real GDP Growth in Austria



Source: OeNB, WIFO.

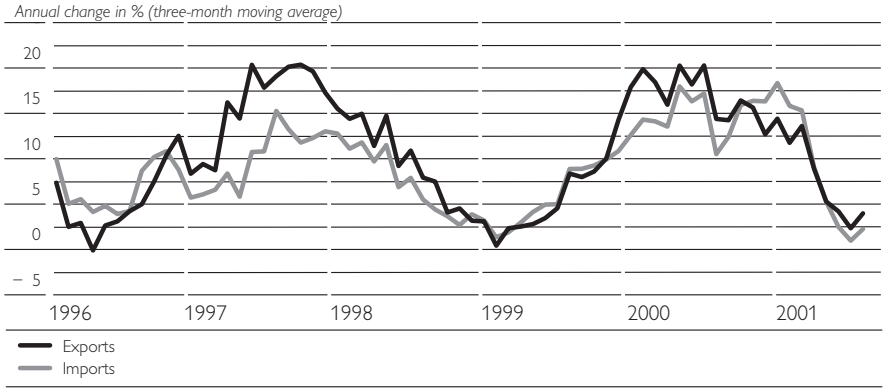
construction investment, while investment in plant and equipment stagnated. Public spending also fell, dampening GDP growth by 0.2 percentage point.

4 Foreign Trade Growth on a Decline Since the End of 2000

Exports rose exceptionally strongly in 2000: According to Statistics Austria, nominal merchandise exports jumped 15.6%. Imports, too, expanded by an animated 14.7%, powered by robust economic growth. At mid-year 2000, though, export growth began to let up considerably. Following an expansion by 12.7% in the first quarter of 2001, deliveries of goods abroad climbed by a moderate 3.8% in the second quarter. Merchandise imports developed

Chart 2

Austrian Goods Exports and Imports in Nominal Terms



Source: Statistics Austria.

similarly. After augmenting by 13.6% in the first quarter, they went up by just 3.9% in the second quarter. Hence on the average from January through August 2001, goods exports advanced by 7.3% against the same period of 2000, goods imports widened by 7.1%.

The current account (cash basis) for January through September 2001 indicates a reduction of the deficit by EUR 0.62 billion to –EUR 3.85 billion. This improvement resulted from the rise in the surplus on services by EUR 0.53 billion and a reduction of current transfers by EUR 0.25 billion. The deficit on merchandise payments and on income remained nearly unchanged.

At EUR 1.51 billion (January through September 2001), the most important component of the services subaccount, travel, posted a surplus of roughly the same order as in the comparable period of 2000 (+0.1%). Between May and September 2001 (the greater part of the summer season), overnight stays as recorded by Statistics Austria came to 53.8 million, a minor reduction of 1.2% compared to the like period of 2000.

5 Prospects on the Labor Market Worsen

In the first months of 2001, the Austrian labor market was doing very well. However, the trend changed in May 2001. For the first time since February 1999 registered unemployment began to mount again, at first slowly (0.5% year on year in May), but then faster (14.5% year on year in October). The ranks of the unemployed are swelling for a number of reasons: First of all, the figures reflect the economic slowdown which began mid-2000. Second, the number of unemployed persons had contracted substantially in 2000. Third, the budget consolidation measures involve further layoffs of public servants. Fourth, the labor market prospects of the construction sector deteriorated dramatically.

All in all, the unemployment rate (national definition) rose to 5.8% in October 2001 compared to 5.2% in October 2000 and to 4.0% (Eurostat definition) against to 3.6% in October 2000. Registered unemployment came to 196,272 persons in October 2001, 24,808 persons more than in the same month of 2000. The construction sector is hardest hit by the rise in unemployment (+25.9%). In a breakdown of unemployment by age groups, the rate was above-average especially among young persons (+20.5%).

Job vacancies, traditionally a fairly accurate leading indicator, has been on the decline since December 2000. In October 2001 job vacancies came to 25,791, marking a reduction by 24.5% from twelve months previously. The number of dependently employed Austrians expanded by an average of 25,800 or 0.8% in 2000. This enlargement was chiefly the result of two opposed developments: The bright outlook for the economy pumped up demand for labor on the one hand, while on the other hand, a wave of early retirement prior to the introduction of more stringent provisions on early retirement had a negative impact on employment growth.

In the first ten months of 2001, employment was lifted continuously (+0.5%), but growth lost momentum from month to month. Employment growth had sunk to 0.3% by October after running at 0.9% in January.

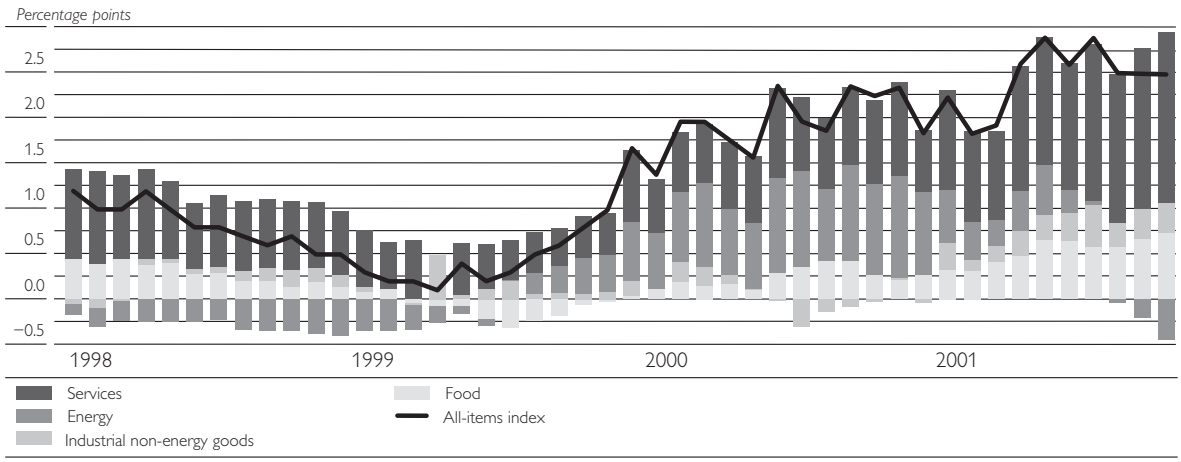
Hence, dependent employment amounted to 3,163,767 persons in October 2001, up by 10,798 from the same months of 2000. The pace of employment growth lagged the development of economic growth, which may be traced to the direct cost of termination of employment contracts for firms. Hence companies try to fine-tune the number of employees not by termination of contracts, but by not replacing employees lost through attrition. Moreover, with the lack of skilled specialists on the market, many companies make an effort to retain their skilled employees.

6 Inflation Peaks, Real Wage Growth Shrinks Further

After inflation was marginal in 1999, consumer prices started to pick up in 2000. According to the national CPI, the rate of price increase came to 2.3% in the year 2000; it amounted to 2.0% as measured by the HICP. Inflation quickened even more in the first half of 2001. In May and July, HICP inflation recorded a high of 2.9%. Since then, the year-on-year rates of price increase have eased again. The main factors contributing to the rise in inflation were the indirect effects of high oil prices and the boost in the price of the highway toll sticker alongside more expensive services and foodstuffs. Services became more costly because of discretionary measures, such as the introduction of the copayment for outpatient hospital visits in April 2001, and because prices for medical services and tourist services were hiked. Food became more expensive in the wake of the animal disease crises (foot-and-mouth disease and BSE).

Chart 3

Contributions to Inflation (HICP)

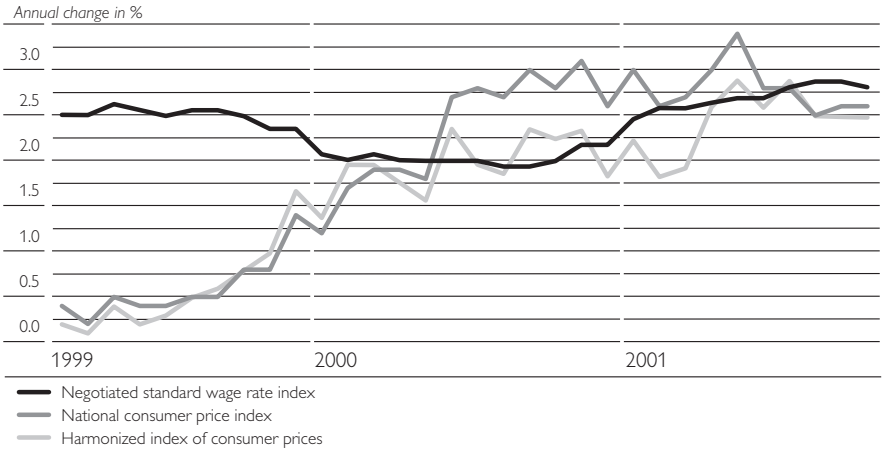


Source: OeNB, Statistics Austria, ECB.

The change in the trend of inflation since July 2001 hinged largely on the petering out of the base effects of the budget consolidation measures which had gone into force in June 2000. Moreover, the inflationary pressure emanating from high energy prices let up in the course of the first half of 2001. Since August, energy prices have gone down year on year. The introduction of tuition fees in October 2001 braked this downtrend marginally. After having surged by more than 4% year on year in some

Chart 4

Wage and Price Developments in Austria



Source: Statistics Austria.

months in 2000, wholesale price inflation slackened in 2001. In the first ten months of 2001, wholesale price inflation averaged 2.1%, with October posting a 0.5% decrease year on year.

Since June 2000, the negotiated standard wage rate index has remained below the national CPI, the inflation yardstick in wage bargaining. As real wage growth has lagged behind the growth of collectively agreed wages as reflected by the negotiated standard wage rate index by an average 0.5 percentage point over the past few years, employees' real wages have in fact been decreasing significantly since 2000.

Although the negotiated standard wage rate index was at +2.8% slightly higher than the national CPI (+2.6%) in October 2001 (like in the two previous months), real wages seem to have remained on the decline. The wage agreements already struck for 2002 imply that the wage drift (i. e. the difference between the collectively agreed increase in wages and the increase in actual compensation) will shrink from 0.5 percentage point to 0.2 to 0.3 percentage point.

7 Confidence Indicators Signal Continuing Slowdown

Uncertainty about the economy is very high at present. Confidence indicators suggest that the pace of the Austrian economy will continue to slow down. The most recent results of the European Commission's October survey confirm entrepreneurs' concerns about economic prospects following the terrorist attacks of September 11. In October, the industrial confidence indicator stood at –23 points, notably below the 1990–2000 averages (–12 points). In the retail and services industries, sentiment deteriorated particularly dramatically compared to September 2001. It should be noted, however, that in the service sector confidence had started to decline already in spring. The services confidence indicator had been decreasing since May (22 points), to hit a new low in October (1 point). This marks a 5 point decline against September. Only business sentiment in

construction – which had already been very pessimistic – did not deteriorate further in October.

In the past, consumer confidence has always been much more stable, and whenever it followed downturns in business sentiment it did so only with a time lag. Therefore, the consumer confidence indicator still benefits from consumers' support of the economy. However, since the second quarter 2001, for the first time both indicators have simultaneously been trending downward. While the business confidence indicator reliably reflects the development of investment activity, the consumer confidence indicator is not as reliable a pointer to the development of private consumption.

Companies' assessment of the economic outlook for the fourth quarter as gauged by the October 2001 business survey of the Austrian Institute of Economic Research (WIFO) had also clearly become more pessimistic. The seasonally adjusted indicator of business sentiment, which offsets positive and negative answers in percent of total responses, sank by 20 percentage points from the second quarter of 2000 and, at –4.1%, turned negative for the first time since the fourth quarter of 1996. The assessment of order books deteriorated especially strongly. The number of negative responses increased by 9.6% on the previous quarter.

Development of Selected Economic Indicators

	1999	2000	2001[1])	2002[1])	Last recently available period		
					1999	2000	2001
	Annual change in %						
Economic output, real GDP at 1995 prices					*2nd quarter*		
GDP	+2.8	+ 3.0	+1.3	+1.9	+1.4	+ 4.2	+ 0.9
Gross capital formation	+2.2	+ 3.6	−0.8	+1.3	+3.8	+ 1.5	− 2.8
Private consumption	+2.7	+ 2.5	+1.5	+2.0	+2.0	+ 2.5	+ 0.6
Public consumption	+2.2	+ 0.9	+0.8	+0.8	+2.9	+ 1.1	− 0.9
Exports	+8.7	+12.2	+4.6	+4.6	+8.3	+13.1	+10.3
Imports	+8.8	+11.1	+4.2	+4.1	+4.7	+ 9.9	+ 8.3
GDP per employee	+1.8	+1.6	+0.8	+1.4	+0.4	+ 3.0	+ 0.3
Industrial output					*January to September*		
Output index incl. construction	+5.0	+ 7.0	×	×	+3.6	+ 7.5	+ 0.6
Productivity per hour	+3.8	+ 8.4	+2.2	+3.5	×	×	×
Labor market					*January to October*		
Payroll employment	+1.0	+ 0.8	+0.4	+0.7	+1.0	+ 0.9	+ 0.5
Registered unemployment	−6.8	−12.4	+2.6	+2.6	−6.1	−12.6	+ 1.7
	%						
Unemployment rate							
EU concept	3.9	3.7	3.8	3.8	4.0	3.8	3.8
National concept	6.7	5.8	6.0	6.1	7.6	5.8	5.8
	Annual change in %						
Prices							
National CPI	+0.6	+ 2.3	+2.6	+1.9	+0.4	+ 2.1	+ 2.8
HICP	+0.5	+ 2.0	×	×	+0.3	+ 1.8	+ 2.4
Wholesale price index	−0.8	+ 4.0	×	×	−1.6	+ 3.6	+ 2.1
Wages							
Negotiated standard wage rate index	+2.5	+ 2.1	+2.7[2])	+2.6[2])	+2.5	+ 2.0	+ 2.7
Unit labor cost							
General	+0.9	+ 0.1	+1.9	+1.0	×	×	×
Manufacturing industry	−0.5	− 6.0	+0.8	−0.5	×	×	×
Relative unit labor cost[3])							
Vis-à-vis major	−1.5	− 6.5	+0.5	−0.5	×	×	×
Vis-à-vis Germany	−0.1	− 2.6	−0.4	−0.9	×	×	×
Foreign trade (Statistics Austria)					*January to August*		
Imports, in nominal terms	+6.7	+14.7	+7.8	+7.6	+4.8	+14.4	+ 7.1
Exports, in nominal terms	+7.0	+15.6	+7.3	+7.8	+4.1	+17.7	+ 7.3
	EUR billion						
Balance of payments[4])					*January to September*		
Current account	−6.3	− 5.7	−5.5	−5.4	−3.2	− 4.5	− 3.8
Goods	−3.4	− 3.0	−3.6	−3.7	−4.2	− 5.8	− 5.9
Services	+1.6	+ 1.0	×	×	+3.5	+ 3.3	+ 3.9
Travel	+1.7	+ 1.5	+1.7	+1.8	+1.7	+ 1.5	+ 1.5
	%						
Interest rates					*October*		
EONIA	2.74	4.12	×	×	2.50	4.76	3.97
Secondary market yield (government bonds)[5])	4.69	5.56	5.00	4.70	5.53	5.52	4.85
	Annual change in %						
Effective exchange rate of the euro							
Nominal	×	−10.4	×	×	×	−13.3	+ 7.6
Real	×	−10.1	×	×	×	−12.7	+ 9.4
Indicator of Austria's price competitiveness[6])	−1.1	− 3.6	+0.5	+0.2	*September* −3.3	− 3.9	− 1.9
	% of GDP						
Budget							
Net government debt[7])							
Central government	−2.4	− 1.4	−1.2[7])	−1.0	×	×	×
General government	−2.1	− 1.1	−0.5[7])	−0.3	×	×	×

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

[1]) WIFO forecast of September 2001.

[2]) Change in gross earnings per employee.

[3]) Manufacturing industry, calculated in uniform currency.

[4]) Annual figures are based on transactions, last recently available period on cash balances.

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

[6]) Until December 1998: real effective exchange rate of the Austrian schilling.

[7]) According to the report of government deficits and debt levels (September 2001 data).

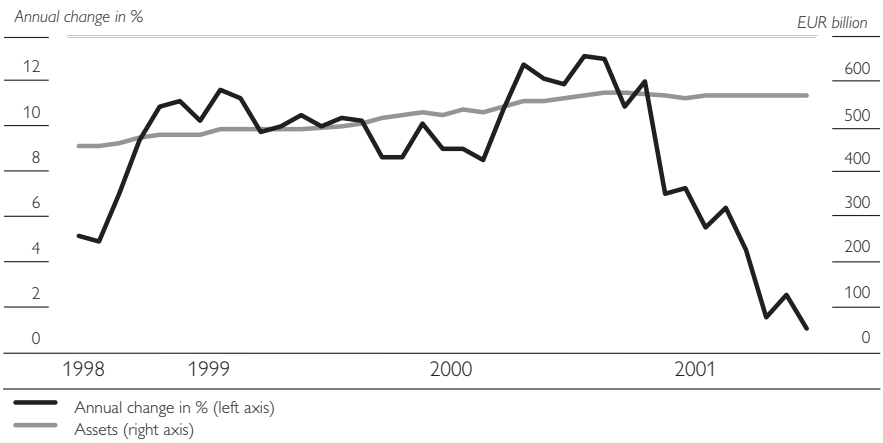
Money and Credit in the First Half of 2001

Ralf Dobringer[1])

Asset Growth Decelerates Sharply

In the first half of 2001, Austrian banks' asset growth lost considerable momentum. After having mounted by EUR 37.43 billion or 7.1% in the first two quarters of 2000, assets expanded more slowly at EUR 5.46 billion or 1.0% in the review period. Though the weakening economy was one reason for the deceleration, the restructuring of Bank Austria AG (BA) in the wake of its merger with Bayerische Hypo- und Vereinsbank AG (HVB) had a more immediate impact. In the reporting period, BA closed its branches in Milan (March 31, 2001), London (June 3, 2001) and Munich (June 30, 2001), which caused foreign transactions to contract powerfully; this was in turn reflected in total assets because of BA's dominant market position. Exclusive of BA's development, Austrian banks' assets would have surged by 6% in the first six months of 2001, only marginally less than in the like period of 2000.

Domestic Banks' Total Assets



Source: OeNB.

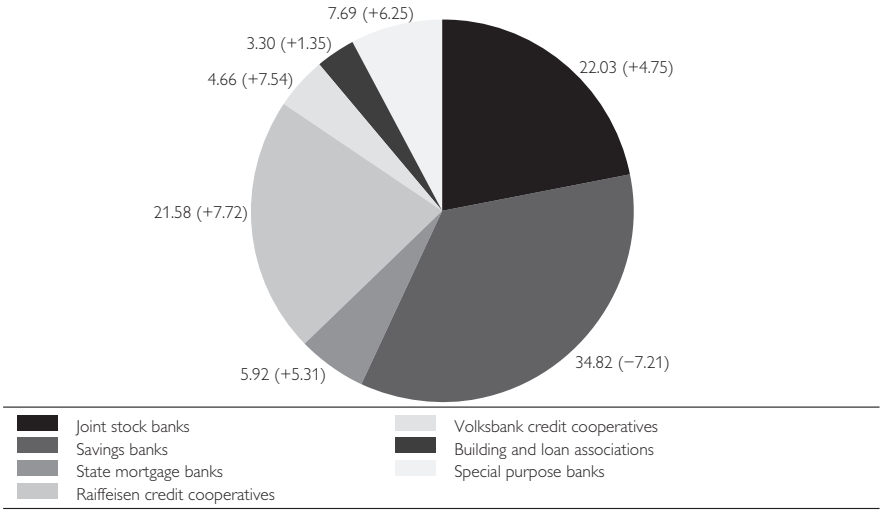
In an analysis of asset growth by sectors, restructuring measures have a particularly strong impact in the savings bank sector, as that sector includes BA: Accordingly, the total assets of the savings bank sector shrank by EUR 15.38 billion (–7.2%) from the beginning of 2001, which contrasts with a rise by EUR 12.93 billion (+6.8%) in the same period of 2000. Exclusive of BA, the savings bank sector's assets expanded by 6.6%. All other sectors succeeded in boosting assets, albeit not as much as in 2000: In percentage terms, the Raiffeisen credit cooperatives (+7.7%) posted the largest gains, followed by the Volksbank credit cooperatives (+7.5%) and the special purpose banks (+6.3%).

The five largest (independent) banks' market share measured by total assets decreased from 45.9% to 44.1% against December 2000, again because of Bank Austria's merger. On the whole the market share of the largest banks has nonetheless enlarged, as it had come to only 35% in 1990.

More or less like in the previous quarter, four banks had assets in excess of EUR 30 billion on June 30, 2001, five banks reported between EUR 30

1 In cooperation with Gudrun Mauerhofer and Walter Waschiczek.

Austrian Banks' Market Share as a Percentage of Total Assets,
Cumulative Change since January 2001 in Percent



Source: OeNB.

billion and EUR 10 billion. The remaining 917 credit institutions reported total assets below EUR 10 billion.

The number of banking offices sank by 17 to 5,462 from the beginning of 2001 to end-June. The number of head offices augmented by 3 to 926; the number of branch offices was cut by 20.

Banking Offices

	Joint stock banks and private banks		Savings banks		State mortgage banks		Raiffeisen credit cooperatives		Volksbank credit cooperatives		Building and loan associations		Special purpose banks		Total		Total head and branch offices
	H	B	H	B	H	B	H	B	H	B	H	B	H	B	H	B	
Dec. 31, 2000	61	751	70	1,397	9	154	625	1,741	71	472	5	34	82	7	923	4,556	5,479
June 30, 2001	64	730	68	1,393	9	164	627	1,724	72	471	5	49	81	5	926	4,536	5,462
Change	+3	−21	−2	−4	−	+10	+2	−17	+1	−1	−	+15	−1	−2	+3	−20	−17

Source: OeNB.
H = Head offices.
B = Branch offices and bureaux de change.

Interbank Business: The Driving Force of Asset Growth

At EUR 6.30 billion (+6.2%), domestic interbank claims were the fastest-growing assets item on Austrian banks' balance sheets in the first half of 2001. This rise was 2.3 percentage points smaller than in the same period of the previous year, (+EUR 9.20 billion or +8.5%). On the liabilities side, domestic and external interbank transactions have come to represent the major item on the balance sheet, even ahead of deposits. BA's merger depressed the rise in foreign interbank claims to just EUR 1.83 billion or 2.3% (down from EUR 10.12 billion or 15.2% in the first half of 2000) and the foreign interbank liabilities to EUR 3.25 billion or 3.9% (down from EUR 12.77 billion or 16.9% in the first half of 2000).

Interbank transactions accounted for an average of some 34% of banks' assets and liabilities across all sectors. While the special purpose banks

(including OeKB) reported a very large share of interbank claims in total assets, interbanks transactions accounted for a fairly low percentage of building and loan associations' assets and liabilities.

Selected Items as a Percentage of Banks' Assets

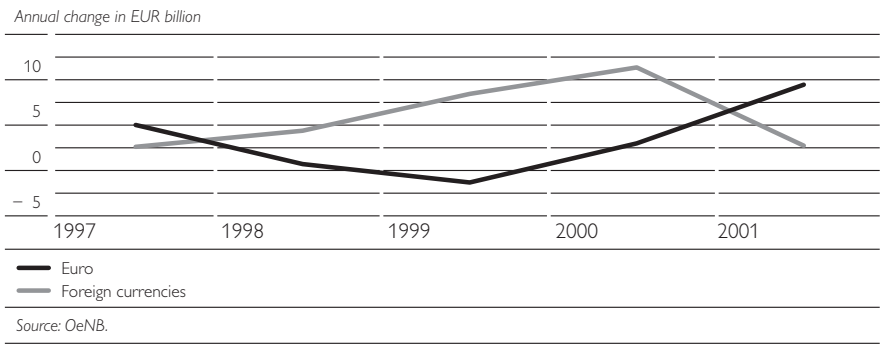
	Loans	Deposits	Interbank business	
			Assets	Liabilities
	%			
Joint stock banks	46.79	37.90	23.63	31.21
Savings banks	34.03	26.29	36.37	40.02
State mortgage banks	60.23	20.21	16.19	12.39
Raiffeisen credit cooperatives	39.49	35.94	38.22	42.98
Volksbank credit cooperatives	51.24	41.55	26.52	33.85
Building and loan association	73.47	87.20	13.76	7.70
Special purpose banks	16.26	2.16	59.35	23.79
Banks total	40.31	31.44	33.33	34.48

Source: OeNB.

Credit Growth Loses Momentum

After loans outstanding had mounted by EUR 5.78 billion (+2.7%) in the first half of 2000, credit growth lost momentum in 2001 hand in hand with the economy[1]) and fell to EUR 4.12 billion (+1.8%). Nevertheless, interest charges in the second quarter (EUR 1.84 billion) were EUR 0.25 billion higher than in 2000 despite falling interest rates. This may be ascribed partly to borrowers' growing preference for euro-denominated loans at higher interest rates over foreign currency loans[2]).

Loans to Domestic Nonbanks



Source: OeNB.

The more animated demand for foreign currency loans prevailing since 1995 eased somewhat in the review period. While in the first half of 2000 the increase in euro loans came to merely EUR 0.26 billion (+0.1%) and that in foreign currency loans ran to EUR 5.52 billion (+16.7%), in the first half of 2001 euro loans advanced by EUR 2.18 billion (+1.2%) and foreign currency loans by only EUR 1.95 billion (+4.9%). Thus, the

1 *For more information about the link between loan growth and the economy, see the Oesterreichische Nationalbank's Financial Market Stability Report 1/2001.*

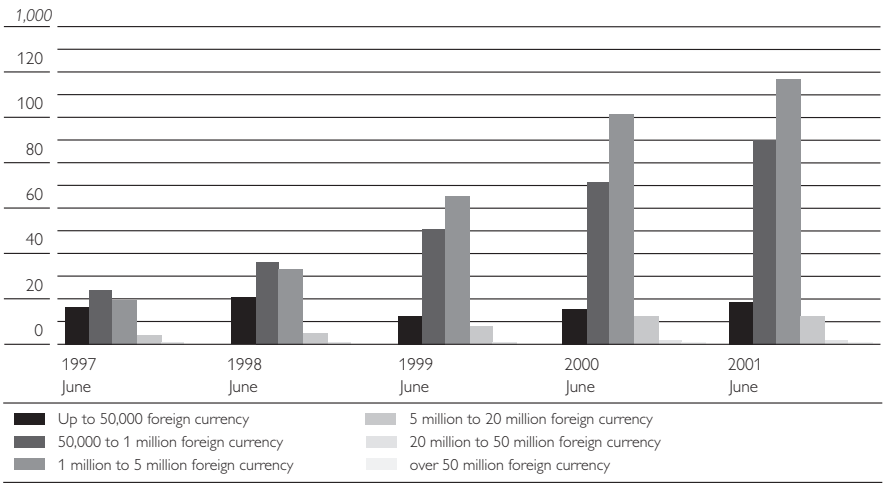
2 *A foreign currency loan is subject not just to interest rate risk, but also to exchange rate risk.*

absolute growth (annual change) of schilling or euro loans surpassed that of foreign currency loans for the first time since 1997. Hence, foreign currency lending as a percentage of total lending edged up by only 0.6 percentage point to 18.1% from the beginning of 2001.

By sectors, the special purpose banks boosted the share of foreign currency-denominated lending in the credit portfolio most, i. e. by 15.2% from the beginning of 2001. Other sectors which posted above-average rises in lending in foreign currency were the Volksbank credit cooperative sector (+9.3%), the savings bank sector (+6.2%) and the Raiffeisen credit cooperative sector (+5.0%).

The changing demand for loans of various sizes implies that foreign currency lending, originally devised as an instrument to finance large corporate investment, has come to represent the favorite borrowing option for both households and small and medium-sized enterprises. This may explain why foreign currency credits with a volume of up to ATS 5 billion show the largest gains by far among all categories.

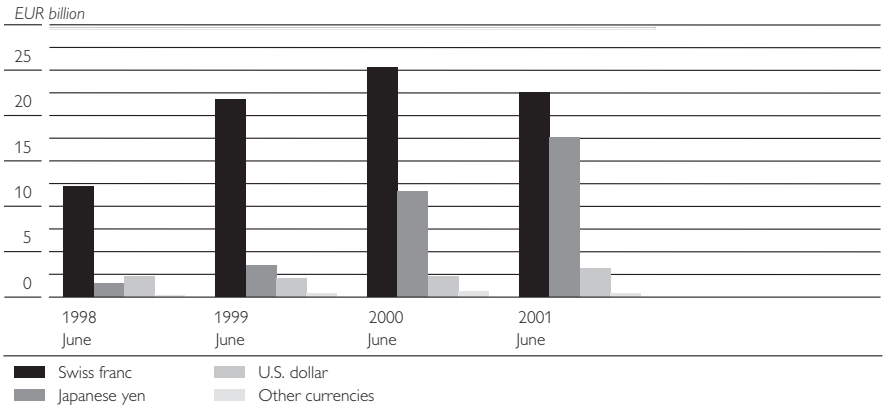
Loans to Domestic Nonbanks



Source: OeNB.

While more than half of all foreign currency loans were denominated in Swiss francs at end-June 2001, their share of all foreign currency lending is on the decline, as confirmed by their contraction by EUR 1.9 billion (–7.7%) from the beginning of 2001 despite a fairly constant exchange rate. Japanese yen loans, however, were still very popular with borrowers: With the volume of lending in Japanese yen raised by EUR 3.7 billion (+26.1%) from the beginning of 2001, yen loans' share of total foreign currency lending jumped from 33.7% to 40.5%. Moreover, as the yen's exchange rate appreciated by only about 1.5% against the euro in the same period, the rise obviously represents real volume growth. At about 7%, U.S. dollar-denominated loans still constituted an insignificant share of foreign currency lending.

Breakdown of Foreign Currency Loans



Source: OeNB.

At the end of March 2001[1]), Austria accounted for 3.1% of all outstanding foreign currency loans extended in the euro area. However, the Austrian share of Swiss franc lending ran to 29.9%, that of Japanese yen loans even amounted to 31.2% of all euro area foreign currency credit.

By regions, foreign currency borrowing expanded somewhat more quickly in the easternmost provinces[2]) from January 2001 (+6.6%) than in the western part of the country (+5.3%). At 14.9%, foreign currency lending as a share of total lending nevertheless remained substantially lower in eastern Austria than in western Austria (31.5%).

Closed-end loans[3]) accounted for somewhat less than half of all loans. Banks boosted this type of credit by EUR 2.07 billion (+2.0%) in the first half compared to EUR 5.39 billion (+5.8%) in the analogous period of 2000. Advances and overdrafts[4]), each accounting for a share of roughly 27%, followed closed-end loans as the most important categories within total lending. Overdrafts mounted by EUR 1.55 billion (+2.6%) from the beginning of 2001, up from only EUR 0.34 billion (+0.6%) a year earlier, and hence developed contrary to closed-end loans. In the long term, though, there is a clear trend toward closed-end loans at lower interest rates.

By contrast to its borrowing activities in the first half of 2000, the public sector took out fewer loans in the review months. Thus, the public sector scaled back its borrowing by EUR 0.19 billion or 0.6% from the beginning of 2001. In the long run, with the government turning increasingly to bond issues, this sector's borrowing from banks is losing significance. However, while the central government (–3.5%) and the regional

1 *No data for June 2001 were available at the editorial close.*

2 *The easternmost provinces are Lower Austria and Burgenland. Vorarlberg, Tyrol and Salzburg are classified as the western provinces.*

3 *A closed-end loan is a nonrevolving loan with a set amount of money to be repaid at a specific time as agreed with the borrower on concluding the loan contract.*

4 *Overdrafts are facilities which may be accessed anytime and up to a specified amount for the duration of an agreement. This definition also covers overdrafts on current account.*

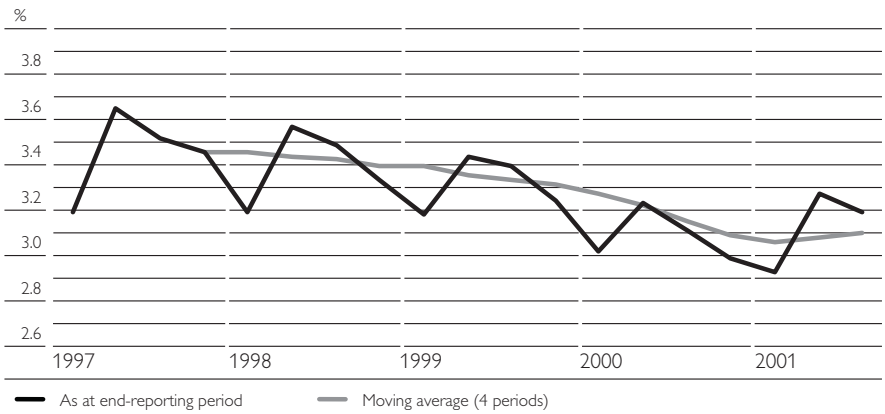
authorities (–10.1%) cut back their borrowing, the demand of the social security sector burgeoned by EUR 0.78 billion or 73.1%, with demand concentrated wholly on short-term loans. The local authorities' level of credit outstanding remained nearly unchanged in the first six months of 2001. 5.7% of all new public sector borrowing consisted of foreign currency loans, down from 6.4% in December 2000. The average interest on loans to public sector entitities in euro decreased by 0.2 percentage point to 5.11% between January and June 2001.

Unlike the public sector, corporate borrowers took out more loans in the first two quarters despite the economic slowdown, boosting credit outstanding by EUR 1.88 billion (+1.5%), which even exceeded the previous year's result of EUR 1.63 billion or +1.4%. Demand for long-term credit was particularly keen (+EUR 2.9 billion or +3.5%). At EUR 0.36 billion or 2.3%, the rise in lending to the nonfinancial enterprise borrower subcategory free-lance professionals and self-employed persons had lost pace from 2000 (+EUR 0.55 billion or +3.7%). The share of foreign currency loans in companies' total borrowing climbed from 18.9% at the beginning of the year to 19.2% on June 30, 2001. In the same period, the average interest on commercial loans in euro decreased by 0.42 percentage point to 6.53%.

The rise in lending to households decelerated from EUR 2.73 billion or +5.1% in the first six months of 2000 to EUR 2.02 billion (+3.4%) in the reporting period. As in 2000, long-term loans acounted for the entire increase. Households accounted for the largest share of foreign currency loans, 22.5% of all borrowers. The average interest rate charged on euro-denominated loans to households fell from 7.81% at end-December 2000 to 7.32%.

EUR 1.26 billion (+3.0%) more home loans and home improvement loans were taken out in between January and June 2001. The share of foreign currency loans in home loans swelled by 1 percentage point to 9.1% at the end of the review period. The average rate of interest on euro-denominated home loans fell by 0.22 percentage point to 6.16%.

Adjustments as a Percentage of Claims on Nonbanks



Source: OeNB.

While adjustments of claims on nonbanks have been steadily declining for years, 3.2% of all claims required adjustment at the end of June 2001, 0.1 percentage point more than one year earlier.

By contrast to loans, securitized lending sank, falling by EUR 0.57 billion (–2.3%) in the review months, compared to a rise by EUR 0.70 billion (+2.8%) in the analogous period of the previous year. Most of the decline was in Federal Treasury bills and notes and other public sector debt instruments, which contracted by EUR 0.49 billion (–25.3%) and EUR 0.31 billion
(–1.7%), respectively. The only category of securitized lending that banks boosted was that of debt securities and other fixed-income securities, which advanced by EUR 0.33 billion or 22.7%. Foreign currency-denominated securitized lending continued to play a subordinated role in 2001.

By sector, only Volksbank credit cooperatives and joint stock banks reported boosts in securitized lending (+21.6% and +3.4%, respectively), all other sectors recorded reductions, some of which were fairly large.

Deposit Growth Stable

Deposits as a source of funding expanded by EUR 2.84 billion (+1.6% from the beginning of 2001, nearly as fast as in the first half of 2000 (+EUR 2.74 billion or +1.6%). While more than a third of the addition to deposits in 2000 had consisted of foreign currency, the entire gain in the 2001 period was in euro.

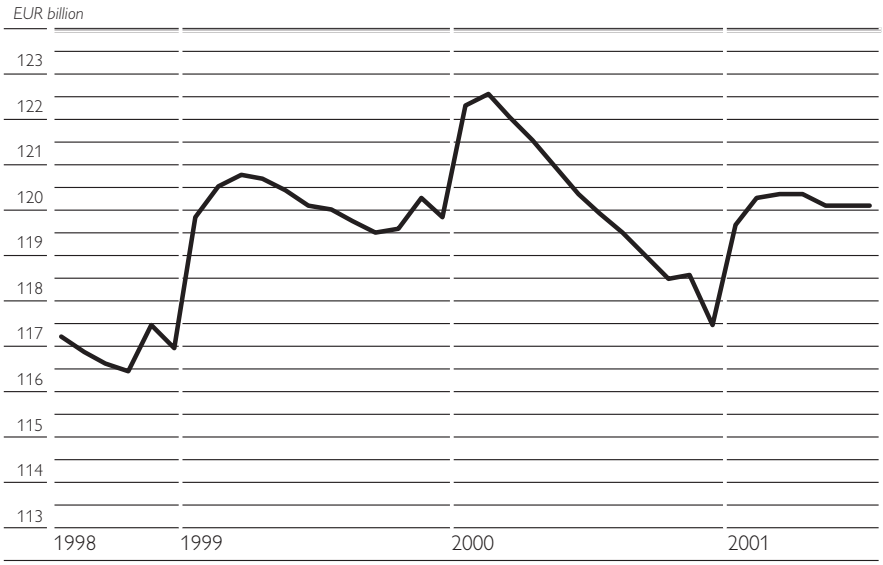
Above all, the state mortgage banks (+8.3%), the Volksbank credit cooperatives (+6.2%) and the joint stock banks (+3.0%) were able to attract above-average additions to deposits, whereas the special purpose banks suffered a decline of 6.1% in deposit levels.

The hike in euro sight deposits, which include salary and pension accounts, slowed from EUR 2.27 billion (+7.5%) in the first half of 2000 to EUR 0.74 billion (+2.1%) in the reporting period. Households lifted sight deposits by EUR 0.63 billion (+3.9%), far below the 2000 result (+EUR 1.27 billion or +9.5%). Nonfinancial enterprises, too, cut down on additions to sight deposits from EUR 0.75 billion (+5.7%) to EUR 0.45 billion (+3.3%). Both the general government (–2.7%) and other financial intermediaries (–15.5%) slashed sight deposits. Households accounted for roughly 47% of all sight deposits in the reporting period. The average rate for salary and pension accounts remained constant from the beginning of the year at 0.33%.

Euro time deposits developed along the same lines in the first six months of 2001 as in the year-earlier period (2001: +EUR 1.84 billion or +10.1%, 2000: +EUR 1.84 billion or +11.3%). More than half of the rise was in corporate deposits, which surged by EUR 1.02 billion (+10.8%). The general government added EUR 0.78 billion (+17.2%) to its time deposit holdings. Households, too, raised time deposits by EUR 0.12 billion (+3.3%), though no longer as avidly as in 2000 (+EUR 0.64 billion or +36.7%).

Although interest rates were on the decline – the average rate for savings deposits tied up for more than a year subsided by 0.34 percentage

Domestic Nonbanks' Savings Deposits



Source: OeNB.

point to 3.26% in the course of the review period – households enlarged their euro-denominated savings deposits by EUR 0.40 billion (+0.3%). In the comparable period of 2000, this category had pared holdings by EUR 2.34 billion or 1.9%.

With international capital markets buffeted by ongoing volatility and many private investors intent on optimizing rather than maximizing yields, the abolition of anonymity for passbook savings accounts does not appear to have had a lasting impact on savings behavior in Austria. Hence the share of deposits in private-sector financial wealth has remained high.

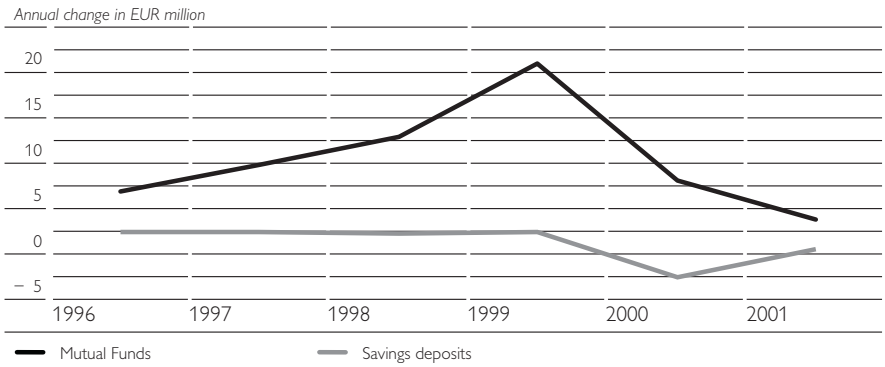
The amount and structure of savings deposits remained larely unaltered from the end of 2000. As on December 31, 2000, some 80% of all savings accounts held up to ATS 100,000; between ATS 100,000 and ATS 500,000 were deposited on 17% of all savings accounts. Between June 2000 and December 2000, the size structure of savings deposits shifted marginally in favor of accounts with below ATS 200,000, reflecting the impact of the abolition of passbook savings anonymity. Up to an amount of ATS 200,000, savings passbooks may be kept as "password savings books"[1]) permitting bearers to make withdrawals upon statement of a password.

The bearish mood currently prevailing on capital markets is largely responsible for the fact that the growth of mutual fund shares[2]) managed by Austrian investment companies lost momentum and edged up by only EUR 3.8 billion or 4.6% from the beginning of 2001. In 2000 growth rates (+10.7%) had already begun to decelerate substantially from 1998 (+31.2%) and 1999 (+38.9%). Although the share of fixed income (bond) funds still came to 52% of the total, equity and balanced funds performed far better (see chart "Fund Volumes by Investment Category").

1 *The bank is always aware of the identity of the customer.*

2 *Source: Association of Austrian Investment Companies (VÖIG).*

Savings Deposits Compared with Mutual Funds

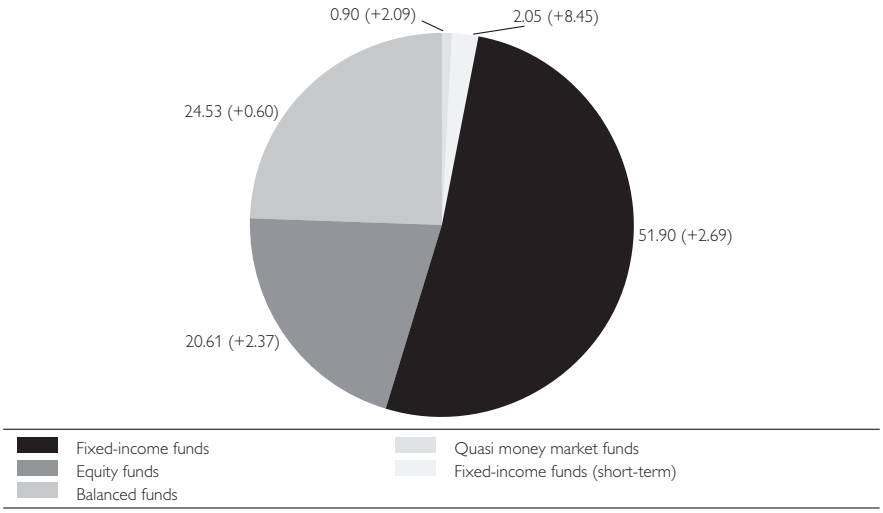


Source: OeNB.

Additions to pension funds also lost momentum from 2000, augmenting by just EUR 0.14 billion or 1.8%. The boost had still come to EUR 0.50 billion or 6.9% in the first half of 2000. Pension funds' business slipped partly because of capital markets' weakness, as in the case of mutual funds, and partly because industry-wide pension funds no longer chalked up solid gains.

Fund Volumes by Investment Category

Share in % and cumulative change since January 2001 in %



Source: Association of Austrian Investment Companies (VÖIG).

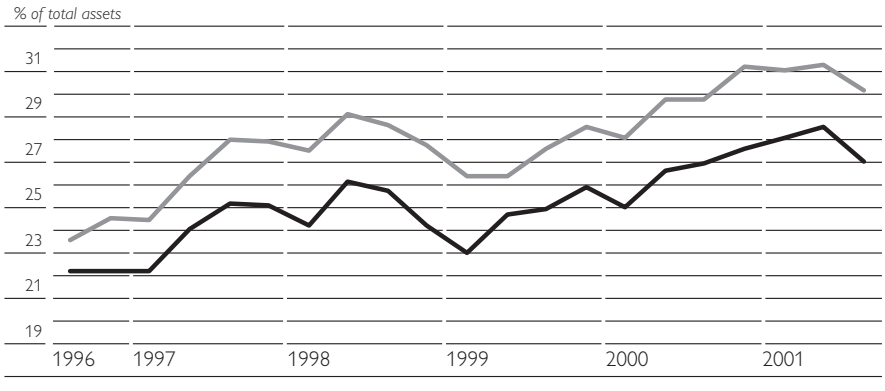
Austrian banks' direct domestic issues augmented by EUR 2.43 billion (+4.6%). This type of refinancing has been enlarging nearly twice as fast as deposit levels for some time. Roughly 88% of direct issues were euro-denominated; in the first six months of 2001, they gained EUR 1.53 billion (+3.3%) compared to EUR 1.99 billion or 4.7% in the same period of 2000. EUR 0.89 billion in new issuances were foreign currency-denominated (2000: EUR +0.95 billion).

Contraction of External Business

With the international interlocking of banks increasing, external business has been gaining importance over the past few years. As mentioned in the introduction, the restructuring of BA (Bank Austria), which also involved the closing of several of its branches abroad, had massive effects on banks' total foreign transactions and hence on assets, entailing an unusual contraction of both external claims and liabilities in the review months. Exclusive of BA, external claims would have surged by 18.7%, external liabilities by 16.4% in the first half of 2001; including BA, external claims sank by a hefty EUR 4.25 billion or 2.7% and external liabilities dropped by EUR 3.27 billion or 1.9%. By comparison, external claims had still widened by EUR 20.01 billion or 15.2% and external liabilities by EUR 19.95 billion or 13.5% in the like period of 2000. On the assets side, foreign-owned debt securities including fixed-income securities declined most, by EUR 5.44 billion or 30.6%, followed by claims on nonresident customers (-EUR 2.06 billion or –4.1%). By contrast, Austrian banks' foreign interbank claims went up by EUR 1.83 billion or 2.3%, which, however, was not very much compared to EUR 10.12 billion or 15.2% in the first six months of 2000. On the liabilities side, securitized foreign liabilities diminished most, falling by EUR 4.70 billion (–8.8%). Liabilities to nonresident customers were also slashed and shrank by EUR 2.83 billion or 9.4%. Like foreign interbank claims, foreign interbank liabilities rose (+EUR 3.25 billion or +3.9%), though not as vigorously as in 2000 (+EUR 12.77 billion or +16.9%).

In 2000, Austrian banks' branches abroad had still accounted for about one third of the rise in foreign business. In 2001, however, their asset volumes slipped to EUR 21.15 billion. As a consequence, the ratio of external claims to total assets slipped from 28.0% at the beginning of 2001 to 27.0%, that of external liabilities to total liabilities from 31.0% to 30.2%.

Austrian Banks' External Transactions

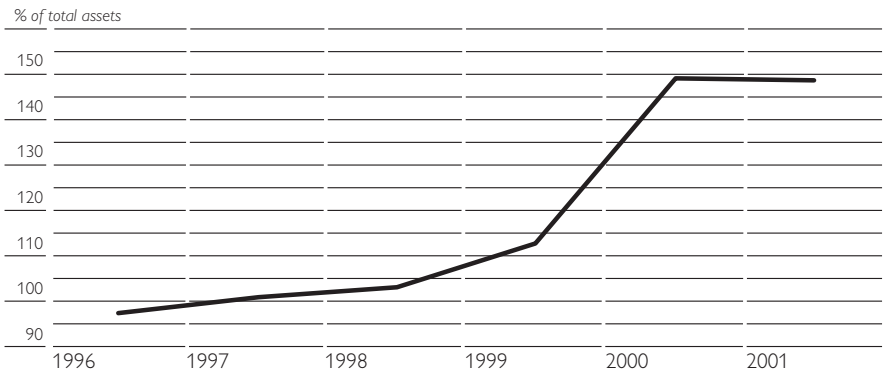


Source: OeNB.

Derivatives Business Growth Eases

In the first half of 2001, the volume of derivatives transactions widened at a less animated rate than in the same period of the previous year (+EUR 184.03 billion or +28.0%), progressing by just EUR 60.28 billion (+7.7%). In June 2001 derivatives transactions as a proportion of total assets amounted to 149.1%. The volume of interest rate contracts – the largest subitem in the derivatives category – advanced by EUR 65.95 billion (+10.8%) in the first half of 2001 compared to EUR 166.22 billion (+34.1%) in the analogous period of 2000.

Specific Off-Balance-Sheet Transactions



Source: OeNB.

Capital Ratio Stands at 14.5%

At the end of June 2001, the capital held by banks operating in Austria amounted to EUR 40.30 billion, EUR 2.87 billion (7.7%) more than at the beginning of the year. Thus banks' (unconsolidated) capital ratio had gained 0.7 percentage point to 14.5%, quite a good value in an international comparison. The minimum capital ratio as stipulated by the Austrian Banking Act is 8%. As in the previous periods, core capital accounted for some two thirds of total capital (EUR 26.93 billion). The banks' tier 1 capital ratio[1]) edged up by 0.6 percentage point to 9.7% from December 2000. Eligible capital[2]) stood at EUR 39.05 billion, EUR 3.19 billion more than at the beginning of 2001. Tier III capital, which principally serves to cover market risks, went down by EUR 0.32 billion to EUR 1.25 billion.

As risk-weighted assets[3]) grew at a noticeably faster pace (by +EUR 11.71 billion or +4.9%) than total assets (+1.0%), the ratio of risk-weighted assets to total assets expanded by 1.7 percentage points to 44.4% in the first six months of 2001.

1 *Total tier I capital expressed as a percentage of total risk-weighted assets. The minimum ratio is 4% according to the Banking Act.*

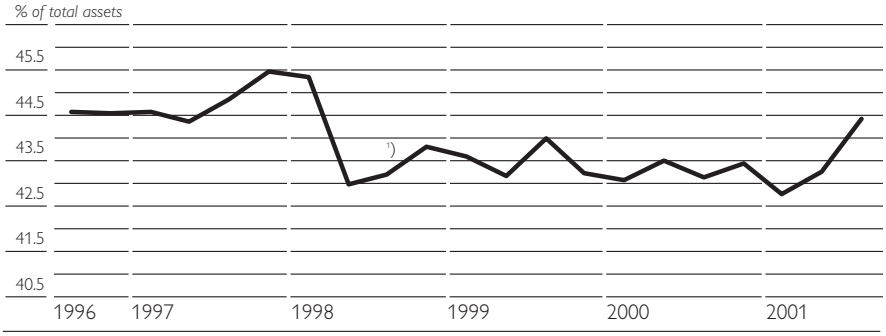
2 *Core capital and supplementary capital minus deductible items.*

3 *Risk-weighted assets are assets reduced by value adjustments and weighted by risk categories in line with § 22 (3) Austrian Banking Act.*

	Capital in % of the assessment base	*Core capital ratio in %*	*Risk-weighted assets in % of total assets*
Joint stock banks	13.98	9.14	46.82
Savings banks	16.46	9.80	41.93
State mortgage banks	11.52	7.52	43.91
Raiffeisen credit cooperatives	13.03	9.53	52.19
Volksbank credit cooperatives	11.84	8.31	59.55
Building and loan associations	9.43	8.07	40.18
Special purpose banks	24.46	21.16	19.92
Banks total	14.52	9.70	44.41

Source: OeNB.

Risk-Weighted Assets



Source: OeNB.
1) Change in Austrian Banking Act.

Balance of Payments in the First Quarter of 2001[1])

René Dell'mour,
Patricia Fahrngruber,
Christine Stecyna,
Isabel Winkler,
Robert Zorzi

– Compared to the first quarter of 2000, the Austrian current account deficit halved in the first quarter of 2001.
– As in previous periods, securities transactions dominated cross-border financial flows.

1 Current Account

In the first quarter of 2001, the deficit on the current account on a transaction basis (EUR 340 million, see table 1) came to only half the deficit recorded in the first quarter of 2000. This favorable development of the current account can be traced to a higher surplus on the goods and services account, the contraction of the deficit on current transfers and an only modest increase of the income account deficit.

According to the latest data released by the European Central Bank (ECB), the current account deficit of the euro area as a whole[2]) amounted to EUR 6.3 billion in the first quarter of 2001, compared to EUR 11.5 billion in the first quarter of 2000. This improvement was essentially attributable to a rise in the surplus on goods trade, as exports grew slightly faster than imports (+16% and +14%, respectively).

The following analysis provides a closer look at the individual subaccounts of the Austrian current account in the first quarter of 2001.

1.1 Goods and Services

In the first quarter of 2001, the surplus on goods and services climbed by EUR 190 million to EUR 700 million. This surge resulted from the favorable development of exports, which, at a growth rate of around +8%, closely matched the pronounced growth registered in the fourth quarter of 2000, as well as from a slight slowdown in import growth (+7%).

1.1.1 Goods

In line with international conventions, the goods item of the current account is derived from the foreign trade statistics on the physical shipment of goods compiled by Statistics Austria and not from the underlying payments recorded by the OeNB.

According to the foreign trade statistics currently available from Statistics Austria for the first quarter of 2001, exports grew by 6% and imports by 10%. The corresponding merchandise payments increased by 14% on the exports side and by 13% on the imports side. Experience of the past few years shows that these two sets of statistical data clearly differ more in terms of intra-year figures than in terms of all-year figures. In line with the balance of payments methodology, such discrepancies are booked under services, i. e. under the subaggregate unclassified transactions, which changes the result of the services balance, but not the overall result of the

1 *Based on transactions. Cut-off date for data: August 9, 2001. As of the beginning of 1999, the Austrian balance of payments figures published by the OeNB in "Focus on Austria" are presented in euro (irrevocable euro conversion rate EUR 1 = ATS 13.7603). For Austrian balance of payments statistics in both euro and schilling, refer to the OeNB website at http://www.oenb.at; Focus on Statistics, chapter 7.*

2 *Including Greece. On January 1, 2001, Greece joined Stage 3 of Economic and Monetary Union (EMU) as the twelfth EU Member State and has since been included in the euro area aggregate.*

current account. Therefore, the aggregated result of trade in goods and services is the most reliable indicator for estimating foreign trade developments.

While in the longer term the data provided by Statistics Austria and the OeNB *coincide* in showing either a rising or a falling trend for both gross exports and imports, they tend to produce different net measurements for the trade balance. Depending on the deviations between the net results, Statistics Austria and the OeNB may arrive at contradicting assessments of the developments in the trade balance: The OeNB, for example, sees the development of the trade balance in the first quarter of 2001 in a slightly more positive light.

The following analysis of the geographic distribution of Austria's external merchandise trade (see table 2) is exclusively based on the foreign trade data provided by Statistics Austria: In the first quarter of 2001, Austria's foreign trade with the euro area was rather restrained, with growth rates for exports and imports both coming to 5%. In absolute figures, merchandise shipments to the euro area amounted to EUR 9,810 million, while Austrian goods imports from euro area countries came to EUR 11,520 million, raising the foreign trade deficit by EUR 80 million to EUR 1,710 million. Across countries, trade developments were mixed. While Austria's trade balance vis-à-vis France improved by EUR 170 million, for example, the deficit vis-à-vis Germany, Austria's most important trade partner, expanded by EUR 220 million.

In the reporting quarter, merchandise trade with non-euro area countries was livelier, in particular on the imports side. Compared to 2000, merchandise exports climbed by 7%, while goods imports augmented by 18%. Austria's exports to non-euro area countries came to EUR 7,750 million, while non-euro area imports amounted to EUR 8,010 million. Exports to the eastern European countries augmented by 8.5% or EUR 220 million in the reporting quarter and shipments to developing countries and to the U.S.A. registered high growth rates.

Goods imports, in particular from developing countries, went up markedly, by EUR 670 million or 54%. Imports from the CEECs also rose by a remarkable 16.5% (+EUR 370 million).

1.1.2 Services

In the first quarter of 2001, the total services surplus expanded by EUR 920 million to EUR 2,110 million.

1.1.2.1 Travel

The relatively favorable development of tourism continued in the first quarter of 2001, with the number of foreign tourist arrivals and bednights rising by around 2% compared to the corresponding quarter of 2000 (see table 4). The quarterly result of 29.7 million foreign tourist bednights has previously only been surpassed in the first quarter of 1994. An uptrend was registered for almost all countries of origin, with German tourists accounting for the largest increase in the number of bednights in absolute terms (+230,000). The number of tourists from the United Kingdom,

Switzerland and the U.S.A. also went up rather strongly as they benefited from favorable exchange rate developments, while tourists from Central and Eastern Europe, e. g. from the CIS countries, continued to arrive in rising numbers in the first quarter of 2001 (+40,000 or +27%). Only the number of tourists arriving from France and Belgium went down considerably. In parallel to the number of foreign tourist bednights, travel receipts (including passenger transport) grew by 4%, coming to EUR 4,080 million, EUR 160 million more than in the comparable period of the previous year (see table 3). Passenger transport accounted for EUR 470 million of total travel receipts. As private consumer demand remained strong even in the face of a beginning recession, Austrians' travel expenses climbed accordingly, driving up expenses by 13.5%, or EUR 250 million, to almost EUR 2,110 million. Passenger transport accounted for 10% of expenses (EUR 210 million).

In the reporting quarter, the surplus in the travel account fell slightly, by EUR 90 million, to EUR 1,980 million owing to the pronounced uptrend in travel expenditure.

1.1.2.2 Other Services

In the first quarter of 2001, the balance on the services account improved by EUR 1,060 million compared to the corresponding period of the previous year, which was largely attributable to a rise in services rendered to foreigners by domestic enterprises.

1.3 Income

In the first quarter of 2001, the deficit on the income subaccount of EUR 860 million roughly equaled that of the first quarter of 2000. While, as in previous quarters, income received from the *compensation of employees* continued to produce a surplus (EUR 130 million), the balance on *investment income* was negative (EUR 990 million).

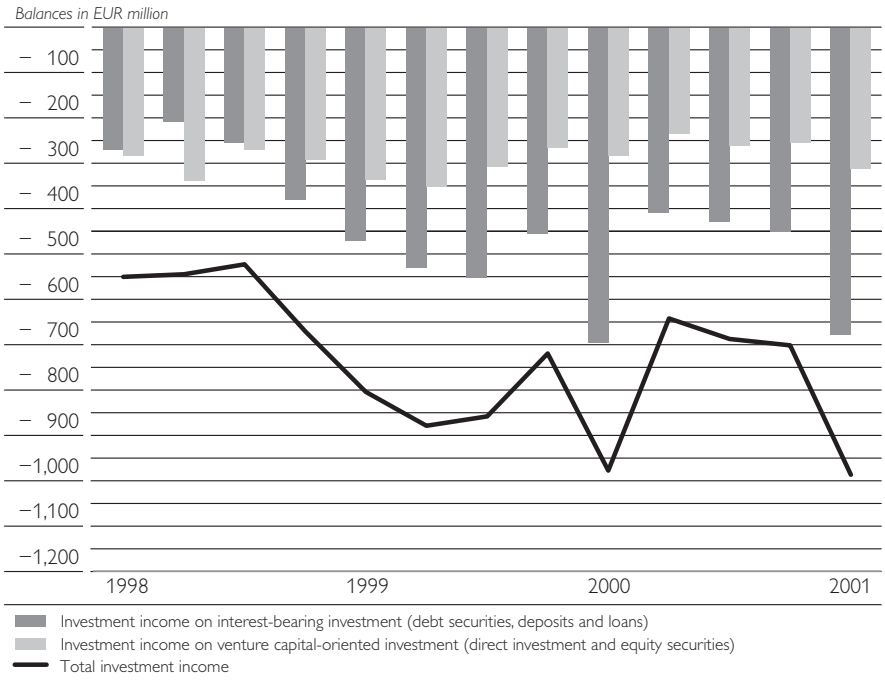
A breakdown of net investment income by regions shows that the euro area accounted for 92% (EUR 910 million) of the total deficit. In the first quarter of 2001, income on interest-bearing[1]) financial assets accounted for two thirds of the overall balance on investment income, while income on venture capital-oriented[2]) investment accounted for the rest.

Broken down by major subaggregates (see table 5), income on direct investment and income on portfolio investment both posted net deficits (of EUR 300 million and EUR 820 million, respectively), while income on other investment recorded a surplus of EUR 130 million. Compared to the first quarter of 2000, income on portfolio investment deteriorated by EUR 160 million, which was, however, compensated by an equal improvement of income on deposits and loans as well as by the OeNB's investment activities.

1 *Income on debt instruments (fixed-interest securities, deposits and loans, irrespective of whether they are classified as direct investment, portfolio investment, other investment or reserve assets).*

2 *Investment income on equity capital and equity securities.*

Components of Austria's Investment Income[1])



Source: OeNB.
[1]) Until 1999 final data, 2000 revised data, 2001 provisional data.

Since the stock of foreign direct investment in Austria still clearly exceeds Austrian direct investment stocks abroad and since, in addition, inward investment has been more profitable in the long run (not least because those investments tend to be more mature), the balance on direct investment income posted a shortfall of EUR 300 million in the first quarter of 2001. This shortfall results from the difference between Austrian residents' profits of EUR 410 million (+18%) and outflows to foreign investors to the tune of EUR 710 million (+12%) in the reporting period.

As cross-border securities transactions intensified over the recent years, income on *portfolio investment* has begun to play a vital role in investment income. Income on this type of outward investment came to EUR 1,160 million in the first quarter of 2001, and was clearly surpassed by the costs resulting from Austria's external debt position (EUR 1,980 million) in the same period.

The key driving force in both cases is the item income on bonds and notes. In the first quarter of 2001, Austria recorded an interest income of EUR 1,110 million, while Austrian borrowers faced interest payments of EUR 1,860 million. Breaking down these items by economic sectors, the result is as follows:

– Around 60% of interest income from abroad went to the domestic other sector, in particular to institutional investors, followed by banks (37%).
– By contrast, around 50% of interest payments to nonresidents were accounted for by the general government, followed by banks (41%).

In the first quarter of 2001, *income on all other investment (other investment and reserve assets)* came to EUR 130 million. Following a EUR 20 million

deficit recorded in the comparable period of 2000, this favorable result is mainly attributable to the banking system (OeNB and banks), which posted an income of EUR 230 million in the first quarter of 2001 (up from EUR 60 million in the previous year). At the same time, however, the net deficit of nonbanks (general government and other sector) climbed from EUR 90 million to EUR 100 million over the reporting period.

1.4 Current Transfers

At EUR 180 million, the current transfers deficit in the first quarter of 2001 remained EUR 110 million below the comparable figure of 2000.

Transactions with the EU dominated current transfers of -EUR 140 million net in the public sector. Austria's contributions to the EU amounted to EUR 560 million during the reporting period, while its receipts (excluding EU contributions to infrastructure projects) came to EUR 450 million, resulting in a net payment of EUR 110 million compared to EUR 190 million in the first quarter of 2000.

2 Capital Account

The capital account closed the reporting quarter at –EUR 60 million, thus remaining almost unchanged vis-à-vis the corresponding quarter of 2000.

General government capital transfers in kind comprise, above all, receipts from the EU that are earmarked for infrastructural measures and are thus not part of current transfers. These transfers amounted to EUR 50 million both in the reporting period and in the analogous period of 2000.

The *private sector's* capital transfers in *kind* recorded a deficit of EUR 70 million, down from EUR 100 million; this is largely due to the subitem "migrants' transfers."

In terms of volume, capital transfers in *cash* play a minor role in Austria's balance of payments statistics.

3 Financial Account

In the first quarter of 2001, Austria's financial account turned from net capital inflows to net capital outflows of EUR 1,130 million for the first time in two years (see table 6). A breakdown by individual financing instruments shows that other investment is primarily responsible for this result. This part of the financial account mirrors the most volatile types of financial investment, e. g. banks' and enterprises' cash management. Inversions of the financial account balance therefore rather result from short-term investment decisions and should not necessarily be interpreted as a change of trend.

A breakdown of the financial account by regions shows the following development for the first quarter of 2001: On balance, Austria registered net capital outflows to the euro area[1]) of EUR 50 million, remaining clearly below the figure recorded in the first quarter of 2000 (see table 7). The growth rate of Austrian financial claims vis-à-vis the countries of the euro

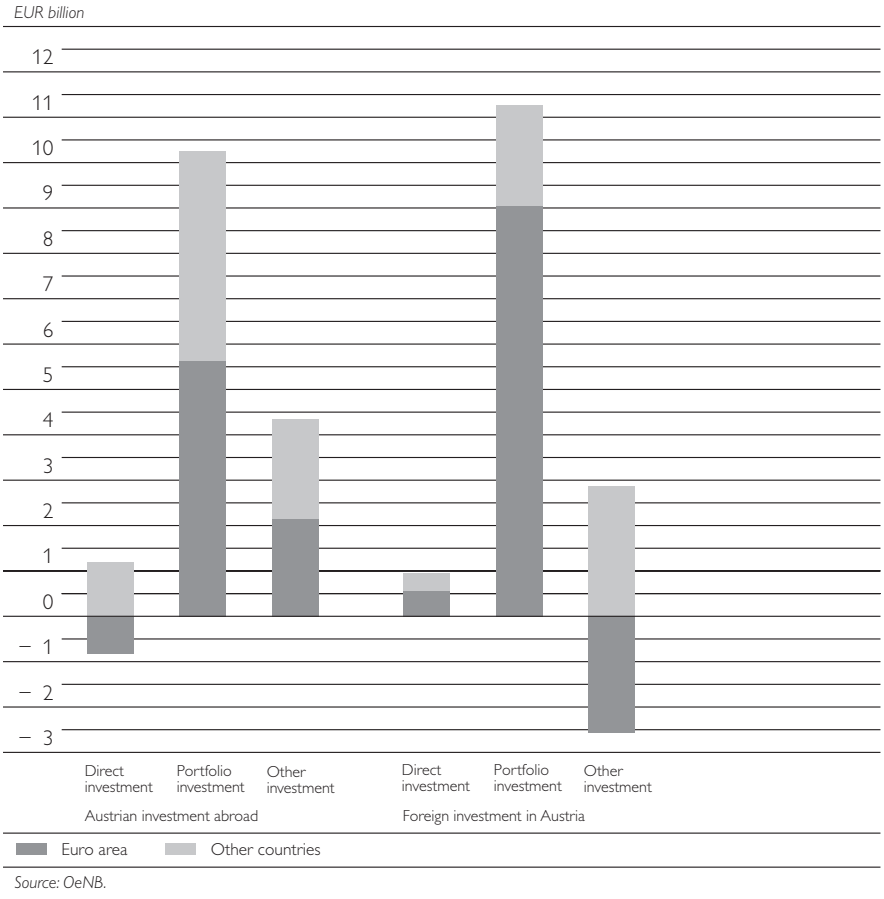
1 *Including Greece. On January 1, 2001, Greece joined Stage 3 of Economic and Monetary Union (EMU) as the twelfth EU Member State and has since been included in the euro area aggregate.*

area went down by 40%, with claims reaching a volume of EUR 6,780 million, while the growth of domestic borrowers' liabilities slowed down by 14%, with liabilities amounting to EUR 6,730 million.

Austria saw net capital outflows to the tune of EUR 1,080 million to *non-euro area countries* in the reporting quarter against net inflows in the first quarter of 2000. In the reporting period, the enhanced interest of Austrian investors in investing in non-euro area countries led to capital outflows of a transaction volume of EUR 6,920 million in the first quarter of 2001 (up from EUR 4,630 million in the first quarter of 2000). Cross-border capital inflows from countries outside the euro area, however, saw a slowdown, shrinking by EUR 2,500 million to EUR 5,840 million in the reporting quarter vis-à-vis the corresponding 2000 period.

Austria's Financial Account in the First Quarter of 2001

(Selected Net Subaccounts)



Source: OeNB.

An analysis of the financial account according to *economic sectors* produces the following results for the first quarter of 2001: The banking sector (the OeNB and banks) recorded net capital outflows to the amount of EUR 3,910 million, while nonbanks (general government and other sector) posted net capital inflows to the tune of EUR 2,790 million. The sectors *OeNB and banks* increased their external assets by EUR 8,440 million in the first quarter of 2001. Foreign net new investment shrank by 68% compared

to the corresponding period of the previous year, coming to EUR 4,530 million. The *general government* sector reduced its claims by EUR 440 million through transactions in the first quarter of 2001. At the same time, the general government took out EUR 6,430 million in the reporting period, thus reducing the volume of its net new borrowing. On balance, the general government therefore registered net capital imports to the tune of EUR 6,870 million. In the reporting period, the *other sector*[1]*)* exported net capital to the amount of EUR 4,080 million, a figure that is clearly below the comparable value of the first quarter of 2000 (EUR 7,720 million). This is attributable to a marked slowdown in asset growth (by EUR 5,690 million) and to the almost constant pace of liabilities growth (+EUR 1,610 million).

When financial flows are split up in the categories of investment in interest-bearing[2]) financial assets and venture capital-oriented[3]) investment, it becomes evident that domestic investors mainly concentrated their investments (totaling EUR 11,350 million) on interest-bearing financial assets in the first quarter of 2001. Their share in total Austrian outward investment came to 83%, thus markedly exceeding the comparable figure of 2000. Austrian investors' exposure to venture capital-oriented investment went down accordingly, reaching 17%.

In the reporting period, interest-bearing financial assets were also of essential importance for foreign investment in Austria. Nonresidents invested EUR 11,050 million in this type of financial assets. Their share in total inward investment in Austria thus amounted to 88%. Venture capital-oriented investments recorded net capital inflows of EUR 1,520 million over the reporting period. Their share in inward direct investment in Austria came to 12%.

3.1 Direct Investment

After reaching record levels in 2000, direct investment is rather expected to slow down in 2001, with even the ECB reporting a downtrend in investments to and from the euro area. Coming to around EUR 360 million net, Austrian outward direct investment in fact clearly failed to match the levels recorded in previous years; at EUR 960 million, inward direct investment was also lower than in 1999 and 2000.

An in-depth look, however, shows that a number of special effects have affected the development of outward direct investment. EUR 1,470 million of gross new investment represent the highest gross new investment ever made in equity capital within one single quarter; this figure is offset, however, by disinvestments to the tune of EUR 1,060 million. Both capital flows reflect the restructuring of a European financial group. The unusually high profit distributions (EUR 470 million) of the first quarter of

1 *Including other financial institutions, insurance companies and pension funds as well as enterprises and households.*

2 *Income on debt instruments (fixed-interest securities, deposits and loans, irrespective of whether they are classified as direct investment, portfolio investment, other investment or reserve assets).*

3 *Investment income on equity capital and equity securities.*

2001 surpassed expected profits, which led to a further reduction in equity and to negative reinvested earnings (EUR 70 million). As almost always, at EUR 20 million, the accumulation of loans to affiliated enterprises was insignificant. However, direct investment focused on non-European host countries (Caribbean offshore financial centers, Australia, Brazil) and, as previously, also on central and eastern Europe, with Slovenia, Hungary, and the Slovak Republic as the most prominent examples. The above-mentioned disinvestment caused foreign capital holdings vis-à-vis the EU to shrink.

Net inward investment in the reporting period amounted to EUR 960 million, with equity – gross new investments of just under EUR 620 million (of which EUR 130 for land purchases) minus disinvestments of EUR 130 million – accounting for EUR 490 million in the reporting period. While expected reinvested earnings (EUR 530 million) are significant as well, intercompany credits even caused a minor reduction (–EUR 60 million) in inward direct investment. The lion's share of invested capital (40%) came from Germany (as usual), with the U.S.A. accounting for 24% and the Netherlands and Switzerland for 16% and 10%, respectively.

3.2 Portfolio Investment

On balance, cross-border transactions related to the acquisition and sale of securities recorded capital imports of EUR 1,020 million in the first quarter of 2001. The corresponding gross values indicate that both Austrian investment in foreign securities and foreign investment in Austrian securities have increased further compared to the previous years.

Austrian investors purchased foreign securities with a market value of EUR 10,240 million, with debt securities accounting for around 80% of purchases. A breakdown of outward portfolio investment by economic sectors shows that banks accounted for 45% of investments and the other sector – mainly institutional investors and enterprises – for 50%. Domestic issuers sold EUR 11,260 million worth of securities abroad, 96% of which were debt securities. Foreign investors were mostly interested in government securities (60%) and securities issued by banks (30%).

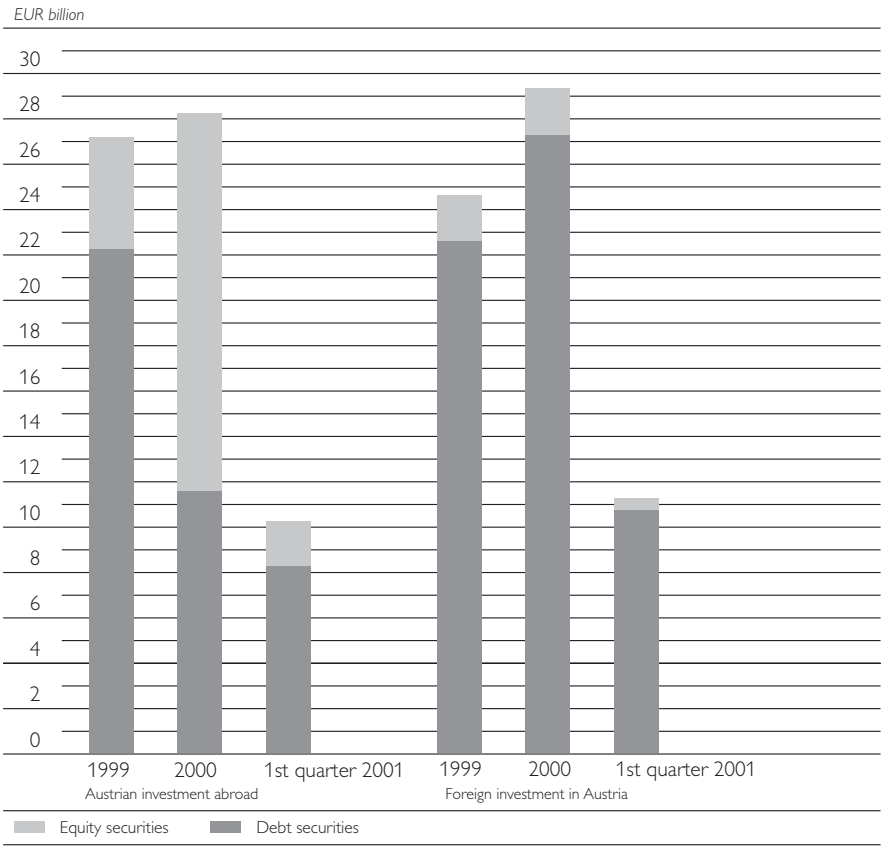
3.2.1 Portfolio Investment in Foreign Securities

In the first quarter of 2001, Austrian investors purchased *foreign equity securities* worth EUR 1,970 million, down one third on the comparable period of 2000. Domestic investors spent EUR 1,740 million on *foreign shares* (mainly listed shares issued by the financial, industrial or technology sectors). Residents mainly invested in shares of enterprises from the U.S.A. (64%) and the euro area (24%), in particular the Netherlands and France, with institutional investors accounting for the lion's share of these securities acquisitions. On balance, domestic households sold shares worth around 20% of the overall annual volume of purchases by foreign investors. In the first quarter of 2001, investment in foreign mutual funds shares came to EUR 230 million, the lowest quarterly value since the first quarter of 1998. A breakdown by regions shows that Austrians were mainly interested in purchasing mutual funds shares issued in Luxembourg, followed by Irish and British issues. Constituting the largest group of investors in this segment,

domestic mutual funds mainly opted for foreign balanced funds and equity funds, while foreign investors mainly bought fixed-income funds. Domestic households also reduced their portfolio holdings of this type of securities.

In the first quarter of 2001, two thirds of cross-border investments in securities were accounted for by *bonds and notes* (EUR 6,770 million). This value is higher than any recorded in the period from 1997 to 2000 (with the exception of the first quarter of 1999). Around 70% of capital investments were made in debt securities from the euro area. Within Economic and Monetary Union (EMU), Austrian investors mainly opted for German, Greek, Italian, Dutch and French issues. Outside the euro area, Austrian investment went chiefly to the U.S.A. (11%) and the United Kingdom (8%). Banks were the dominating group of investors (around 60%), followed by the other sector (mainly institutional investors, around 40%). 93% of investments were made in euro-denominated securities, 3% in U.S. dollar-denominated debt securities.

Securities Transactions by Financial Instruments[1])



Source: OeNB.
[1]) 1999 final data, 2000 revised data, 2001 provisional data.

In the first quarter of 2001, Austrians spent EUR 1,500 million on the acquisition of *foreign money market instruments* (mainly commercial papers and certificates of deposit). Short-term debt securities from the euro area, the Cayman Islands and Switzerland accounted for around 20% of invested capital.

From January 2001, when Greece joined EMU, it has been included in the analysis of Austria's transactions with the euro area. A long-term analysis of the time series suggests that capital transactions with Greece are mainly of relevance in the segment of bonds and notes; in some quarters, this region accounts for a share of up to 10% of total capital flows.

3.2.2 Portfolio Investment in Domestic Securities

Of the EUR 500 million worth of *domestic equity securities* sold to foreign investors, domestic shares accounted for EUR 230 million. Among domestic borrowers, business enterprises accounted for around 80% of capital investments in this segment, while banks accounted for the remaining 20%. Foreigners spent EUR 270 million on *Austrian mutual funds shares,* mainly focusing on equity funds and balanced funds.

Domestic bonds and notes (EUR 8,460 million) continued to be the most popular investment instrument for foreign investors also in the first quarter of 2001, reaching a quarterly value higher than any recorded in the period from 1997 to 2000. Aside from euro-denominated issues foreign investors mainly opted for U.S. dollar-denominated securities. A breakdown of debt securities by sectors shows that foreign borrowers made 48% of their investments in the general government sector and 40% in the banking sector. Foreigners invested EUR 6,385 million in new or reopened issues of the Republic of Austria in the first quarter of 2001.

Government Bond Syndication and Tender Offers in the First Quarter of 2001 [1])

		ISIN	External transactions
			EUR million
5.875%	Federal government bond 1996–2006/7	AT0000383518	917
5.25%	Federal government bond 2001–2011/1	AT0000385067	4,119
3.4%	Federal government bond 1999–2004/3	AT0000384862	1,349
Total			6,385

Source: OeNB.
[1]) Transaction values: positive sign = purchased by nonresident investors.

Foreign investors invested EUR 2,300 million in *domestic money market instruments;* this equals 21% of total inward portfolio investment. Foreign investors mainly purchased commercial papers and certificates of deposits, while selling short-term bonds to Austrian investors.

3.3 Other Investment

In line with an ECB decision, the following conceptual change has been carried out in the other investment subaccount of the Austrian balance of payments: The balance on the OeNB's TARGET transactions is now no longer posted under claims, but under liabilities from other investment made by the monetary authority. All quarters affected by this change (effective as of the beginning of 1999) have been recalculated.

In the first quarter of 2001, *other investments* posted net capital outflows of EUR 4,070 million. By comparison, capital outflows were markedly lower in the first quarter of 2000, totaling EUR 2,530 million.

This development – which resulted from cross-border deposit and credit transactions – was dominated by the *banking system* (OeNB and banks), which exported capital to the tune of EUR 3,230 million, on balance, in the reporting period. Transactions carried out by *nonbanks* (general government and other sector) in the reporting period also led to net capital outflows of EUR 840 million.

A breakdown by regions shows that, in the first quarter of 2001, other investment recorded net capital outflows of EUR 4,740 million vis-à-vis the *euro area* and net capital inflows vis-à-vis *non-euro area countries* of EUR 670 million.

3.4 Financial Derivatives

The financial derivatives position basically includes options, futures contracts and swaps, which are either based on capital products (e. g. foreign exchange assets, securities) or on interest rate products. On the one hand, transaction values refer to the buying and selling of securities-based financial derivatives and, on the other, to transactions resulting from option payments (including premiums) in the course of OTC deals and/or from variation margin payments for futures contracts and swap payments.

The financial derivatives subaccount closed the first quarter 2001 with net capital outflows of EUR 620 million. The interest rate derivatives contained therein resulted in a capital export of EUR 360 million. Like in the past, transactions under this item were largely determined by financial derivatives not based on securities, with swap operations dominating this development.

3.5 Reserve Assets

Reserve assets in the first quarter of 2001 declined by EUR 1,950 million through transactions.

This decline was mainly attributable to the reduction of securities under reserve assets by EUR 1,880 million and gold sales worth EUR 270 million. Deposits under reserve assets and special drawing rights went up slightly, by EUR 200 million, in the reporting period.

Revenues from the sale of gold and securities mainly served to reduce intra-ESCB liabilities (TARGET), thereby also producing a positive effect on the balance on cross-border income.

Annex

Table 1

Balance of Payments Summary

	1st quarter 2000[1])	1st quarter 2001[2])	Annual change
	EUR million		
Current account	− 623	− 342	+ 281
Goods, services and income	− 333	− 164	+ 169
Goods and services	+ 503	+ 696	+ 193
Goods	− 694	−1,417	− 723
Services	+1,197	+2,113	+ 916
Travel	+1,864	+1,718	− 146
Other services items	− 667	+ 395	+1,062
Transportation	+ 371	+ 443	+ 72
thereof international passenger transport	+ *204*	+ *259*	+ *55*
Construction services	+ 59	+ 87	+ 28
Financial services	+ 26	+ 81	+ 55
Royalties and license fees	− 102	− 72	+ 30
Other business services	+ 278	+ 535	+ 257
thereof merchanting	+ *288*	+ *320*	+ *32*
Other services	− 1	+ 109	+ 110
Unclassified transactions	−1,298	− 788	+ 510
Income	− 836	− 860	− 24
Compensation of employees	+ 141	+ 127	− 14
Investment income	− 977	− 987	− 10
Current transfers	− 290	− 178	+ 112
General government	− *268*	− *144*	+ *124*
Private sector	− *22*	− *33*	− *11*
Capital and financial account	+ 200	−1,182	−1,382
Capital account	− 72	− 58	+ 14
General government	+ *48*	+ *45*	− *3*
Private sector	− *99*	− *65*	+ *34*
Acquisition/disposal of nonproduced, nonfinancial assets	− *21*	− *38*	− *17*
Financial account	+ 272	−1,125	−1,397
Direct investment	+ 601	+ 601	+ 0
Portfolio investment	+1,753	+1,016	− 737
Other investment	−2,526	−4,070	−1,544
Financial derivatives	+ 454	− 622	−1,076
Reserve assets[3])	− 11	+1,951	+1,962
Errors and omissions	+ 423	+1,524	+1,101

Source: OeNB.

[1]) Revised data.

[2]) Provisional data.

[3]) OeNB: Gold and foreign exchange, reserve position in the Fund, SDRs, etc.; increase: − / decrease: +.

Table 2

Merchandise Exports and Imports

as Recorded in the Foreign Trade Statistics

Goods by geographic area[1])

	1st quarter 2001					
	Exports		Imports		Balance	
	Annual change	Share of total exports	Annual change	Share of total imports		Annual change
	%				EUR million	
EU	+ 4.8	63.1	+ 4.1	63.6	−1,328	+ 24
Euro area[2])	+ 5.0	55.9	+ 5.0	59.0	−1,707	− 83
thereof:						
Germany	*+ 3.2*	*33.5*	*+ 5.5*	*39.5*	*−1,825*	*−221*
Italy	*+ 0.7*	*8.6*	*+ 4.4*	*7.0*	*+ 155*	*− 46*
France	*+16.1*	*5.0*	*− 6.1*	*3.8*	*+ 137*	*+170*
Non-euro area countries	+ 7.4	44.1	+17.9	41.0	− 253	−683
thereof:						
Switzerland and Liechtenstein	*−10.5*	*5.8*	*+ 8.8*	*3.3*	*+ 373*	*−170*
CEECs[3])	*+ 8.5*	*16.0*	*+16.5*	*13.4*	*+ 192*	*−150*
USA	*+18.9*	*5.1*	*+ 8.9*	*5.3*	*− 128*	*+ 59*
Japan	*+17.9*	*1.3*	*− 1.3*	*2.5*	*− 265*	*+ 40*
Total	+ 6.0	100.0	+10.0	100.0	−1,960	−766

Source: Statistics Austria.

[1]) Geographic areas as defined by WIFO.

[2]) Including Greece. On January 1, 2001, Greece joined Stage 3 of EMU as the twelfth EU Member State and has since been included in the euro area aggregate.

[3]) Central and Eastern European countries: Albania, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine, Yugoslavia.

Table 3

Travel and International Passenger Transport

	1st quarter 2000[1])	1st quarter 2001[2])	Annual change	
	EUR million		%	
Travel				
Receipts	3,539	3,611	+ 72	+ 2.0
Expenses	1,675	1,894	+219	+13.1
Balance	1,864	1,718	−146	− 7.8
International passenger transport				
Receipts	385	473	+ 88	+22.9
Expenses	181	214	+ 33	+18.2
Balance	204	259	+ 55	+27.0
	1,000		%	
Foreign tourist bednights	*29,154*	*29,712*	*+558*	*+ 1.9*

Source: Statistics Austria, OeNB.

[1]) Revised data.

[2]) Provisional data.

Table 4

Foreign Tourist Bednights by Country of Origin

	1st quarter 2001			
	Overnight stays	Annual change		Share
	1,000		%	
Germany	18,335	+229	+ 1.3	61.7
Netherlands	4,021	+ 28	+ 0.7	13.5
United Kingdom	1,116	+ 88	+ 8.6	3.8
Belgium. Luxembourg	842	− 48	− 5.4	2.8
Switzerland. Liechtenstein	867	+ 41	+ 5.0	2.9
Denmark	548	+ 62	+12.8	1.8
Italy	443	+ 4	+ 0.9	1.5
France	340	− 35	− 9.4	1.1
Sweden	309	− 11	− 3.4	1.0
Spain	57	+ 9	+17.6	0.2
Poland	472	+ 16	+ 3.6	1.6
Hungary	377	+ 35	+10.1	1.3
Czech Republic	364	+ 34	+10.2	1.2
Croatia	155	− 3	− 2.1	0.5
Commonwealth of Independent States	186	+ 40	+27.2	0.6
Slovenia	109	− 11	− 8.9	0.4
Slovak Republic	70	+ 10	+16.4	0.2
U.S.A.	283	+ 33	+13.3	1.0
Japan	86	+ 7	+ 8.4	0.3
Other countries	734	+ 32	+ 4.5	2.5
Total	29,712	+558	+ 1.9	100.0
Memorandum item: Austrian tourists	*8,262*	*+158*	*+ 2.0*	*x*

Source: Statistics Austria.

Table 5

Investment Income

	1st quarter 2000[1])	1st quarter 2001[2])	Annual change
	EUR million		
Net investment income[3])	– 977	– 987	– 10
Investment income receipts	2,577	3,311	+734
Investment income payments	3,554	4,299	+745
Net direct investment income[3])	– 296	– 305	– 9
Income on direct investment abroad	342	405	+ 63
Income on direct investment in Austria	637	710	+ 73
Net portfolio investment income[3])	– 658	– 816	–158
Income on foreign equity securities	42	36	– 6
Income on domestic equity securities	22	32	+ 10
Income on foreign bonds and notes	908	1,113	+205
Income on domestic bonds and notes	1,544	1,859	+315
Income on foreign money market instruments	13	10	– 3
Income on domestic money market instruments	55	84	+ 29
Net other investment income[3])	– 24	134	+158
Income on other investment, assets[4])	1,273	1,748	+475
Income on other investment, liabilities	1,296	1,614	+318
Investment income on foreign interest-bearing investment[5])	2,202	2,880	+678
Investment income on domestic interest-bearing investment[6])	2,897	3,557	+660
Investment income on foreign venture capital-oriented investment[7])	375	432	+ 57
Investment income on domestic venture capital-oriented investment[7])	657	742	+ 85
Memorandum item:			
Financial derivatives based on interest rate contracts, net[8])	*+ 617*	*– 356*	*–973*

Source: OeNB.

[1]) Revised data.

[2]) Provisional data.

[3]) Income on outward investment less income on inward investment.

[4]) Income on deposits, loans and reserve assets.

[5]) Income on debt securities, deposits, loans and reserve assets.

[6]) Income on debt securities, deposits and loans.

[7]) Income on direct investment and equity securities.

[8]) Included in the financial account, financial derivatives.

Table 6

Financial Account

	1999[1])	2000[2])	1st quarter 2000[2])	1st quarter 2001[3])
	EUR million, net			
Financial Account	+ 6,614	+ 5,584	+ 272	− 1,125
Assets	−39,421	−47,343	−15,932	−13,696
Liabilities	+46,034	+52,926	+16,204	+12,571
Direct investment	− 306	+ 6,537	+ 601	+ 601
Direct investment abroad	− 3,098	− 3,642	− 713	− 356
Equity capital	− 2,591	− 3,213	− 388	− 412
Reinvested earnings	− 666	− 140	− 198	+ 74
Other capital	+ 159	− 288	− 127	− 17
Direct investment in Austria	+ 2,792	+10,179	+ 1,314	+ 957
Equity capital	+ 1,309	+ 9,463	+ 797	+ 490
Reinvested earnings	+ 1,431	+ 667	+ 438	+ 531
Other capital	+ 51	+ 49	+ 79	− 64
Portfolio investment	− 2,553	+ 1,085	+ 1,753	+ 1,016
Portfolio investment in foreign securities	−27,207	−28,276	− 8,490	−10,245
Equity securities	− 4,935	−16,684	− 3,093	− 1,971
Bonds and notes	−22,114	−10,775	− 5,029	− 6,771
Money market instruments	− 158	− 816	− 368	− 1,503
Portfolio investment in domestic securities	+24,654	+29,360	+10,243	+11,261
Equity securities	+ 2,002	+ 2,039	+ 274	+ 497
Bonds and notes	+19,120	+25,529	+ 8,128	+ 8,455
Money market instruments	+ 3,532	+ 1,792	+ 1,841	+ 2,309
Other investment	+ 7,925	− 2,884	− 2,526	− 4,070
Assets	−10,571	−16,012	− 7,030	− 4,354
Trade credits	− 639	− 959	− 276	− 182
Loans	−11,452	− 9,963	− 3,523	− 3,346
Currency and deposits	+ 1,589	− 5,175	− 3,174	− 735
Other assets	− 69	+ 84	− 57	− 91
Liabilities	+18,496	+13,129	+ 4,505	+ 284
Trade credits	+ 1,181	+ 156	+ 55	− 189
Loans	+ 1,863	+ 3,514	+ 130	+ 280
Currency and deposits	+14,924	+ 9,329	+ 4,584	+ 259
Other liabilities	+ 527	+ 129	− 264	− 67
Financial derivatives	− 415	+ 6	+ 454	− 622
Reserve assets[4])	+ 1,963	+ 839	− 11	+ 1,951
Memorandum item:				
Interest-bearing investment	*+10,675*	*+13,353*	*+ 2,422*	*− 297*
Assets	*−31,597*	*−27,404*	*−12,273*	*−11,349*
Liabilities	*+42,272*	*+40,757*	*+14,695*	*+11,053*
Breakdown by sectors				
OeNB and banks	+ 7,204	+18,275	+ 1,212	− 3,917
Assets	−17,014	−16,779	− 6,423	− 8,444
Liabilities	+24,219	+35,054	+ 7,635	+ 4,527
General government	+15,087	+ 8,941	+ 6,775	+ 6,868
Assets	+ 440	− 2,487	− 437	+ 440
Liabilities	+14,646	+11,427	+ 7,212	+ 6,428
Other sectors	−15,676	−21,632	− 7,715	− 4,076
Assets	−22,846	−28,077	− 9,071	− 5,692
Liabilities	+ 7,170	+ 6,445	+ 1,356	+ 1,616

Source: OeNB.

[1]) Final data.

[2]) Revised data.

[3]) Provisional data.

[4]) OeNB: Gold and foreign exchange, reserve position in the Fund, SDRs, etc.; increase: − / decrease: +.

Table 7

Financial Account by Region[1])

	Investment in/ from the euro area[2])			Investment in/ from non-euro area countries		
	2000[3])	1st quarter 2000[3])	1st quarter 2001[4])	2000[3])	1st quarter 2000[3])	1st quarter 2001[4])
	EUR million, net					
Financial account	14,133	– 3,441	– 48	– 8,549	+3,713	–1,077
Assets	–31,493	–11,305	–6,775	–15,850	–4,627	–6,921
Liabilities	45,626	7,864	6,727	+ 7,300	+8,340	+5,844
Direct investment	8,471	839	1,408	– 1,934	– 238	– 807
Direct investment abroad	– 214	– 190	836	– 3,428	– 523	–1,192
Direct investment in Austria	8,685	1,029	571	+ 1,494	+ 285	+ 386
Portfolio investment	7,920	2,488	3,422	– 6,835	– 735	–2,406
Portfolio investment in foreign securities	–20,142	– 4,933	–5,620	– 8,134	–3,557	–4,625
Portfolio investment in domestic securities	28,062	7,421	9,041	+ 1,298	+2,822	+2,220
Other investment	– 3,342	– 6,643	–4,735	+ 458	+4,117	+ 665
Assets	–10,176	– 6,242	–2,160	– 5,836	– 788	–2,194
Liabilities	6,835	– 401	–2,575	+ 6,294	+4,906	+2,859
Financial derivatives	1,083	– 124	– 417	– 1,077	+ 578	– 205
Reserve assets[5])	×	×	×	+ 839	– 11	+1,951

Source: OeNB.

[1]) While for foreign direct investment in Austria and other inward investment it is possible to establish the identity of the foreign investors, in the case of portfolio investment one can only determine the country via which the transaction has been effected. This means that it is not possible to provide a current and/or completely reliable classification of creditors. Ongoing studies, however, show that the largest volume of Austrian securities sold to the euro area are government bonds bought by foreign banks in the course of tender or syndication offers. Since, in this case, the secondary market generated only a relatively small volume of cross-border transactions, the regional structure of the basic data derived from the reporting system on foreign exchange statistics can be regarded as sufficiently conclusive.

[2]) Including Greece. On January 1, 2001, Greece joined Stage 3 of EMU as the twelfth EU Member State and has since been included in the euro area aggregate.

[3]) Revised data.

[4]) Provisional data.

[5]) OeNB: Gold and foreign exchange, reserve position in the Fund, SDRs, etc.; increase: - / decrease: +.

Austria's International Investment Position in 2000[1])

1 Framework

Patricia Fahrngruber

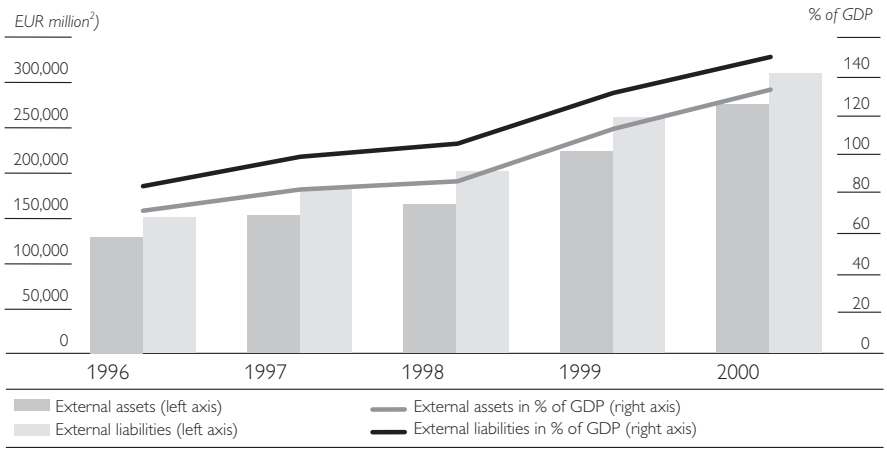
The start of Stage Three of Economic and Monetary Union (EMU) in 1999 substantially accelerated the formation of links between Austrian and world financial markets, a trend that continued in 2000. This development is also reflected in Austria's International Investment Position (IIP), which records the financial assets held abroad by Austrians and in Austria by nonresidents.

Both external assets (Austria's claims on the rest of the world) and external liabilities (nonresidents' holdings in Austria) were markedly higher at the end of 2000 than one year earlier. Austrians' external assets augmented by EUR 51.3 billion oder 23% to EUR 276.3 billion at the reference date of December 31, 2000 (see table 1a). The continued expansion of foreign security holdings accounted for much of the rise in external assets. This development is also reflected by structural gains in portfolio investment at the expense of all other financing instruments (see table 1b).

External assets of EUR 276.3 billion compared with external liabilities of EUR 311.3 billion at the end of 2000. Liabilities were up by EUR 49.5 billion or 19% on the end-1999 result. Like on the assets side of the IIP, the bulk of the rise on the liabilities side was attributable to investment in securities, which triggered a structural shift in favor of portfolio investment, also like on the assets side.

Chart 1

Austria's External Assets and Liabilities[1])



Source: OeNB.
[1]) Final data until 1999, revised data from 2000.
[2]) Irrevocable euro conversion rate EUR 1=ATS 13.7603.

Austria's internationalization ratio – this ratio expresses external assets and liabilities as a percentage of GDP and is thus an indicator of how strong Austria's international economic ties are – rose at the end of 2000 on both

1 *Cut-off date: September 17, 2001. Since the beginning of 1999, the Austrian IIP data published in the OeNB's "Focus on Austria" have been given in euro (irrevocable euro conversion rate: EUR 1 = ATS 13.7603). For Austrian balance of payments statistics in both euro and schilling, please refer to the OeNB website at http://www.oenb.at; Focus on Statistics, chapter 7.*

the assets and the liabilities side of the IIP. At the reporting date of December 31, 2000, these ratios came to 134% of GDP for external assets and 151% for external liabilities, a high ratio in an international comparison (see table 2).

The net IIP – the difference between the total value of Austria's financial assets and liabilities – was negative on the reporting date; external liabilities outweighed assets by EUR 35.0 billion, down from –EUR 36.8 billion at end-1999. The net negative position improved chiefly because portfolio investment and other investment posted smaller net deficits. Transactions were largely responsible for the net changes in the individual categories of financial instruments, whereas changes which did not arise from transactions, such as price and exchange rate changes, played a subordinate role (see table 3).

The regional breakdown of Austria's international investment shows that the euro area gained even greater importance for Austrian cross-border financial investment in 2000 than before. The euro area accounted for a high of 45% of Austria's external assets at end-December 2000. Especially in the category of portfolio investment (equity plus debt securities), the euro area countries accounted for 59% or EUR 124.7 billion of Austrians' external portfolio investment (see table 4).

With both external assets and external liabilities having expanded sharply, it is interesting to take a closer look at the development of securities with different maturities, i. e. short[1]) or long-term maturities[2]). This analysis is based on external debt (essentially nonequity assets or nonequity liabilities).[3]) According to this definition, which excludes equity components, Austria's net external debt position deteriorated from –EUR 48.8 billion to –EUR 58.3 billion. Overall, however, the net negative IIP improved from –EUR 36.8 billion to –EUR 35.0 billion, as mentioned above.

An analysis of the structure of this indicator by maturities provides the following insights: In terms of original maturities, the share of short-term external assets came to 38% at the end of 2000. The share of short-term external liabilities was roughly the same at 41%. Of all debt securities (market value: EUR 150.3 billion) held by nonresidents, EUR 141.4 billion were long-term securities (see table 5).

When analyzing cross-border financial stocks and flows in 2000, the effect of the Bank Austria AG and Bayerische Hypo- und Vereinsbank AG merger must be taken into account. This large-volume transaction has an impact on the assets and liabilities sides of the direct investment and portfolio investment subaggregates (volume: EUR 6.3 billion). However, even if this transaction is factored out, the basic development trend toward a

1 *Maturities of up to and including one year.*

2 *Maturities of over one year.*

3 *Next to the international investment position as a whole, which captures all cross-border financial transactions, this indicator covers all assets excluding the equity components of the investment position. According to an international convention currently being discussed (the IMF's External Debt Statistics) external debt comprises gross assets excluding direct investment, equity components, monetary gold and SDRs, or gross liabilities excluding equity components.*

greater internationalization of Austria's financial investment remains evident.

2 Components of Austria's IIP

At the end of 2000, the stock of Austria's *outward foreign direct investment (FDI)*[1]) had a value of EUR 23.8 billion, up by EUR 3.5 billion (+17%) from December 31, 1999. In the same period, inward direct investment mounted even more, i. e. by EUR 7.2 billion (+30%). Foreign firms targeted Austria as a destination for FDI more intensely, so that inward FDI climbed to EUR 31.1 billion on December 31, 2000. Notably the merger of Bank Austria AG and Bayerische Hypo- und Vereinsbank AG was implicated in this increase.

Changes in the key aggregate *portfolio investment* had a big impact on Austria's IIP. At EUR 125.1 billion at the end of 2000, the market value of securities owned by Austrians was 35% higher than one year earlier. Austrian investors lifted holdings not only of debt securities, but especially of equity securities, raising them from EUR 28.8 billion in 1999 to EUR 46.1 billion at end-2000. Total external liabilities also owed much of their change to the expansion of portfolio investment liabilities: Foreign investors hiked their holdings of Austrian securities by 20% from the end of 1999. Austrian securities carried in nonresidents' portfolios had a market value of EUR 166.8 billion, with debt securities accounting for the lion's share (EUR 150.3 billion) like in preceding years.

Austrians' external assets consisting of *loans, deposits and other claims* were up by 17% on the end of 1999 and ran to EUR 108.5 billion on December 31, 2000. The external liabilities' subitem loans, deposits and other claims closed with a value of EUR 113.4 billion (+14%) in the same period.

Reserve assets remained nearly unchanged from December 31, 1999, coming to EUR 18.9 billion at end-2000. Reserve assets consisted overwhelmingly of securities issued abroad (EUR 10.5 billion).

3 The Austrian IIP – Sectoral Breakdown

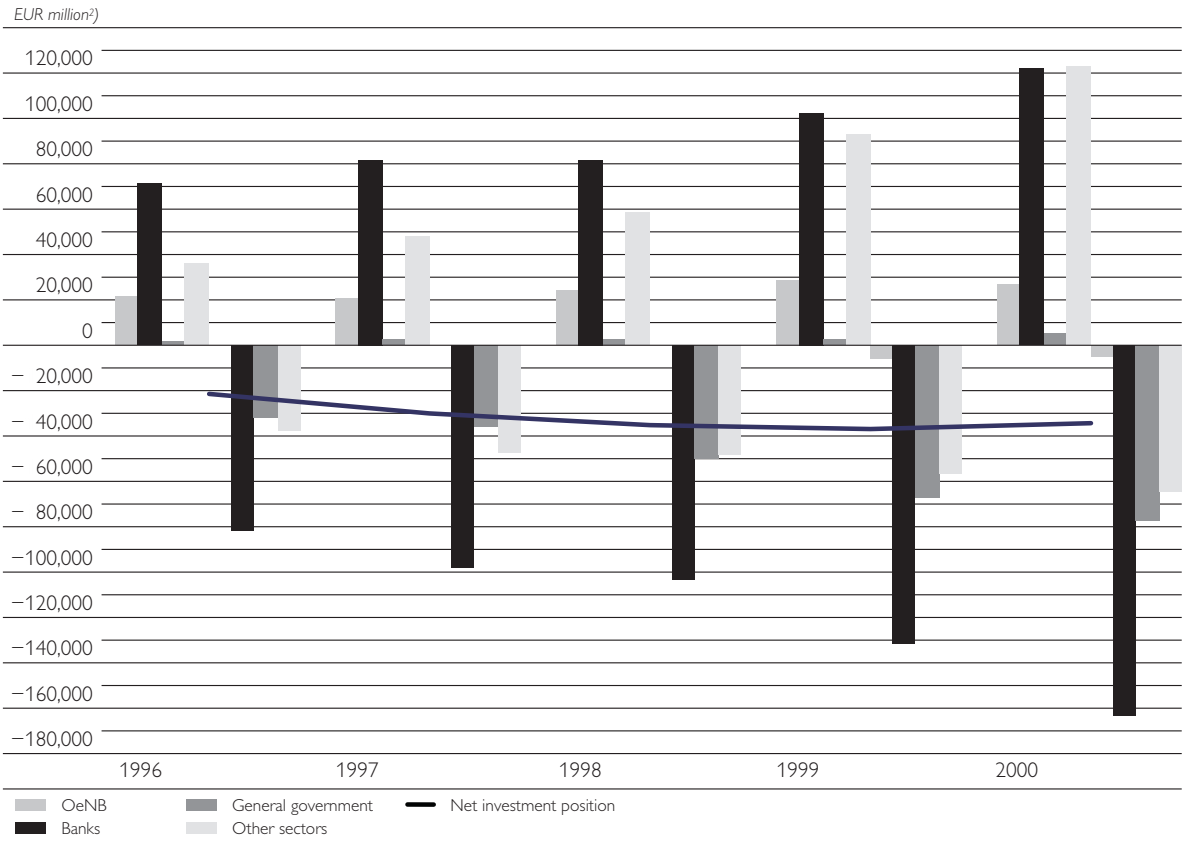
In a sectoral breakdown of the IIP at end-2000, the category other sectors[2]) and the OeNB closed the year as net creditors whereas the banks and the general government were net debtors. The category other sectors substantially expanded its creditor position from EUR 35.2 billion at end-1999 to EUR 57.9 billion in 2000; the OeNB's position remained roughly the same at EUR 21.3 billion. The banks and the general government both widened their net external debt further in 2000. At the end of the year, banks carried EUR 42 billion of net external debt; the

1 *In line with international usage, the direct investment figures published as part of the IIP also contain transnational real estate holdings. By contrast, the detailed data on direct investment stocks (FDI survey) published in Focus on Austria 2/2001 do not include real estate investment (for quantitative data, see table 8 in the annex).*

2 *Other sectors comprises other financial institutions, nonfinancial corporations and households.*

Chart 2

Austria's External Assets and Liabilities – Sectoral Breakdown[1])



Source: OeNB.

[1]) Final data until 1999, revised Data from 2000.

[2]) Irrevocable euro conversion rate: EUR 1= ATS 13.7603.

general government closed with EUR 72.3 billion of net external debt (see table 6).

At the balance sheet date, *banks'* external assets came to EUR 122.1 billion. Thus at the end of 2000 banks accounted for some 45% of Austria's total external assets, like in the previous year. Almost three quarters of these external assets consisted of deposits abroad and lending to nonresidents. Moreover, banks held direct investment stakes and foreign securities with a market value of ATS 31.9 billion, predominantly debt securities (see table 7). Banks' external liabilities amounted to EUR 164.0 billion, much of which was made up largely of short-term deposits and lending abroad and securities issues abroad. Banks' cross-border portfolio investment outstanding amounted to a market value of EUR 67.9 billion, with bonds and notes accounting for ATS 57.5 billion of this amount at the end of 2000.

The *general government* more than doubled its external assets from EUR 2.3 billion to EUR 5.1 billion at the end of 2000. Securities (market value: approximately EUR 2 billion) accounted for almost half of the general government's total external assets. This category's external liabilities reached a hefty EUR 77.4 billion in the same period.

On the assets side, the category *other sectors* for the first time took the lead among domestic investors, surpassing the banks. Other sectors widened their share of Austria's external assets from 41% to 45% at end-2000, which corresponds to a volume of EUR 122.7 billion. Portfolio investment accounted for most of the external assets (70%); the value of the portfolio of foreign securities ran to EUR 86.3 billion on December 31, 2000. Within the category other sectors, other financial institutions – in effect institutional investors[1]) – were the largest group, accounting for somewhat over 50% of the external assets, followed by nonfinancial corporations (just under 38%) and households (just under 12%). The market participants subsumed under other sectors had external liabilities of EUR 64.8 billion, the bulk of which (81%) was attributable to nonfinancial corporations, followed by other financial institutions and households. This sector's net creditor position was expanded to EUR 57.9 billion at end-2000.

1 *Comprises fund managers, insurance companies and pension funds.*

Annex

Table 1a

Austria's International Investment Position

End-of-period stocks	Assets		Liabilities		Net	
	1999[1])	2000[2])	1999[1])	2000[2])	1999[1])	2000[2])
	EUR million[3])					
Direct investment						
Equity capital and reinvested earnings	+ 18,663	+ 21,950	+ 22,998	+ 30,145	− 4,336	− 8,196
Other capital	+ 1,702	+ 1,883	+ 883	+ 944	+ 819	+ 940
Total	+ 20,364	+ 23,833	+ 23,881	+ 31,089	− 3,517	− 7,256
Portfolio investment						
Equity securities	+ 28,803	+ 46,119	+ 14,677	+ 16,491	+14,126	+29,628
Monetary authorities	+ 1,448	+ 1,448	+ 0	+ 0	+ 1,448	+ 1,448
General government	+ 55	+ 61	+ 0	+ 0	+ 55	+ 61
Banks	+ 2,530	+ 2,518	+ 3,043	+ 3,697	− 514	− 1,179
Other sectors	+ 24,771	+ 42,092	+ 11,634	+ 12,794	+13,137	+29,298
Debt securities	+ 64,068	+ 78,997	+123,740	+150,287	−59,671	−71,290
Bonds and notes	+ 62,287	+ 75,859	+116,444	+141,360	−54,157	−65,500
Monetary authorities	+ 2,904	+ 2,992	+ 0	+ 0	+ 2,904	+ 2,992
General government	+ 146	+ 143	+ 61,296	+ 71,655	−61,149	−71,511
Banks	+ 22,775	+ 28,940	+ 43,738	+ 57,473	−20,963	−28,533
Other sectors	+ 36,461	+ 43,784	+ 11,410	+ 12,232	+25,051	+31,553
Money market instruments	+ 1,782	+ 3,138	+ 7,296	+ 8,928	− 5,514	− 5,790
Monetary authorities	+ 659	+ 601	+ 0	+ 0	+ 659	+ 601
General government	+ 1	+ 1,717	+ 2,156	+ 1,936	− 2,156	− 219
Banks	+ 773	+ 421	+ 4,536	+ 6,740	− 3,763	− 6,319
Other sectors	+ 349	+ 399	+ 603	+ 251	− 254	+ 147
Total	+ 92,872	+125,117	+138,417	+166,778	−45,545	−41,661
Other investment						
Trade credits	+ 3,658	+ 4,617	+ 3,511	+ 3,667	+ 147	+ 950
Loans	+ 47,123	+ 58,092	+ 12,009	+ 15,911	+35,114	+42,181
Monetary authorities	+ 990	+ 100	+ 952	+ 104	+ 38	− 4
General government	+ 13	+ 0	+ 2,832	+ 2,702	− 2,819	− 2,702
Banks	+ 39,707	+ 49,626	+ 3,678	+ 6,187	+36,029	+43,439
thereof long-term	*+ 29,873*	*+ 35,336*	*+ 2,485*	*+ 3,417*	*+27,388*	*+31,919*
Other sectors	+ 6,413	+ 8,366	+ 4,547	+ 6,918	+ 1,866	+ 1,448
Currency and deposits	+ 35,811	+ 39,544	+ 80,308	+ 89,940	−44,497	−50,396
Monetary authorities	+ 3,227	+ 2,342	+ 5,161	+ 5,031	− 1,934	− 2,689
General government	+ 481	+ 1,496	+ 0	+ 0	+ 481	+ 1,496
Banks	+ 31,376	+ 34,880	+ 75,147	+ 84,909	−43,771	−50,029
thereof short-term	*+ 26,367*	*+ 29,359*	*+ 71,042*	*+ 80,464*	*−44,675*	*−51,105*
Other sectors	+ 727	+ 826	+ 0	+ 0	+ 727	+ 826
Other claims, other liabilities	+ 6,217	+ 6,252	+ 3,663	+ 3,921	+ 2,554	+ 2,331
Monetary authorities	+ 118	+ 118	+ 0	+ 0	+ 118	+ 118
General government	+ 1,574	+ 1,685	+ 716	+ 1,069	+ 858	+ 616
Banks	+ 3,023	+ 2,877	+ 438	+ 706	+ 2,585	+ 2,171
Other sectors	+ 1,502	+ 1,572	+ 2,509	+ 2,146	− 1,007	− 574
Total	+ 92,809	+108,505	+ 99,491	+113,439	− 6,682	− 4,934
Financial derivatives	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0
Reserve assets						
Monetary gold[4])	+ 3,793	+ 3,555	×	×	+ 3,793	+ 3,555
Special drawing rights	+ 145	+ 144	×	×	+ 145	+ 144
Reserve position in the Fund	+ 1,057	+ 675	×	×	+ 1,057	+ 675
Foreign exchange	+ 13,952	+ 14,500	×	×	+13,952	+14,500
Currency and deposits	+ 4,651	+ 3,952	×	×	+ 4,651	+ 3,952
with monetary authorities	+ 3,376	+ 2,723	×	×	+ 3,376	+ 2,723
with foreign banks	+ 1,275	+ 1,229	×	×	+ 1,275	+ 1,229
Securities	+ 9,301	+ 10,548	×	×	+ 9,301	+10,548
Equity securities	+ 0	+ 0	×	×	+ 0	+ 0
Bonds and notes	+ 7,603	+ 8,612	×	×	+ 7,603	+ 8,612
Money market instruments	+ 1,698	+ 1,936	×	×	+ 1,698	+ 1,936
Financial derivatives	+ 0	+ 0	×	×	+ 0	+ 0
Other sectors	+ 0	+ 0	×	×	+ 0	+ 0
Total	+ 18,947	+ 18,874	×	×	+18,947	+18,874
External assets or liabilities	+224,992	+276,329	+261,789	+311,306	−36,797	−34,977
Nonequity assets or liabilities	+175,363	+206,401	+224,113	+264,670	−48,751	−58,269

Source: OeNB.
[1]) Final data.
[2]) Revised data.
[3]) Irrevocable euro conversion rate: EUR 1 = ATS 13.7603.
[4]) Valued at market prices.

Table 1b

Austria's International Investment Position – Structural Data

End-of-period stocks	Assets		Liabilities	
	1999[1])	2000[2])	1999[1])	2000[2])
	% of external assets or liabilities			
Direct investment				
Equity capital and reinvested earnings	8.3	7.9	8.8	9.7
Other capital	0.8	0.7	0.3	0.3
Total	9.1	8.6	9.1	10.0
Portfolio investment				
Equity securities	12.8	16.7	5.6	5.3
Monetary authorities	0.6	0.5	0.0	0.0
General government	0.0	0.0	0.0	0.0
Banks	1.1	0.9	1.2	1.2
Other sectors	11.0	15.2	4.4	4.1
Debt securities	28.5	28.6	47.3	48.3
Bonds and notes	27.7	27.5	44.5	45.4
Monetary authorities	1.3	1.1	0.0	0.0
General government	0.1	0.1	23.4	23.0
Banks	10.1	10.5	16.7	18.5
Other sectors	16.2	15.8	4.4	3.9
Money market instruments	0.8	1.1	2.8	2.9
Monetary authorities	0.3	0.2	0.0	0.0
General government	0.0	0.6	0.8	0.6
Banks	0.3	0.2	1.7	2.2
Other sectors	0.2	0.1	0.2	0.1
Total	41.3	45.3	52.9	53.6
Other investment				
Trade credits	1.6	1.7	1.3	1.2
Loans	20.9	21.0	4.6	5.1
Monetary authorities	0.4	0.0	0.4	0.0
General government	0.0	0.0	1.1	0.9
Banks	17.6	18.0	1.4	2.0
thereof long-term	*13.3*	*12.8*	*0.9*	*1.1*
Other sectors	2.9	3.0	1.7	2.2
Currency and deposits	15.9	14.3	30.7	28.9
Monetary authorities	1.4	0.8	2.0	1.6
General government	0.2	0.5	0.0	0.0
Banks	13.9	12.6	28.7	27.3
thereof short-term	*11.7*	*10.6*	*27.1*	*25.8*
Other sectors	0.3	0.3	0.0	0.0
Other claims, other liabilities	2.8	2.3	1.4	1.3
Monetary authorities	0.1	0.0	0.0	0.0
General government	0.7	0.6	0.3	0.3
Banks	1.3	1.0	0.2	0.2
Other sectors	0.7	0.6	1.0	0.7
Total	41.2	39.3	38.0	36.4
Financial derivatives	0.0	0.0	0.0	0.0
Reserve assets				
Monetary gold	1.7	1.3	×	×
Special drawing rights	0.1	0.1	×	×
Reserve position in the Fund	0.5	0.2	×	×
Foreign exchange	6.2	5.2	×	×
Currency and deposits	2.1	1.4	×	×
with monetary authorities	1.5	1.0	×	×
with foreign banks	0.6	0.4	×	×
Securities	4.1	3.8	×	×
Equity securities	0.0	0.0	×	×
Bonds and notes	3.4	3.1	×	×
Money market instruments	0.8	0.7	×	×
Financial derivatives	0.0	0.0	×	×
Other sectors	0.0	0.0	×	×
Total	8.4	6.8	×	×
External assets or liabilities	100.0	100.0	100.0	100.0
Nonequity assets or liabilities	77.9	74.7	85.6	85.0

Source: OeNB.
[1]) Final data.
[2]) Revised data.

Table 2

Austria's International Investment Position – Key Positions

	End-of-period stocks				
	EUR million[1])	*% of GDP*	*% of exports of goods and services*	*% of external liabilities*	*% of nonequity liabilities*
External assets					
1996[2])	129,801	72.9	184.1	85.5	×
1997[2])	152,598	83.5	195.5	83.6	×
1998[2])	166,414	87.6	201.3	82.4	×
1999[2])	224,992	114.2	253.2	85.9	×
2000[3])	276,329	134.2	274.3	88.8	×
External liabilities					
1996[2])	151,886	85.3	215.5	×	×
1997[2])	182,620	100.0	233.9	×	×
1998[2])	201,936	106.3	244.2	×	×
1999[2])	261,789	132.8	294.6	×	×
2000[3])	311,306	151.2	309.0	×	×
Nonequity assets					
1996[2])	114,445	64.3	162.4	×	88.0
1997[2])	127,308	69.7	163.1	×	84.3
1998[2])	135,280	71.2	163.6	×	79.6
1999[2])	175,363	89.0	197.3	×	78.2
2000[3])	206,401	100.2	204.9	×	78.0
Nonequity liabilities					
1996[2])	130,019	73.0	184.5	85.6	×
1997[2])	150,963	82.6	193.4	82.7	×
1998[2])	170,054	89.5	205.7	84.2	×
1999[2])	224,113	113.7	252.2	85.6	×
2000[3])	264,670	128.5	262.7	85.0	×
Net investment position					
1996[2])	– 22,085	12.4	31.3	14.5	×
1997[2])	– 30,021	16.4	38.5	16.4	×
1998[2])	– 35,522	18.7	43.0	17.6	×
1999[2])	– 36,797	18.7	41.4	14.1	×
2000[3])	– 34,977	17.0	34.7	11.2	×
Net external debt					
1996[2])	– 15,574	8.7	22.1	×	12.0
1997[2])	– 23,655	13.0	30.3	×	15.7
1998[2])	– 34,774	18.3	42.1	×	20.4
1999[2])	– 48,751	24.7	54.9	×	21.8
2000[3])	– 58,269	28.3	57.8	×	22.0

Source: OeNB.

[1]) *Irrevocable euro conversion rate: EUR 1 = ATS 13.7603.*

[2]) *Final data.*

[3]) *Revised data.*

Table 3

Austria's International Investment Position – Change in the Position

	1999 end-of-period stocks[1])	2000 annual changes			2000 end-of-period stocks[2])
		total	transactions	price and exchange rate changes	
	EUR million[3])				
Direct investment	+ 20,364	+ 3,469	+ 3,554	− 85	+ 23,833
Portfolio investment	+ 92,872	+32,245	+28,791	+3,454	+125,117
Other investment	+ 92,809	+15,696	+16,066	− 370	+108,505
Financial derivatives	+ 0	+ 0	+ 0	+ 0	+ 0
Reserve assets	+ 18,947	− 73	− 839	+ 766	+ 18,874
External assets	+224,992	+51,337	+47,572	+3,765	+276,329
Direct investment	+ 23,881	+ 7,208	+10,173	−2,966	+ 31,089
Portfolio investment	+138,417	+28,361	+29,312	− 951	+166,778
Other investment	+ 99,491	+13,948	+13,704	+ 244	+113,439
Financial derivatives	+ 0	+ 0	+ 0	+ 0	+ 0
External liabilities	+261,789	+49,517	+53,189	−3,672	+311,306
Direct investment	− 3,517	− 3,739	− 6,619	+2,880	− 7,256
Portfolio investment	− 45,545	+ 3,884	− 521	+4,404	− 41,661
Other investment	− 6,682	+ 1,748	+ 2,362	− 614	− 4,934
Financial derivatives	+ 0	+ 0	+ 0	+ 0	+ 0
Reserve assets	+ 18,947	− 73	− 839	+ 766	+ 18,874
Net investment position	− 36,797	+ 1,820	− 5,617	+7,437	− 34,977

Source: OeNB.

[1]) Final data.

[2]) Revised data.

[3]) Irrevocable euro conversion rate: EUR 1 = ATS 13.7603.

Table 4

Austria's International Investment Position – Regional Breakdown

	2000 end-of-period stocks[1])						
	total	vis-à-vis EU-15	vis-à-vis the euro area	*thereof vis-à-vis Germany*	vis-à-vis non-euro area residents	*thereof vis-à-vis Central and Eastern Europe*	*thereof vis-à-vis the U.S.A.*
	EUR million[2])						
Direct investment	23,833	9,239	5,913	*2,823*	17,920	*7,857*	*1,760*
Portfolio investment	125,117	87,177	73,650	*40,685*	51,466	*3,410*	*17,034*
Equity securities	46,119	29,902	26,941	*14,461*	19,178	*612*	*9,447*
Debt securities	78,997	57,275	46,709	*26,224*	32,288	*2,798*	*7,587*
Other investment	108,505	56,844	45,105	*19,225*	63,400	*18,017*	*4,595*
thereof currency and deposits	*39,544*	*34,308*	*28,471*	*11,485*	*11,073*	*997*	*578*
Financial derivatives	0	0	0	*0*	0	*0*	*0*
Reserve assets	18,874	×	0	*0*	18,874	*x*	*x*
External assets	276,329	×	124,668	*62,733*	151,660	*x*	*x*
Direct investment	31,089	24,660	22,540	*14,344*	8,549	*56*	*1,576*
Portfolioinvestitionen	166,778	×	×	*x*	×	*x*	*x*
Other investment	113,439	67,172	53,025	*24,954*	60,414	*5,415*	*9,045*
thereof currency and deposits	*89,940*	*55,927*	*45,112*	*19,381*	*44,828*	*5,489*	*6,711*
Financial derivatives	0	0	0	*0*	0	*0*	*0*
External liabilities	311,306	×	×	*x*	×	*x*	*x*

Source: OeNB.

[1]) Revised data.

[2]) Irrevocable euro conversion rate: 1 EUR = ATS 13.7603.

Table 5

Austria's International Investment Position – Maturity Breakdown (Original Maturities)

	1999[1])			2000[2])		
	total	short-term	long-term	total	short-term	long-term
	End-of-period stocks in EUR million[3])					
Direct investment	1,702	0	1,702	1,883	0	1,883
Portfolio investment	64,068	1,782	62,287	78,997	3,138	75,859
Other investment	91,702	59,339	32,363	107,321	69,278	38,043
Financial derivatives	0	0	0	0	0	0
Reserve assets	17,890	6,349	11,541	18,199	5,888	12,311
Nonequity assets	175,363	67,470	107,892	206,401	78,304	128,097
Direct investment	883	0	883	944	0	944
Portfolio investment	123,740	7,296	116,444	150,287	8,928	141,360
Other investment	99,491	87,618	11,873	113,439	100,134	13,305
Financial derivatives	0	0	0	0	0	0
Nonequity liabilities	224,113	94,914	129,200	264,670	109,062	155,608
Net external debt	– 48,751	–27,444	– 21,307	– 58,269	– 30,758	– 27,511
	Maturity bands in % of total					
Direct investment	100.0	0.0	100.0	100.0	0.0	100.0
Portfolio investment	100.0	2.8	97.2	100.0	4.0	96.0
Other investment	100.0	64.7	35.3	100.0	64.6	35.4
Financial derivatives	×	×	×	×	×	×
Reserve assets	100.0	35.5	64.5	100.0	32.4	67.6
Nonequity assets	100.0	38.5	61.5	100.0	37.9	62.1
Direct investment	100.0	0.0	100.0	100.0	0.0	100.0
Portfolio investment	100.0	5.9	94.1	100.0	5.9	94.1
Other investment	100.0	88.1	11.9	100.0	88.3	11.7
Financial derivatives	×	×	×	×	×	×
Nonequity liabilities	100.0	42.4	57.6	100.0	41.2	58.8
Net external debt	100.0	56.3	43.7	100.0	52.8	47.2

Source: OeNB.

[1]) Final data

[2]) Revised data.

[3]) Irrevocable euro conversion rate: 1 EUR = ATS 13.7603.

Table 6

Austria's International Investment Position – Sectoral Breakdown

	1996[1])	1997[1])	1998[1])	1999[1])	2000[2])
	End-of-period stocks in EUR million[3])				
External assets or liabilities					
OeNB	+ 21,311	+ 20,792	+ 23,647	+ 28,294	+ 26,475
General government	+ 1,309	+ 2,246	+ 2,667	+ 2,270	+ 5,102
Banks	+ 71,283	+ 81,186	+ 81,468	+102,131	+122,051
Other sectors	+ 35,898	+ 48,377	+ 58,628	+ 92,298	+122,701
Other financial institutions	×	+ 18,461	+ 25,522	+ 48,880	+ 62,139
Nonfinancial corporations	×	+ 22,227	+ 24,937	+ 32,836	+ 46,191
Households	×	+ 7,689	+ 8,170	+ 10,582	+ 14,371
External assets	+129,801	+152,601	+166,410	+224,992	+276,329
OeNB	+ 7	+ 0	+ 0	+ 6,113	+ 5,135
General government	+ 31,728	+ 36,525	+ 50,291	+ 67,000	+ 77,362
Banks	+ 81,786	+ 98,265	+103,489	+131,550	+164,033
Other sectors	+ 38,363	+ 47,832	+ 48,158	+ 57,126	+ 64,777
Other financial institutions	×	+ 9,714	+ 8,858	+ 8,949	+ 11,918
Nonfinancial corporations	×	+ 37,551	+ 39,206	+ 47,765	+ 52,573
Households	×	+ 567	+ 94	+ 411	+ 285
External liabilities	+151,884	+182,622	+201,937	+261,790	+311,306
OeNB	+ 21,305	+ 20,792	+ 23,647	+ 22,181	+ 21,340
General government	− 30,420	− 34,280	− 47,624	− 64,731	− 72,259
Banks	− 10,503	− 17,078	− 22,021	− 29,420	− 41,982
Other sectors	− 2,465	+ 545	+ 10,471	+ 35,172	+ 57,924
Other financial institutions	×	+ 8,747	+ 16,664	+ 39,930	+ 50,221
Nonfinancial corporations	×	− 15,324	− 14,269	− 14,929	− 6,383
Households	×	+ 7,122	+ 8,076	+ 10,171	+ 14,085
Net investment position	− 22,083	− 30,021	− 35,527	− 36,798	− 34,977
Nonequity assets or liabilities					
OeNB	+ 20,667	+ 19,272	+ 21,591	+ 25,789	+ 24,352
General government	+ 381	+ 1,068	+ 1,586	+ 1,108	+ 3,857
Banks	+ 69,884	+ 78,713	+ 79,060	+ 97,712	+116,911
Other sectors	+ 23,515	+ 28,531	+ 33,041	+ 50,753	+ 61,281
Other financial institutions	×	+ 12,939	+ 17,699	+ 32,665	+ 40,461
Nonfinancial corporations	×	+ 11,567	+ 11,574	+ 14,408	+ 17,462
Households	×	+ 4,026	+ 3,768	+ 3,680	+ 3,359
Nonequity assets	+114,448	+127,585	+135,278	+175,362	+206,401
OeNB	+ 7	+ 0	+ 0	+ 6,113	+ 5,135
General government	+ 31,728	+ 37,812	+ 50,373	+ 67,000	+ 77,362
Banks	+ 80,224	+ 94,891	+ 99,013	+127,405	+155,884
Other sectors	+ 18,059	+ 18,909	+ 20,665	+ 23,595	+ 26,290
Other financial institutions	×	+ 586	+ 544	+ 357	+ 1,966
Nonfinancial corporations	×	+ 17,757	+ 20,055	+ 22,882	+ 24,143
Households	×	+ 567	+ 66	+ 355	+ 181
Nonequity liabilities	+130,017	+151,612	+170,051	+224,113	+264,670
OeNB	+ 20,661	+ 19,272	+ 21,591	+ 19,676	+ 19,217
General government	− 31,348	− 36,743	− 48,787	− 65,892	− 73,504
Banks	− 10,339	− 16,177	− 19,954	− 29,693	− 38,972
Other sectors	+ 5,457	+ 9,622	+ 12,376	+ 27,158	+ 34,991
Other financial institutions	×	+ 12,353	+ 17,155	+ 32,308	+ 38,495
Nonfinancial corporations	×	− 6,190	− 8,481	− 8,474	− 6,681
Households	×	+ 3,459	+ 3,702	+ 3,325	+ 3,178
Next external debt	− 15,570	− 24,027	− 34,774	− 48,751	− 58,269

Source: OeNB.

[1]) Final data.

[2]) Revised data.

[3]) Irrevocable euro conversion rate: 1 EUR = ATS 13.7603.

Table 7

Portfolio Investment in 2000[1]) – Sectoral Breakdown

	Total	Equity securities			Debt securities		
		total	shares	mutual funds shares	total	bonds and notes	money market instruments
	End-of-period stocks in EUR million[2])						
OeNB	5,041	1,448	154	1,294	3,593	2,992	601
General government	1,921	61	21	40	1,860	143	1,717
Banks	31,880	2,518	1,740	778	29,361	28,940	421
Other sectors	86,275	42,092	34,068	8,024	44,183	43,784	399
Other financial institutions	59,703	20,918	17,449	3,470	38,784	38,422	362
Nonfinancial corporations	12,650	10,689	9,235	1,455	1,961	1,937	24
Households	13,922	10,484	7,385	3,099	3,438	3,425	13
Portfolio investment, assets	125,117	46,119	35,984	10,136	78,997	75,859	3,138
OeNB	×	×	×	×	×	×	×
General government	73,591	×	×	×	73,591	71,655	1,936
Banks	67,911	3,697	3,697	0	64,214	57,473	6,740
Other sectors	25,277	12,794	4,899	7,895	12,483	12,232	251
Other financial institutions	10,325	8,795	900	7,895	1,530	1,530	0
Nonfinancial corporations	14,943	4,000	4,000	0	10,943	10,692	251
Households	×	×	×	×	×	×	×
Portfolio investment, liabilities	166,778	16,491	8,596	7,895	150,287	141,360	8,928

Source: OeNB.
[1]) Revised data.
[2]) Irrevocable euro conversion rate: 1 EUR = ATS 13.7603.

Table 8

Bridging Table to the Results of the 1999 Direct Investment Survey

	1999[1])
	End-of-period stocks in EUR million[2])
Assets	
Outward direct investment (IIP)	20.364
Less real estate abroad	1.325
corresponds to direct investment claims on nonresidents/total[3])	19.039
thereof equity	*17.337*
other capital	*1.702*
Liabilities	
Inward direct investment (IIP)	23.881
Less real estate in Austria	517
corresponds to direct investment liabilities to nonresidents/total[4])	23.364
thereof equity	*22.490*
other capital	*874*

Source: OeNB.
[1]) Final data.
[2]) Irrevocable euro conversion rate: EUR 1 = ATS 13.7603.
[3]) See supplement to Focus on Austria 2/2001 Austrian Outward and Inward Direct Investment, table 1.1.
[4]) See supplement to Focus on Austria 2/2001 Austrian Outward and Inward Direct Investment, table 1.2.

Austrian Outward and Inward Direct Investment – Results of the 1999 Survey and Development of Selected Indicators

René Dell'mour

This report provides a brief overview of the main results of the survey of the stock of direct investment at the turn of 1999/2000 and an update of some of the indicators first presented in Reports and Summaries 4/1995. For detailed results structured by regions and sectors, see the supplement to Focus on Austria 2/2001 (see also http://www.oenb.co.at/english/engl_p.htm).

Review of 1999 Results and Outlook for 2000

The OeNB's most recent direct investment survey shows that the total stock of Austrian direct investment abroad (outward FDI) came to EUR 19.0 billion (ATS 262 billion) and the total stock of foreign direct investment in Austria (inward FDI) ran to EUR 23.4 billion (ATS 321 billion) at the end of 1999.[1]) In line with the trend prevailing since the fall of the Iron Curtain, total stocks of outward FDI continued to augment faster (28%) than inward FDI stocks (16%) in 1999. FDI growth hit new record highs. Austrian outward FDI increased by more than EUR 4.1 billion (ATS 56 billion) and inward FDI by EUR 3.2 billion (ATS 44 billion); these amounts are higher than any recorded in the past. Overall, the gap between inward and outward FDI stocks narrowed further in 1999. Outward FDI stocks amounted to more than 81% of inward FDI stocks in Austria, while ten years earlier, this share had come to less than a third.

International statistics also confirm that Austrian outward investment has been catching up: According to UNCTAD's World Investment Report 2001 (WIR2001), worldwide direct investment stocks more than tripled between 1990 and 1999.[2]) Inward FDI in Austria (stated in U.S. dollars) more than doubled in this period, while outward FDI increased more than fourfold. Nevertheless, Austria still has a need to catch up: The ratio of FDI to gross domestic product (GDP) shows that the Austrian economy's integration into global markets has remained below average. While world stocks of FDI corresponded to some 17% of GDP in 1999, Austrian inward FDI stocks came to 11.2% of GDP and outward FDI stocks amounted to 9.2% (WIR2001, p. 325). Austria's GDP ratio of inward FDI holdings is half, that of outward direct investment stocks a little less than one third of the EU average (22.2% and 29.6% of GDP, respectively). Within the EU, the net position is negative only in Austria, Greece, Portugal, Spain, Ireland and Belgium/Luxembourg, i.e. only in these countries does inward FDI outweigh outward FDI.

1 *Following a proposal put forward by the European Central Bank (ECB) and taking into account the objective of international harmonization, equity capital of direct investment stock and thus also total capital from now on also comprise the profit (or loss) for the financial year. Formerly, it had been argued that if the profit for the financial year were distributed and could not be reinvested, it would no longer be at the enterprise's disposal. Eventually, however, representatives within the European System of Central Banks agreed that profit should be included as long as it is not distributed. The OeNB's recalculations according to the altered definition go back to 1989.*

2 *While inward FDI climbed from USD 1,888,672 to USD 5,196,046, outward FDI enlarged from USD 1,717,444 to USD 5,004,931. The discrepancy between total outward and total inward FDI (which, theoretically, should be equal), shows that the data are not accurate to USD 1 million. In a worldwide set of data, however, the discrepancies of 3% to 4% observed can in fact be considered satisfactory (WIR2001, p. 301 and p. 307).*

While Austria's *outward* FDI stocks rose, the number of Austrian direct investors remained unchanged at about 900, but they held stakes in a larger number of enterprises abroad (+89). In 1999, a total of 199,200 foreigners[1]) were employed by 2,095 Austrian direct investment enterprises abroad, which represents a 6% rise. The increase in inward FDI, with the number of affiliated enterprises rising by 17 to 2,442, went hand in hand with a decrease (by 21 to 2,992) in the number of investors. The number of Austrians working for foreign enterprises remained constant at 228,400.

Since substantial outward FDI flows and unusually high inward FDI flows (following the merger of Bank Austria AG with Bayerische Hypo- und Vereinsbank AG) were recorded in the balance of payments statistics 2000 (outward net new investment: EUR 3.6 billion; inward net new investment: EUR 10.2 billion), FDI stocks between end-1999 and 2000 can be expected to surge. At the end of 2000, total stocks of outward FDI are forecast to reach EUR 23.5 billion. Outward direct investment stocks cannot be calculated by simply adding the inflows, as the result would be distorted because of the differences between market values (transaction value in the balance of payments) and the book values in the statistics for stocks. It can be assumed that the result of the upcoming survey will not surpass EUR 30.5 billion in invested capital (see table 1).

Regional Breakdown

The sharpest rise in Austria's *outward* FDI in 1999 was recorded in Sweden, which accounted for 15% of the overall increase. Sweden thus advanced to ninth place in the ranking of the most important target countries, for the first time entering the top 15. Germany came in second, recording 10% of the increase. Thus Germany's position of the most important target country of Austrian outward FDI has not been seriously challenged, but its share in Austrian enterprises' total investment abroad was halved from 28% to 14% within ten years. Next in the ranking are the U.S.A., the United Kingdom, the Caribbean offshore financial centers and Singapore. The expansion of FDI in Central and Eastern European Countries, as measured by the growth of capital stock, was fairly modest in 1999.[2]) Outward FDI augmented by more than EUR 100 million each in Hungary, Poland, the Czech Republic, the Slovak Republic, Russia and Slovenia. On the whole, however, the structure hardly changed: At the end of 1999, some 45% of Austrian direct investment abroad went to the European Union, a little less than 30% to Central and Eastern Europe, 8% to the U.S.A., 6% to Switzerland (including Liechtenstein) and 5% to the Caribbean offshore financial centers. The rest of the world – such as the emerging markets in Asia and Latin America – accounted for only 4% of Austria's outward FDI stocks. Yet, the distribution of invested capital and employment shows that the number of participations surged in particular in Central and Eastern Europe (without Hungary), namely by 66, with the total number of participations

1 *The number of employees is weighted for the investor's voting capital share.*

2 *However, the balance of payments statistics 2000 show record amounts of new FDI in Central and Eastern Europe; therefore, a significant increase in capital stock can be expected for end-2000.*

mounting by 94. The number of employees in Austrian direct investment enterprises also advanced most in Central and Eastern Europe (without Hungary), which accounted for more than 10,000 of a total of 11,500 new employees.

Three quarters of the *increase* in foreign direct investment capital in Austria (totaling EUR 3.25 billion in 1999) came from only three countries: Switzerland was the largest new investor (EUR 900 million), followed by the United Kingdom and Germany (EUR 760 million and EUR 740 million, respectively). This development did not change the ranking of investors substantially, except that the United Kingdom overtook Japan and France, advancing to sixth place. The data show that the role of investors from the EU has been increasing over the medium term. Their capital share rose from some 60% at the beginning of the 1990s to more than 70%. Germany, the most important country of origin, accounts for some 40%.

Thanks to record investment in 1999, Switzerland was able to consolidate its second position. However, the long-term trend points downward: While in 1989, Switzerland accounted for 20% of inward FDI stock, its share had dropped to 12% by 1998 and picked up only slightly (to 14%) in the reporting year. The largest non-European investors are the U.S.A. (accounting for 7%), Japan (3%) and the Gulf countries (2%). Unlike in the case of outward FDI, the regional distribution of employment largely mirrors the distribution of invested capital.

Sectoral Breakdown

Nearly three quarters of new outward FDI were focused on services (see table 3). This result confirmed the uptrend in FDI in the service sector. The share of outward FDI in services has grown to 70%, whereas manufacturing and construction capture only 28% of Austrian investors' capital placements abroad. The residual 2% were invested in mining and quarrying and electricity, gas and water. The largest gains were recorded in business services (by EUR 1.6 billion, including holding companies) and in the financial sector (by EUR 855 million). Within manufacturing (which augmented by EUR 1 billion), the NACE subitems *DL*[1]) and *DI*[2]) posted a hefty increase by EUR 260 million each. Austrian activities in wood and wood products more than doubled (+EUR 130 million). No sector recorded significant disinvestment in 1999.

Contrary to the trend prevailing over the past few years, there was a considerable upturn in inward FDI in manufacturing. The high share of 42% was first and foremost traceable to the EUR 900 million (or more than threefold) increase in foreign investment in the electronics industry. Trade and business services posted even larger gains in inward FDI (by EUR 1.1 billion and EUR 1.2 billion, respectively). In financial intermediation, transport and communications as well as machine production capital stocks were on the decline. All in all, production slightly gained importance,

1 *Production of office machinery, computers and other information processing equipment, of electrical machinery and apparatus, and of medical, precision and optical instruments, watches and clocks.*

2 *Production of nonmetallic mineral products.*

enhancing its share from 29% to 31% between 1998 and 1999, while the service sector's share diminished from 70% to 68%.

Income and Return on Equity

Companies in Austria partly owned by foreign direct investors scored record profits. For one thing, they boosted annual profit by EUR 600 million to a total of EUR 2.55 billion, while net profit or loss carried forward shrank from +EUR 470 million to +EUR 130 million, producing a profit for the year of EUR 2.67 billion. The annual results were positive for each of the ten most important countries of origin as well as for all sectors, except transport and communications as well as hotels and restaurants.

The profitability of foreign affiliates of Austrian direct investors continued to improve considerably in 1999. The annual results were positive in all relevant target regions and in all sectors, except in transport and communications. All in all, direct investment companies closed with EUR 1.1 billion in 1999, almost double the outcome of 1998. Profit or loss carried forward, which had been in deficit by EUR 90 million, for the first time reversed to post a profit carryover of EUR 320 million. In the reporting year of 1999, 1,224 direct investment enterprises posted a profit and 948 incurred a loss. The share of direct investment enterprises abroad turning a profit has reached 56% and thus corresponds to the share of profitable foreign direct investment undertakings in Austria (57%).

The analysis of the key ratios for individual enterprises confirms that the surge in the aggregate profit for the year was indeed a general phenomenon – most Austrian direct investment firms abroad benefited from a pickup in the return on equity. In 1999, the median return on equity,[1]) which had been improving almost steadily since 1993, progressed to a new high since 1989 (4.9%, see table 5), notably surpassing the previous high of 1.5% recorded in 1997. This shift occurred because particularly unprofitable enterprises either succeeded in making a turn-around or were dissolved, an interpretation which is confirmed by the fact that the return on equity of the 10% or 25% of the worst performing enterprises improved, while the return on equity of the most successful enterprises remained unchanged.

The age of direct investments is still highly correlated with the profitability of individual enterprises: *Outward* direct investments established for over five years had a return on equity of 8.1%, significantly more than newer affiliates, which recorded a median of only 0.8%. The same is true of *inward* direct investment: Again, the return on equity of longer-standing investments (7.8%) considerably outpaced that of more recently established investments. The latter's return on equity reached a median of merely 0.0%, which means that approximately half of the enterprises posted profits, while the others posted losses. Thus, for the first time, the median return on equity of *outward* FDI outpaced that of *inward* FDI both in recently established and in older subsidiaries. Consequently, the seemingly better return on equity of foreign direct investment in Austria compared to

1 *Like in previous years, annual profits relates to equity excluding annual profits.*

Austrian direct investment abroad can be largely traced to the different age structure. 75% of inward, but only 58% of outward FDI stocks are older than four years. If recently established affiliates suffer startup losses in the first few years of their existence (and unless large sums are invested), the earnings situation can be expected to improve only as the enterprises become more mature.[1])

The median equity ratio of both foreign direct investment companies in Austria and of Austrian direct investment companies abroad rose slightly in 1999. An equity ratio of 30.2% for outward FDI corresponds to the long-term average; a ratio of 24.9% for inward FDI marks the highest value in ten years.

The measures show that improved profitability in manufacturing has been going hand in hand with higher productivity rates. After median sales per employee in Austrian subsidiaries abroad had fallen from ATS 1.5 million to under ATS 1 million after the opening up of Eastern Europe, they began to advance steadily from 1993. In 1999, sales per employee amounted to EUR 0.10 million (ATS 1.37 million), that is, the median of labor productivity in manufacturing augmented by more than 10% compared to the previous year. Sales per employee in foreign subsidiaries in Austria stagnated at the high level of EUR 0.16 million (ATS 2.3 million) in 1999.

The return on sales[2]) in manufacturing developed roughly along the same lines. A sharp increase from 1.3% to 1.9% recorded for outward FDI contrasted with a small decline, if from a significantly higher level, to 2.3% for inward FDI.

Employment Rate

In 1990 Austrian direct investors employed 260,800 persons within Austria, a number that surged to nearly 350,000 in 1995 on the back of booming outward direct investment. While this expansion can be traced above all to a swelling of the ranks of investing enterprises, the contraction by about 60,000 employees in 1996 resulted not from a decline in the number of investors, but rather from a single transport company's decision to shed its foreign affiliates. On average in 1999, resident direct investors employed a staff of 258,300, down by 1,800 persons or 0.7% from 1998. 156,700 of these wage and salary earners worked in manufacturing,[3]) 101,600 in services. Jobs in direct investment firms in Austria accounted for roughly 8.3% of total employment in Austria.

In 1999, a total of 199,200 persons were employed by 2,095 Austrian direct investment enterprises abroad, which represents a 6.1% rise. The number of employees working in Austrian direct investors' affiliates abroad thus more than quadrupled between 1990 and 1999. If indirectly owned direct investment companies abroad were included, the figure would rise by

1 *In 1994, less than 30% of outward direct investment enterprises were older than four years.*

2 *Annual profit in relation to sales.*

3 *The classification by sector is based on the Austrian Statistical Classification of Economic Activities (ÖNACE). The classification of several industries under "manufacturing" comprises sections C to F. Back calculations are available to 1994.*

another 46,700 or almost 25%. Increasing the number of employees from 124,000 to 128,900, the manufacturing sector did not open as fast as the service sector (from 63,700 to 70,200). In other words, while the service sector accounts for 70% of total capital invested, it accounts for only 35% of employees. A comparison of Austrian direct investment companies' employment figures at home and abroad shows that in industrial enterprises, for every 100 persons employed, another 82 are on the payroll of affiliates abroad. Services are close on the heels of manufacturing: For every 100 employees at the parent company, there are 69 employees at foreign affiliates.

The employment figures of Austrian direct investment enterprises abroad are less impressive if they are viewed in terms of the overall dependent labor force in Austria rather than just of the number of persons working for the direct investor.[1]) For every 100 employees in Austria, there are 6.6 persons working for Austrian direct investment enterprises abroad, up from just 1 person up to 1990. Nevertheless, in some sectors employment in affiliates abroad reached quite substantial proportions. In the sector nonmetallic mineral products, 100 domestic employees contrast with 36 persons working for foreign affiliates, and 27 persons each in the sector refined petroleum products, chemicals, rubber as well as in the sector electrical and optical equipment (see chart). With Austrian financial intermediaries intensively working the markets of Central and Eastern Europe, more than 20 employees (twice as many as in 1995) were posted abroad for very 100 employees of financial intermediaries at home.

The *regional breakdown* of employment in foreign affiliates differs considerably from the distribution of the capital invested. For some time, Central and Eastern Europe has been the region where most *employees* of Austrian direct investment companies work.[2]) At the end of 1999, 128,100 of a total of 199,200 employees abroad were working in Central and Eastern Europe (49,300 thereof in Hungary, 32,900 in the Czech Republic, 14,500 in Poland, 11,800 in the Slovak Republic and 5,000 in Croatia), while the EU accounted for 50,400 (approximately a quarter); only 10% of people employed at Austrian direct investment companies abroad can be found outside Europe.

Turning to inward FDI, the number of domestic employees hired by nonresident investors' affiliates in Austria has not changed. Like in 1998, a total of 228,400 persons (weighted for the investor's nominal capital share) were employed by enterprises owned by foreign direct investors. There were some regional shifts, i.e. the number of employees in enterprises owned by German investors increased by 1,100, whereas the number of employees in enterprises owned by Swiss investors decreased by 1,000. The trend of tertiarization has also continued, with 3,600 jobs having moved from the manufacturing to the service sector. As a result, the statistics for the first time showed that the majority of employees in foreign direct investors' subsidiaries in Austria worked in the service sector.

1 *This is not a "share"; theoretically, the values can rise beyond 100%.*

2 *Against a capital share of 30%.*

Expressed as a percentage of the total dependent labor force in Austria, this means that some 7.4% of all jobs were held by people working in nonresident investors' companies in Austria. Broken down by sectors, this applies to 12.3% of all jobs in manufacturing and 5.5% of all jobs in services. The sector influenced most heavily by inward FDI in terms of employment is electrical and optical equipment (36% of all employees), followed by chemicals (31%) and transport equipment (28%). Sectors with an exceptionally low share of employees working for foreign investors are construction as well as mining and energy (less than 2%). Among services, the share ranges from a high of 14% in trade and repairs to 11% in financial intermediation to a low of 0.1% in other services. A comparison of the scale of employment in Austrian parent companies' affiliates abroad with the total number of dependently employed persons in Austria working for foreign enterprises[1]) (see chart) shows that there are sectors with considerable *outward* direct investment activities (nonmetallic mineral products and financial intermediation) and those with substantial *inward* direct investment activities (transportation equipment, machine construction). In the textiles and chemicals industries, both inward and outward FDI stocks are *high,* while – not surprisingly – other services as well as hotels and restaurants are hardly the target of foreign direct investment, therefore employment in these sectors also remains unaffected.

It should also be noted that these calculations include only employees of the *first* tier of direct investment enterprises. If the number of employees of *indirectly* owned foreign direct investment enterprises[2]) is added to the 228,400 jobs at directly owned foreign direct investment companies, the number of employees concerned rises by 68,000 and the share of foreign-controlled jobs mounts to 9.7%. Likewise, the number of Austrian-controlled jobs abroad increases, if the indirect share in foreign indirectly owned direct investment companies is factored in. The 199,200 persons employed in directly owned direct investment enterprises and the 46,700 employees of indirectly owned direct investment enterprises (total employment in affiliates abroad) together make up 8.1% of the dependently employed in Austria.

1 *Measured as the relation of persons employed by Austrian subsidiaries abroad (outward) and of persons employed by foreign subsidiaries in Austria (inward) to total domestic employment per sector. The first measure is theoretically unlimited (upwards), the second is an actual share, i.e. it cannot exceed 100%.*

2 *Persons working in indirectly owned foreign direct investment enterprises in Austria. Their number is weighted twice: first for the foreign investor's nominal capital share in the domestic direct investment enterprise, second for this enterprise's share in the indirectly owned direct investment company.*

Table 1

Stocks and Flows of Austrian Inward and Outward Direct Investment

Capital stocks and flows	Outward Direct Investment		Inward Direct Investment	
	EUR million			
Direct investment stocks at the end of 1998				
Equity capital	13,235		19,616	
Other capital (intragroup lending)	1,678		501	
		14,912		20,117
Transactions according to the 1999 balance of payments				
New equity capital	3,607		2,327	
Disinvestment	– 1,016		– 1,018	
Excluding privately owned real estate	– 253		– 201	
Equity capital		2,338		1,109
Reinvested earnings		666		1,431
Net lending		– 159		51
Valuation differences and valuation changes[1])		1,282		656
Direct investment stocks at the end of 1999				
Equity capital	17,337		22,490	
Other capital (intragroup lending)	1,702		874	
		19,039		23,364
Transactions according to the 1999 balance of payments				
New equity capital	4,344		10,406	
Disinvestment	– 1,143		– 949	
Excluding privately owned real estate	– 250		– 368	
Equity capital		2,951		9,090
Reinvested earnings		143		667
Net lending		288		49
Valuation differences and valuation changes[1])		73		– 2,616
Direct investment forecast for the end of 2000				
Equity capital	20,504		29,631	
Other capital (intragroup lending)	1,990		923	
		22,494		30,553

Source: OeNB.

[1]) E.g. exchange rate changes, differences between the transaction value and the book value, definitional differences.

Table 2.1

Outward Direct Investment Stocks at the End of 1999

	1992	1993	1994	1995	1996	1997	1998	1999	Forecast 2000
	EUR billion								
Nominal capital	3.3	4.4	4.7	5.2	6.0	6.8	7.9	9.3	×
Other equity capital[1])	1.1	1.1	1.6	1.8	2.6	4.4	5.4	8.1	×
Equity capital	4.3	5.5	6.3	7.0	8.7	11.2	13.2	17.3	20½
Lending	1.1	1.5	1.4	1.7	1.7	1.6	1.7	1.7	2
Total capital	5.4	7.0	7.7	8.7	10.4	12.9	14.9	19.0	22½
Number of investments	*1,340*	*1,562*	*1,698*	*1,796*	*1,897*	*2,020*	*2,078*	*2,172*	×
	EUR billion								*1999 %*
Total capital broken down by target regions									
EU-15	2.8	3.5	3.4	4.0	4.7	5.3	6.8	8.5	*44.5*
thereof									
Euro area	2.3	2.8	2.7	3.4	4.1	4.2	4.9	5.5	*29.1*
Germany	1.3	1.4	1.3	1.7	2.0	2.0	2.3	2.7	*14.4*
Netherlands	0.5	0.5	0.5	0.7	0.8	0.7	0.7	0.9	*4.9*
Italy	0.1	0.2	0.2	0.2	0.2	0.4	0.4	0.5	*2.5*
France	0.1	0.1	0.1	0.2	0.3	0.3	0.5	0.5	*2.8*
United Kingdom	0.4	0.6	0.5	0.4	0.5	0.9	1.4	1.7	*8.8*
Central and Eastern Europe	1.3	1.9	2.4	2.4	3.0	4.0	4.3	5.5	*28.8*
thereof									
Hungary	0.9	1.2	1.3	1.2	1.3	1.5	1.4	1.7	*8.8*
Czech Republic	0.2	0.4	0.6	0.7	0.9	1.0	1.1	1.3	*6.8*
Slovak Republic	0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.6	*3.0*
Rest of Europe	0.8	0.9	1.0	1.1	1.1	1.4	1.3	1.5	*7.8*
thereof									
Switzerland, Liechtenstein	0.8	0.8	0.9	0.9	0.9	1.1	1.0	1.1	*5.7*
America	0.4	0.6	0.7	1.0	1.3	2.0	2.3	2.8	*14.9*
thereof									
U.S.A.	0.2	0.3	0.4	0.4	0.5	1.2	1.2	1.5	*7.6*
Caribbean states[2])	0.0	0.1	0.0	0.2	0.4	0.4	0.6	0.9	*4.6*
Asia, Africa, Pacific countries	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.8	*4.1*
Total	5.4	7.0	7.7	8.7	10.4	12.9	14.9	19.0	*100.0*
Market value	4.1	5.1	5.3	6.7	7.9	10.5	13.3	17.3	×
by relation to total equity	*94*	*92*	*84*	*95*	*91*	*93*	*100*	*100*	×

Source: OeNB.

[1]) Including profit/loss for the reporting year.

[2]) Netherlands Antilles, Barbados, Bermuda, Jamaica, St. Kitts & Nevis, Cayman Isles, Montserrat, British Virgin Isles.

Table 2.2

Inward Direct Investment Stock at the End of 1999

	1992	1993	1994	1995	1996	1997	1998	1999	Forecast 2000
	EUR billion								
Nominal capital	4.4	4.5	4.7	5.2	5.4	5.7	7.0	7.2	×
Other equity capital[1])	4.5	4.6	5.6	7.9	9.1	11.4	12.6	15.3	×
Equity capital	9.0	9.2	10.3	13.1	14.5	17.1	19.6	22.5	29 1/2
Lending	1.0	1.5	1.5	1.3	1.1	0.8	0.5	0.9	1
Total capital	9.9	10.7	11.8	14.5	15.6	17.9	20.1	23.4	30 1/2
Number of investments	*3,260*	*3,092*	*3,056*	*3,094*	*3,190*	*3,246*	*3,266*	*3,230*	*x*
	EUR billion								*1999 %*
Total capital broken down by target regions									
EU-15	6.3	6.8	7.2	9.7	10.6	12.5	14.6	16.7	*71.4*
thereof									
Euro area	5.7	6.2	6.4	8.8	9.6	11.5	13.2	14.3	*61.4*
Germany	3.8	4.1	4.3	6.1	7.0	8.2	8.3	9.1	*38.8*
Netherlands	1.0	1.0	0.8	1.4	1.3	1.7	1.6	1.7	*7.2*
Italy	0.4	0.4	0.4	0.4	0.4	0.7	1.6	1.6	*6.7*
France	0.3	0.4	0.5	0.5	0.5	0.5	1.0	1.1	*4.8*
United Kingdom	0.4	0.4	0.5	0.6	0.6	0.6	0.7	1.4	*6.2*
Central and Eastern Europe	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.1	*0.4*
Rest of Europe	1.8	1.8	2.0	2.2	2.1	2.3	2.5	3.4	*14.6*
thereof									
Switzerland, Liechtenstein	1.8	1.8	2.0	2.2	2.0	2.2	2.3	3.2	*13.8*
America	1.2	1.4	1.4	1.2	1.5	1.6	1.7	1.9	*8.0*
thereof									
U.S.A.	1.2	1.3	0.9	1.1	1.4	1.5	1.6	1.7	*7.4*
Asia	0.4	0.4	0.7	0.8	0.8	0.9	1.0	1.2	*5.0*
thereof									
Japan	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.7	*3.1*
Gulf countries[2])	0.2	0.1	0.3	0.4	0.4	0.4	0.4	0.4	*1.7*
Africa, Pacific countries	0.0	0.2	0.3	0.3	0.4	0.2	0.1	0.2	*0.7*
Total	9.9	10.7	11.8	14.5	15.6	17.9	20.1	23.4	*100.0*
Market value	12.4	13.1	14.1	18.4	21.3	26.0	24.9	30.5	×
by relation to total equity	*139*	*142*	*137*	*140*	*146*	*152*	*127*	*136*	×

Source: OeNB.

[1]) Including profit/loss for the reporting year.

[2]) Bahrein, Irak, Yemen, Qatar, Kuwait, Oman, Saudi Arabia, United Arab Emirates.

Table 3

Time Series of Outward and Inward Direct Investment by Economic Activity

	Outward direct investment				Inward direct investment			
	1995	1997	1998	1999	1995	1997	1998	1999
	EUR million							
Mining and quarrying, and electricity, gas	192	215	304	392	156	166	280	289
Manufacturing and construction	2,772	3,641	4,200	5,239	5,480	5,599	5,820	7,175
Food, beverages and tobacco	236	277	330	381	522	312	334	396
Textile products, apparel and leather	71	83	91	102	192	192	170	232
Wood and wood products	134	113	114	243	43	56	50	22
Paper, publishing and printing	197	360	383	403	511	697	665	803
Refined petroleum products, chemicals, rubber and plastic products	574	636	716	803	1,771	1,986	2,150	2,379
Nonmetallic mineral products	369	566	826	1,086	300	341	368	404
Metal products	403	568	614	738	208	284	375	493
Mechanical products	217	242	262	299	597	683	799	673
Electrical and optical equipment	262	298	366	630	630	390	347	1,232
Transport equipment	54	41	37	87	482	413	407	387
Manufacturing, n.e.c.	31	64	84	68	97	106	73	74
Construction	224	392	376	398	127	139	83	81
Services	5,710	9,007	10,408	13,409	8,821	12,158	14,016	15,899
Trade and repairs	1,053	2,028	2,118	2,564	3,311	3,930	4,214	5,290
Hotels and restaurants	108	167	68	118	102	161	191	202
Transport and communication	35	40	43	64	273	579	1,580	1,444
Financial intermediation	1,690	2,697	3,291	4,146	1,925	3,349	2,520	2,234
Real estate and business activities	2,746	3,999	4,764	6,396	3,196	4,081	5,457	6,658
Other services	78	74	124	121	13	58	55	72
Total capital[1])	8,674	12,863	14,912	19,039	14,458	17,922	20,117	23,364

Source: OeNB.

[1]) Including profit/loss for the reporting year.

Table 4.1

Income from Outward Direct Investment by Regions

	Austrian share of											
	Profit or loss for the year				Net profit or loss carried forward				Income for the year			
	1992	1995	1998	1999	1992	1995	1998	1999	1992	1995	1998	1999
	EUR million											
EU-15 (excl. Germany)	–124	18	178	169	4	– 72	74	249	–120	– 54	252	418
Germany	–118	10	34	165	– 78	–347	–381	–411	–196	–337	–347	– 245
Switzerland and Liechtenstein	86	58	41	73	137	208	273	275	223	266	314	348
Eastern Europe (excl. Hungary)	– 9	–29	– 38	216	– 1	–109	–166	–195	– 11	–137	–205	21
Hungary	5	3	162	225	– 12	–106	– 44	82	– 7	–103	118	307
U.S.A., Canada	– 36	– 4	67	31	–132	–134	47	144	–168	–138	114	174
Other countries	– 33	39	135	245	– 75	14	109	178	–109	53	244	424
Total	–229	95	580	1,125	–157	–545	– 90	322	–387	–450	489	1,447

Source: OeNB.

Table 4.2

Income from Inward Direct Investment by Regions

	Foreign shares of											
	Profit or loss for the year				Net profit or loss carried forward				Income for the year			
	1992	1995	1998	1999	1992	1995	1998	1999	1992	1995	1998	1999
	EUR million											
EU-15 (excl. Germany)	133	409	580	1,041	− 92	− 12	− 56	17	41	397	523	1,058
Germany	321	656	997	835	179	208	232	47	500	864	1,229	882
Switzerland and Liechtenstein	103	176	217	251	− 92	− 97	− 58	− 44	11	79	159	208
Eastern Europe (excl. Hungary)	− 6	− 0	− 10	0	− 3	− 16	1	2	− 8	− 17	− 9	3
Hungary	0	2	− 7	− 2	− 3	− 4	− 6	11	− 3	− 2	− 14	− 13
U.S.A., Canada	148	324	78	336	94	19	442	188	242	344	501	524
Other countries	− 13	38	65	86	− 20	−107	− 66	− 73	− 33	− 69	− 1	13
Total	686	1,604	1,920	2,548	65	− 8	468	126	751	1,596	2,388	2,674

Source: OeNB.

Table 5.1

Performance Indicators of Outward Direct Investment

	1994	1995	1996	1997	1998	1999	1999	
							Age of direct investment	
							< 5 years	> = 5 years
	%							
Total								
Return on equity								
Highest decile	35.7	42.9	52.5	53.1	53.1	53.2	*44.7*	*58.2*
Highest quartile	13.5	14.2	18.2	20.6	20.0	21.3	*14.7*	*26.4*
Median	0.7	1.0	3.1	4.5	4.0	4.9	*0.8*	*8.1*
Lowest quartile	− 10.2	− 9.2	− 5.1	− 4.6	− 6.0	− 4.5	*−11.7*	*0.0*
Lowest decile	− 52.2	− 52.5	− 34.6	− 36.4	− 43.8	− 38.0	*−53.2*	*− 25.7*
Equity ratio								
Highest decile	95.5	92.7	93.7	88.8	88.2	87.3	*93.3*	*81.9*
Highest quartile	68.4	63.2	62.4	59.5	59.8	59.0	*63.3*	*55.8*
Median	32.1	31.3	28.8	28.0	29.6	30.2	*31.8*	*28.9*
Lowest quartile	12.0	12.0	11.4	11.0	12.5	12.0	*12.9*	*11.6*
Lowest decile	2.6	2.4	1.3	2.1	2.7	2.5	*3.7*	*2.3*
Number of enterprises	*1,617*	*1,718*	*1,810*	*5,066*	*2,971*	*2,095*	*876*	*1,219*
Manufacturing[1])								
Return on sales								
Highest decile	10.9	9.5	12.0	12.7	14.7	14.5	*13.2*	*15.1*
Highest quartile	4.9	4.4	5.6	5.9	6.1	7.0	*5.4*	*8.4*
Median	0.6	0.6	1.3	1.4	1.3	1.9	*0.6*	*2.5*
Lowest quartile	− 4.8	− 3.7	− 1.8	− 1.8	− 2.9	− 2.0	*− 5.9*	*0.0*
Lowest decile	− 27.0	− 22.6	− 20.7	− 15.9	− 18.3	− 15.4	*−24.4*	*− 9.0*
	ATS million							
Output								
Highest decile	4.7	5.6	4.6	5.1	4.8	5.1	*4.9*	*5.3*
Highest quartile	2.4	2.5	2.5	2.6	2.6	2.8	*2.4*	*3.1*
Median	1.1	1.1	1.2	1.2	1.2	1.4	*1.1*	*1.6*
Lowest quartile	0.4	0.4	0.5	0.5	0.5	0.6	*0.5*	*0.7*
Lowest decile	0.2	0.1	0.2	0.2	0.2	0.2	*0.2*	*0.3*
Number of enterprises	*581*	*621*	*768*	*2,156*	*1,270*	*886*	*384*	*502*

Source: OeNB.

[1]) Classified under the sectoral association "industry" in the Austrian Federal Economic Chamber until 1995; since 1996 calculations have been made for the ÖNACE (Austrian Statistical Classification of Economic Activities) sections C through F (mining and quarring and electricity, gas and water, manufacturing and construction).

Table 5.2

Performance Indicators of Inward Direct Investment

	1994	1995	1996	1997	1998	1999	1999	
							Age of direct investment	
							< 5 years	> = 5 years
	%							
Total								
Return on equity								
Highest decile	79.4	81.5	65.8	67.3	78.1	73.7	*77.2*	*72.8*
Highest quartile	26.7	27.1	22.6	23.3	28.0	26.5	*16.4*	*28.6*
Median	5.6	5.9	4.2	4.7	5.9	6.1	*0.0*	*7.8*
Lowest quartile	– 4.0	– 2.8	– 5.6	– 4.2	– 3.2	– 5.6	*–28.4*	*– 0.3*
Lowest decile	– 49.9	– 50.0	– 50.7	– 50.0	– 50.7	– 48.5	*–94.5*	*– 31.8*
Equity ratio								
Highest decile	72.2	74.6	77.6	79.6	82.8	80.2	*97.3*	*75.3*
Highest quartile	44.4	45.2	47.1	46.9	48.0	49.2	*55.6*	*47.8*
Median	21.5	22.7	23.4	23.6	23.5	24.9	*22.8*	*25.5*
Lowest quartile	7.6	7.6	7.5	7.4	7.4	7.4	*6.8*	*7.9*
Lowest decile	– 6.3	– 6.4	– 7.5	– 9.9	– 9.1	– 10.6	*– 7.2*	*– 11.9*
Number of enterprises	*2,205*	*2,262*	*2,362*	*2,464*	*2,525*	*2,542*	*633*	*1,909*
Manufacturing[1])								
Return on sales								
Highest decile	12.2	12.8	12.5	11.8	13.4	13.9	*9.8*	*14.6*
Highest quartile	6.3	6.0	5.6	6.4	6.9	7.0	*4.3*	*7.9*
Median	2.1	1.7	1.3	1.7	2.4	2.3	*0.6*	*2.7*
Lowest quartile	– 0.9	– 1.2	– 1.2	– 0.1	0.0	– 0.4	*– 5.5*	*0.0*
Lowest decile	– 7.3	– 8.3	– 11.3	– 8.4	– 9.4	– 9.6	*–38.9*	*– 5.1*
	ATS million							
Output								
Highest decile	4.7	4.8	5.0	5.4	5.8	6.1	*6.3*	*5.9*
Highest quartile	2.9	3.0	3.0	3.2	3.4	3.5	*3.4*	*3.6*
Median	1.8	2.0	2.0	2.2	2.3	2.3	*2.3*	*2.3*
Lowest quartile	1.2	1.3	1.4	1.5	1.5	1.5	*1.5*	*1.5*
Lowest decile	0.9	1.0	0.9	1.0	1.1	1.0	*0.8*	*1.1*
Number of enterprises	*549*	*2,195*	*682*	*1,513*	*833*	*680*	*153*	*527*

Source: OeNB.

[1]) Classified under the sectoral association "industry" in the Austrian Federal Economic Chamber until 1995; since 1996 calculations have been made for the ÖNACE (Austrian Statistical Classification of Economic Activities) sections C through F (mining and quarring and electricity, gas and water, manufacturing and construction).

Table 6

Direct Investment and Employment

	1990	1995	1996	1997	1998	1999
	1,000 persons					
Outward direct investment						
Employed in Austria by Austrian direct investors	260.8	346.6	284.0	269.1	260.1	258.3
Manufacturing	x	173.2	177.2	162.7	162.0	156.7
Services	x	173.4	106.8	106.4	98.0	101.6
	%					
Share of total employment	8.9	11.3	9.3	8.8	8.5	8.3
Manufacturing	x	18.3	19.2	17.6	17.5	17.0
Services	x	8.7	5.3	5.3	4.8	4.9
	1,000 persons					
Employed abroad[1]) by Austrian direct investors	43.6	125.0	135.4	161.4	187.7	199.2
Manufacturing	x	83.6	88.4	100.6	124.0	128.9
Services	x	41.4	47.1	60.8	63.7	70.2
Ratio of foreign to domestic employment	*17*	*36*	*48*	*60*	*72*	*77*
Manufacturing	*x*	*48*	*50*	*62*	*76*	*82*
Services	*x*	*24*	*44*	*57*	*65*	*69*
Employment[1]) by target country/region	43.6	125.0	135.4	161.4	187.7	199.2
EU-11 (excl. Germany)	6.0	11.7	12.8	12.5	12.6	13.9
Germany	16.1	21.1	23.8	23.7	32.9	33.7
Other EU countries	2.0	2.8	2.5	3.2	5.0	2.7
Switzerland and Liechtenstein	2.3	2.4	2.5	2.5	2.5	2.6
Central and Eastern European Countries (excl. Hungary)	3.3	33.9	39.4	54.5	68.6	78.8
Hungary	7.5	44.2	46.0	51.7	52.5	49.3
U.S.A., Canada	3.9	3.2	2.8	6.3	6.6	9.0
Other countries	2.7	5.7	5.7	6.9	6.8	9.1
Inward direct investment						
Employed[1]) by inward direct investment enterprises in Austria	235.8	207.7	211.7	211.5	228.4	228.4
Manufacturing	x	116.3	118.9	117.2	117.1	113.1
Services	x	91.4	92.9	94.3	111.3	115.4
	%					
Share of total employment	8.1	6.8	6.9	6.9	7.4	7.4
Manufacturing	x	12.3	12.9	12.7	12.6	12.3
Services	x	4.6	4.6	4.7	5.4	5.5

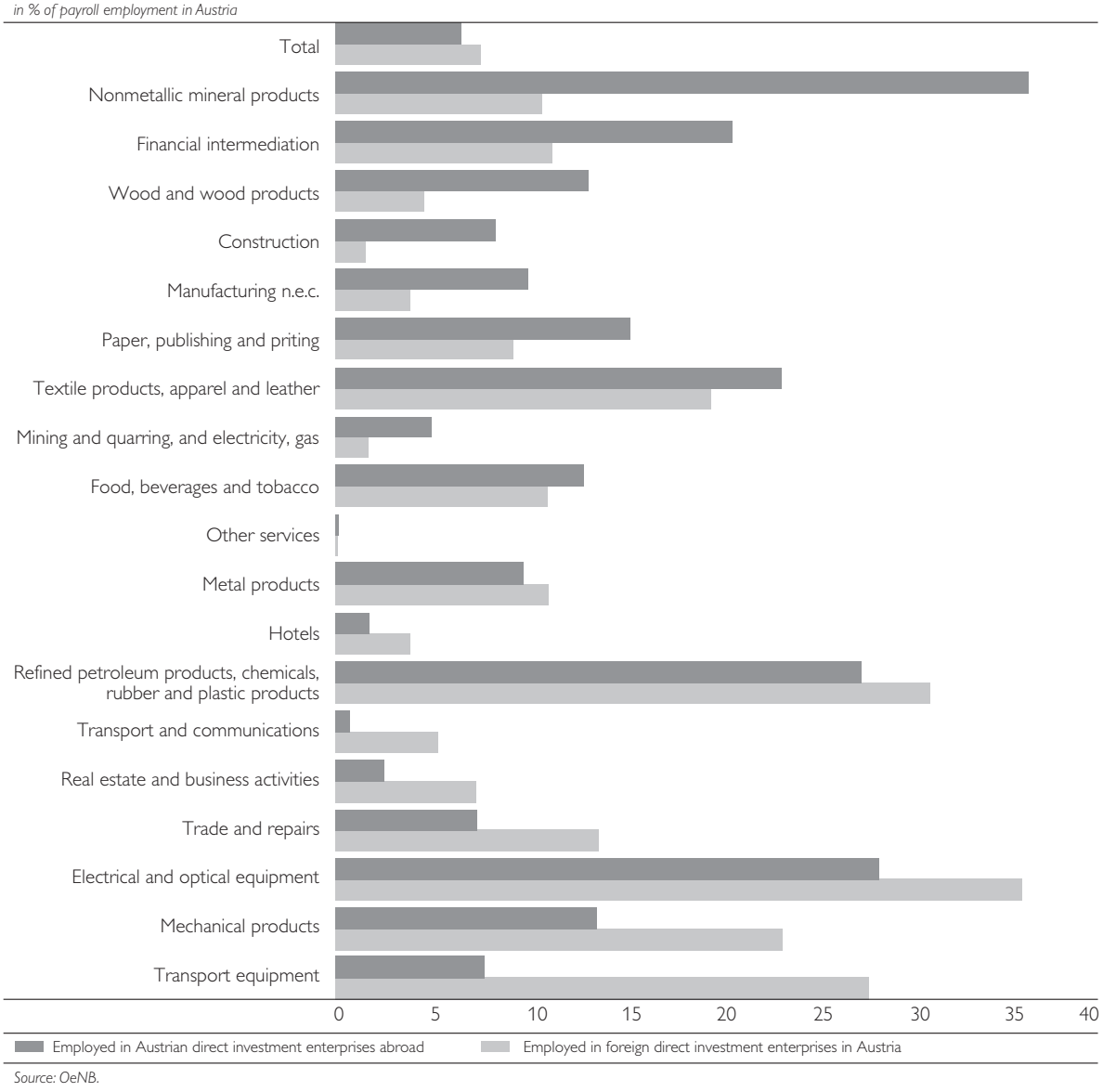
Source: OeNB, Statistics Austria.

[1]) Weighted by the share of the direct investment enterprise's nominal capital.

Ratio of Persons Employed by Austrian Direct Investment Enterprises

Abroad (Outward) and Persons Employed by Foreign Direct Investment Enterprises in Austria (Inward) to Total Employment by Sector

in % of payroll employment in Austria



Source: OeNB.

Aspects of the Transmission of Monetary Policy

The Transmission Mechanism and the Role of Asset Prices in Monetary Policy

Frederic S. Mishkin[1])

Although the instrument set by monetary policymakers is typically an interest rate, monetary policy affects the economy through other asset prices besides those on debt instruments. Thus, movements in these other asset prices should play an important role in how monetary policy is conducted. But what role should they play?

This paper answers this question by first surveying the monetary transmission mechanism through these other asset prices and then discusses their role in the conduct of monetary policy.

1 Asset Prices in the Monetary Transmission Mechanism

In the literature on the monetary transmission mechanism, there are three categories of asset prices besides those on debt instruments that are viewed as providing important channels through which monetary policy affects the economy: 1) stock market prices, 2) real estate prices, and 3) exchange rates.

Stock Market Prices

Fluctuations of the stock market, which are influenced by monetary policy, have important impacts on the aggregate economy. Transmission mechanisms involving the stock market are of four types: 1) stock market effects on investment, 2) firm balance sheet effects, 3) household wealth effects, and 4) household liquidity effects.

Stock Market Effects on Investment

Tobin's q-theory (Tobin, 1969) provides an important mechanism for how movements in stock prices can affect the economy. Tobin's q is defined as the market value of firms divided by the replacement cost of capital. If q is high, the market price of firms is high relative to the replacement cost of capital, and new plant and equipment capital is cheap relative to the market value of firms. Companies can then issue stock and get a high price for it relative to the cost of the facilities and equipment they are buying. Investment spending will rise because firms can now buy a lot of new investment goods with only a small issue of stock.

The crux of the Tobin q-model is that a link exists between stock prices and investment spending. But how might monetary policy affect stock prices? Expansionary monetary policy, which lowers interest rates, makes bonds less attractive relative to stocks and results in increased demand for stocks, which bids up their price. Combining this with the fact that higher stock prices will result in higher investment spending, leads to a transmission mechanism of monetary policy which can be described by the following schematic:

$$M_{\uparrow} => P_{s\uparrow} => q_{\uparrow} => I_{\uparrow} => Y_{\uparrow} \qquad (1)$$

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where $M_{\uparrow}$ indicates expansionary monetary policy leading to a rise in stock prices $(P_{s\uparrow})$, which raises $q(q_{\uparrow})$, which raises investment $(I_{\uparrow})$, thereby leading to an increase in aggregate demand and a rise in output $(Y_{\uparrow})$.

Another way of getting to this same mechanism is by recognizing that firms not only finance investment through bonds but by issuing equities (common stock). When stock prices rise, it now becomes cheaper for firms to finance their investment because each share that is issued produces more funds. Thus, a rise in stock prices leads to increased investment spending. Therefore, an alternative description of this mechanism is that expansionary monetary policy $(M_{\uparrow})$, which raises stock prices $(P_{s\uparrow})$ lowers the cost of capital $(c_{\downarrow})$ and causes investment and output to rise $(I_{\uparrow}, Y_{\uparrow})$.[1]) In other words:

$$M_{\uparrow} => P_{s\uparrow} => c_{\downarrow} => I_{\uparrow} => Y_{\uparrow} \qquad (2)$$

Firm Balance Sheet Effects

The presence of asymmetric information problems in credit markets provides another transmission mechanism for monetary policy that operates through stock prices. This mechanism is often referred to as the "credit view", and it works through the effect of stock prices on firms' balance sheets so it is also referred to as the balance sheet channel.[2])

The lower the net worth of firms, the more severe are the adverse selection and moral hazard problems in lending to these firms. Lower net worth means that there is effectively less collateral for the loans made to a firm, and so potential losses from adverse selection are higher. A decline in net worth, which increases the severity of the adverse selection problem, leads to decreased lending to finance investment spending. The lower net worth of firms also increases the moral hazard problem because it means that owners of firms have a lower equity stake, giving them greater incentives to engage in risky investment projects. Since taking on riskier investment projects makes it more likely that lenders will not be paid back, a decrease in net worth leads to a decrease in lending and hence in investment spending.

Monetary policy can affect firms' balance sheets and aggregate spending through the following mechanism. Expansionary monetary policy $(M_{\uparrow})$, which causes a rise in stock prices $(P_{s\uparrow})$ along the lines described earlier, raises the new worth of firms $(NW_{\uparrow})$, which reduces adverse selection and moral hazard problems, and so leads to higher lending $(L_{\uparrow})$. Higher lending then results in higher investment spending $(I_{\uparrow})$ and aggregate spending $(Y_{\uparrow})$. This leads to the following schematic for the balance sheet channel of monetary transmission.

$$M_{\uparrow} => P_{s\uparrow} => NW_{\uparrow} => L_{\uparrow} => I_{\uparrow} => Y_{\uparrow} \qquad (3)$$

1 *See Bosworth (1975) and Hayashi (1982) for a demonstration that this alternative description of the link between stock prices and investment is equivalent to Tobin's q-approach.*

2 *For surveys on the credit view, see Bernanke and Gertler (1995), Cecchetti (1995), Hubbard (1995), and Bernanke, Gertler, and Gilchrist (1999).*

Household Liquidity Effects

Another way of looking at balance sheet channels of monetary transmission is to look at household balance sheets, particularly liquidity effects on consumer durables and housing expenditures.[1]) In the liquidity effects view, balance sheet effects work through their impact on consumers' desire to spend rather than on lenders' desire to lend. Because of asymmetric information about their quality, consumer durables and housing are very illiquid assets. If, as a result of a negative income shock, consumers needed to sell their consumer durables or housing assets to raise money, they would expect a big loss because they could not get the full value of these assets in a distress sale. In contrast, if consumers held financial assets (such as money in the bank, stocks, or bonds), they could sell them quickly for their full market value and raise the cash. Hence if consumers expect a higher likelihood of finding themselves in financial distress, they would rather be holding fewer illiquid consumer durables or housing assets and more liquid financial assets.

A consumer's balance sheet should be an important influence on his or her estimate of the likelihood of suffering financial distress. Specifically, when consumers have a large amount of financial assets relative to their debts, their estimate of the probability of financial distress is low, and they will be more willing to purchase consumer durables or housing assets. When stock prices rise, the value of financial assets rises as well $(FA_{\uparrow})$; expenditure on consumer durables will also rise because consumers have a more secure financial position and a lower estimate of the likelihood of suffering financial distress $(FD_{\downarrow})$. This leads to another transmission mechanism for monetary policy, operating through the link between money and stock prices:

$$\begin{aligned} &M_{\uparrow} => P_{s\uparrow} => FA_{\uparrow} => \\ &FD_{\downarrow} => C_{d\uparrow}, H_{\uparrow} => Y_{\uparrow} \end{aligned} \tag{4}$$

where $C_{d\uparrow}$ indicates a rise in expenditure on consumer durables and $H_{\uparrow}$ a rise in residential housing spending.

Household Wealth Effects

Another balance sheet channel operating through consumers involves household wealth effects. Modigliani's life cycle model states that consumption is determined by the lifetime resources of consumers. An important component of consumers' lifetime resources is their financial wealth, a major component of which is common stocks. Thus, expansionary monetary policy, which raises stock prices, raises the value of household wealth, thereby increasing the lifetime resources of consumers, which causes consumption to rise. This produces the following transmission mechanism:

$$M_{\uparrow} => P_{s\uparrow} => W_{\uparrow} => C_{\uparrow} => Y_{\uparrow} \tag{5}$$

1 See Mishkin (1976, 1977).

where $W_{\uparrow}$ and $C_{\uparrow}$ indicate increases in household wealth and consumption. Research has found this transmission mechanism to be quite strong in the United States, but the size of the wealth effect is still controversial.[1])

Real Estate Prices

Another set of asset prices that play an important role in the monetary transmission mechanism are real estate prices. Real estate prices can affect aggregate demand through three routes: 1) direct effects on housing expenditure, 2) household wealth, and 3) bank balance sheets.

Direct Effects on Housing Expenditure

Monetary expansion $(M_{\uparrow})$, which lowers interest rates, lowers the cost of financing housing and so increases their price $(P_{h\uparrow})$. With a higher price of housing relative to its construction cost, construction firms find it more profitable to build houses, and thus houses expenditure will rise $(H_{\uparrow})$ and aggregate demand will rise $(Y_{\uparrow})$.[2]) This transmission mechanism is described by the following schematic:

$$M_{\uparrow} => P_{h\uparrow} => H_{\uparrow} => Y_{\uparrow} \tag{6}$$

Household Wealth Effects

Housing prices are an important component of household wealth, which, as we have seen, affects consumption spending. Hence, expansionary monetary policy $(M_{\uparrow})$, which raises housing prices $(P_{h\uparrow})$, also raises household wealth $(W_{\uparrow})$, which raises consumption spending $(C_{\uparrow})$ and aggregate demand $(Y_{\uparrow})$:

$$M_{\uparrow} => P_{h\uparrow} => W_{\uparrow} => C_{\uparrow} => Y_{\uparrow} \tag{7}$$

Bank Balance Sheets

The credit view of the monetary transmission mechanism suggests that banks play a special role in the financial system because they are especially well suited to solve asymmetric information problems in credit markets. Certain borrowers will not have access to the credit markets unless they borrow from banks.[3]) Banks engage in a substantial amount of real estate lending, in which the value of the real estate acts as collateral. If real estate prices rise as a result of monetary expansion, then banks' loan losses will decrease, which increases their bank capital. As a consequence, higher bank capital allows banks to engage in more lending, and because banks are special with many customers dependent on them, investment and aggregate demand will rise. The bank balance sheet channel thus can be described as follows:

1 *See Modigliani (1971) and Lettau, Ludvigson, and Steindel (2001).*

2 *This model of housing expenditure is really a variant of Tobin's q-theory in which q for housing investment is the price of housing relative to its replacement cost. For a recent empirical analysis of a model of this type, see McCarthy and Peach (2001).*

3 *See Kashyap and Stein (1994) and Gertler and Gilchrist (1994).*

$$M_{\uparrow} => P_{r\uparrow} => NW_{b\uparrow} => L_{\uparrow} => I_{\uparrow} => Y_{\uparrow} \qquad (8)$$

where expansionary monetary policy $(M_{\uparrow})$, which raises real estate prices $(P_{r\uparrow})$, raises bank capital $(NW_{b\uparrow})$ and causes bank lending to rise $(L_{\uparrow})$, thereby causing investment and output to rise $(I_{\uparrow}$ and $Y_{\uparrow})$.

When the opposite happens and real estate prices fall, this transmission mechanism has often been described as a "capital crunch" and was operational in the United States in the early 1990s (Bernanke and Lown, 1991). It has also been an important source of stagnation in Japan in recent years.

Exchange Rates

There are two primary mechanisms that operate through exchange rates: 1) exchange rate effects on net exports and 2) exchange rate effects on balance sheets.

Exchange Rate Effects on Net Exports

With the growing internationalization of economies throughout the world and the advent of flexible exchange rates, more attention has been paid to how monetary policy affects exchange rates, which in turn affect net exports and aggregate output. Clearly, this channel does not operate if a country has a fixed exchange rate, and the more open an economy is, the stronger is this channel.

Expansionary monetary policy affects exchange rates because when it leads to a fall in domestic interest rates, deposits denominated in domestic currency become less attractive relative to deposits denominated in foreign currencies. As a result, the value of domestic deposits relative to foreign currency deposits falls, and the exchange rate depreciates $(E_{\downarrow})$.[1]) The lower value of the domestic currency makes domestic goods cheaper than foreign goods, thereby causing a rise in net exports $(NX_{\uparrow})$ and hence in aggregate spending $(Y_{\uparrow})$. The schematic for the monetary transmission mechanism that operates through the exchange rate is:

$$M_{\uparrow} => E_{\downarrow} => NX_{\uparrow} => Y_{\uparrow} \qquad (9)$$

Exchange Rate Effects on Balance Sheets

Fluctuations in exchange rates also can have important effects on aggregate demand by affecting the balance sheets of both financial and nonfinancial firms when a substantial amount of domestic debt is denominated in foreign currency, which is the case for most emerging market countries. In these countries, monetary expansion often can have a negative impact on aggregate demand if it leads to a depreciation of the exchange rate through the following mechanism.

With debt contracts denominated in foreign currency, expansionary monetary policy $(M_{\uparrow})$, which leads to a depreciation or devaluation of the

1 *In the literature, a depreciation of the currency is typically denoted as* $e_{\uparrow}$*, but I have used the notation* $E_{\downarrow}$ *because I think it is more intuitive.*

domestic currency $(E_{\downarrow})$, causes the debt burden of domestic nonfinancial firms to increase. Since assets are typically denominated in domestic currency and do not increase in value, there is a resulting decline in net worth $(NW_{\downarrow})$. This deterioration in balance sheets increases adverse selection and moral hazard problems, which, as discussed above, leads to a decline in lending $(L_{\downarrow})$, a decline in investment $(I_{\downarrow})$ and hence in economic activity $(Y_{\downarrow})$. The schematic for this transmission mechanism is as follows:

$$M_{\uparrow} => E_{\downarrow} => NW_{\downarrow} => L_{\downarrow} => I_{\downarrow} => Y_{\downarrow} \qquad (10)$$

This mechanism was very important in the recent financial crises in Mexico and East Asia.[1]) For example, this mechanism was particularly strong in Indonesia, the worst hit of all the crisis countries, which saw the value of its currency decline by over 75%, thus increasing the rupiah value of foreign currency-denominated debt by a factor of four. Even a healthy firm would be likely to be driven into insolvency by such a shock if it had a significant amount of foreign currency-denominated debt, and then no one will lend to it even if it had productive investment opportunities.

A second mechanism through which an exchange rate depreciation can lead to a decline in aggregate demand in emerging markets operates through a deterioration of bank balance sheets. For example, in Mexico and the East Asian countries, banks and many other financial institutions had many liabilities denominated in foreign currency, which increased sharply in value when a depreciation occurred. On the other hand, the problems of firms and households meant that they were unable to pay off their debt, which also resulted in loan losses on the asset side of financial institutions' balance sheets. The result was that banks' and other financial institutions' balance sheets were squeezed from both the assets and liabilities side. Moreover, much of these institutions' foreign currency-denominated debt was very short-term, so that the sharp increase in the value of this debt led to liquidity problems because this debt needed to be paid back quickly. The result of the further deterioration in banks' and other financial institutions' balance sheets and their weakened capital base is that they cut back lending. In the case of Indonesia, these forces were severe enough to cause a banking panic, in which numerous banks were forced to go out of business.

The effect of depreciations on bank balance sheets implies that expansionary monetary policy $(M_{\uparrow})$ may actually be contractionary in emerging market countries by causing bank balance sheets to deteriorate $(NW_{b\downarrow})$ and bank lending to fall $(L_{\downarrow})$, which then causes investment and aggregate output to fall ($I_{\downarrow}$ and $Y_{\downarrow}$):

$$M_{\uparrow} => E_{\downarrow} => NW_{b\downarrow} => L_{\downarrow} => I_{\downarrow} => Y_{\downarrow} \qquad (11)$$

1 *For example, see Mishkin (1996, 1999a).*

It is important to note that the possible contractionary effects from expansionary monetary policy through exchange rate effects on balance sheets only operate if the economy has a substantial amount of debt denominated in foreign currency. These mechanisms are thus rarely important in industrialized countries, whose debt is typically denominated in domestic currency, but they can be very important in emerging market countries, whose debt structure may be entirely different, with much of the debt denominated in foreign currency.

2 The Role of Asset Prices in Monetary Policy

The survey in the previous section suggests that monetary policy works not just through its direct effects on interest rates, but also through its effects on other asset prices. Since other asset prices are an important element of the monetary transmission mechanism, how should monetary policymakers incorporate movements of these asset prices into their decisions about the conduct of monetary policy?

In looking at the role of asset prices in monetary policy, it is worth separating the discussion into how central banks should respond to exchange rates and how they should respond to fluctuations in stock market and real estate prices.

Exchange Rates

The asset price that typically receives the most attention in discussions of monetary policy is the exchange rate. Central banks clearly care about the value of the domestic currency for several reasons. Changes in the exchange rate can have a major impact on inflation, particularly in small open economies. For example, depreciations lead to a rise in inflation as a result of the pass-through from higher import prices and greater demand for net exports, as discussed in the previous section. In addition, the public and politicians pay attention to the exchange rate and this puts pressure on the central bank to alter monetary policy. An appreciation of the domestic currency can make domestic businesses uncompetitive, while a depreciation is often seen as a failure of the central bank, as has recently been the case for the European Central Bank (ECB), which has been blamed, I think unfairly, for the euro decline.

Emerging market countries, quite correctly, have an even greater concern about exchange rate movements. Not only can a real appreciation make domestic industries less competitive, but it can lead to large current account deficits, which might make the country more vulnerable to currency crises if capital inflows turn to outflows. Depreciations in emerging market countries are particularly dangerous because they can be contractionary, as described in the previous section, and can trigger a financial crisis along the lines suggested in Mishkin (1996,1999a).

Concern about exchange rate fluctuations might lead countries to choose to peg their exchange rates to that of another country. In other works, I have discussed the pros and cons of pegging exchange rates as a

monetary policy strategy and I will not discuss this issue further.[1]) However, if a country decides that it wants to have its own independent monetary policy, then with open capital markets it must necessarily choose to allow the exchange rate to fluctuate. However, the fact that exchange rate fluctuations are a major concern in so many countries raises the danger that monetary policy may put too much focus on limiting exchange rate movements. This indeed was a problem for Israel in the early stages of its inflation targeting regime. As part of this regime, Israel had an intermediate target of an exchange rate band around a crawling peg, whose rate of crawl was set in a forward-looking manner by deriving it from the inflation target for the coming year. Even though the Bank of Israel downplayed the exchange rate target relative to the inflation target over time, it did slow the Bank's effort to win support for disinflation and lowering of the inflation targets (see Bernanke, Laubach, Mishkin, and Posen, 1999).

The second problem from a focus on limiting exchange rate fluctuations is that it can induce the wrong policy response when a country is faced with real shocks such as a terms-of-trade shock. Two graphic examples occurred in New Zealand and Chile in the late 1990s.

Because of the direct impact of exchange rates on inflation, the Reserve Bank of New Zealand tended to focus on the exchange rate as an indicator of the monetary policy stance. By early 1997, the Reserve Bank institutionalized this focus by adopting as its primary indicator of monetary policy a Monetary Conditions Index (MCI) similar to that developed by the Bank of Canada. The idea behind the MCI, which is a weighted average of the exchange rate and a short-term interest rate, is that both interest rates and exchange rates on average have offsetting impacts on inflation. When the exchange rate falls, this usually leads to higher inflation in the future, and so interest rates need to rise to offset the upward pressure on inflation. However, the offsetting effects of interest rates and exchange rates on inflation depend on the nature of the shocks to the exchange rates. If the exchange rate depreciation comes from portfolio considerations, then it does lead to higher inflation and needs to be offset by an interest rate rise. However, if the reason for the exchange rate depreciation is a real shock such as a negative terms-of-trade shock, which decreases the demand for a country's exports, then the situation is entirely different. The negative terms-of-trade shock reduces aggregate demand and is thus likely to be deflationary. The correct interest rate response is then a decline in interest rates, not a rise as the MCI suggests.

With the negative terms-of-trade shock in 1997, the adoption of the MCI in 1997 led to exactly the wrong monetary policy response to the East Asian crisis. With depreciation setting in after the crisis began in July 1997 after the devaluation of the Thai baht, the MCI began a sharp decline, indicating that the Reserve Bank needed to raise interest rates, which it did by over 200 basis points. The result was a very tight monetary policy, with the overnight cash rate exceeding 9% by June 1998. Because the

1 *See Mishkin (1999b) and Mishkin and Savastano (2001).*

depreciation was due to a substantial, negative terms-of-trade shock, which decreased aggregate demand, the tightening of monetary policy, not surprisingly, led to a severe recession and an undershoot of the inflation target range with actual deflation occurring in 1999.[1]) The Reserve Bank of New Zealand did eventually realize its mistake and reversed course, sharply lowering interest rates beginning in July 1998 after the economy had entered a recession, but by then it was too late. It also recognized the problems with using an MCI as an indicator of monetary policy, and abandoned it in 1999. Now the Reserve Bank operates monetary policy in a more conventional way, using the overnight cash rate as its policy instrument, with far less emphasis on the exchange rate in its monetary policy decisions.

Chile, which also adopted inflation targeting in the early 1990s, also included a focus on limiting exchange rate fluctuations by having an exchange rate band with a crawling peg which was (loosely) tied to lagged domestic inflation.[2]) This focus on the exchange rate induced a serious policy mistake in 1998 because the central bank was afraid it might lose credibility in the face of the financial turmoil if it allowed the exchange rate to depreciate after what had taken place in financial markets after the East Asian crisis and the Russian meltdown. Thus, instead of easing monetary policy in the face of the negative terms-of-trade shock, the central bank raised interest rates sharply and even narrowed its exchange rate band. In hindsight, these decisions appear to have been a mistake: the inflation target was undershot and the economy entered a recession for the first time in the 1990s. With this outcome, the central bank came under strong criticism for the first time since it had adopted its inflation targeting regime in 1990, weakening support for the independence of the central bank and its inflation targeting regime. During 1999, the central bank did reverse course, easing monetary policy by lowering interest rates and allowing the peso to decline.

The contrast of the experience of New Zealand and Chile during this period with that of Australia, another small open economy with an inflation targeting regime, is striking. Prior to the adoption of their inflation targeting regime in 1994, the Reserve Bank of Australia had adopted a policy of allowing the exchange rate to fluctuate without interference, particularly if the source of the exchange rate change was a real shock, like a terms-of-trade shock. Thus, when faced with the devaluation in Thailand in July 1997, the Reserve Bank recognized that it would face a substantial negative terms of trade shock because of the large component of its foreign trade conducted with the Asian region and that it should not fight the depreciation of the Australian dollar that would inevitably result.[3]) Thus, in contrast to New Zealand, it immediately lowered the overnight cash rate by

1 *The terms of trade shock, however, was not the only negative shock the New Zealand economy faced during that period. Its farm sector experienced a severe drought, which also hurt the economy. Thus, a mistake in monetary policy was not the only source of the recession. Bad luck played a role, too. See Drew and Orr (1999) and Brash (2000).*

2 *See Landerretche, Morandé, and Schmidt-Hebbel (1999), and Mishkin and Savastano (2001).*

3 *See MacFarlane (1999) and Stevens (1999).*

50 basis points to 5% and kept it near this level until the end of 1998, when it was lowered again by another 25 basis points.

Indeed, the adoption of the inflation targeting regime probably helped the Reserve Bank of Australia to be even more aggressive in its easing in response to the East Asian crisis and helps explain why their response was so rapid. The Reserve Bank was able to make clear that easing was exactly what inflation targeting called for in order to prevent an undershooting of the target, so that the easing was unlikely to have an adverse effect on inflation expectations. The outcome of the Reserve Bank's policy actions was extremely favorable. In contrast to New Zealand and Chile, real output growth remained strong throughout this period. Furthermore, there were no negative consequences for inflation despite the substantial depreciation of the Australian dollar against the U.S. dollar by close to 20%: inflation remained under control, actually falling during this period to end up slightly under the target range of 2% to 3%.

The analysis above and the recent experiences of countries like New Zealand, Chile and Australia strongly suggest that central banks' concerns about the exchange rate should not deter them from keeping their eyes on the inflation ball.

Does a focus on achieving the inflation goal imply that central banks should pay no attention to the exchange rate? Of course not. As we have seen in the previous section, an important transmission mechanism for monetary policy is the exchange rate and its level has important effects on inflation and aggregate demand depending on the nature of the shocks, particularly in small open economies. Therefore, the central bank needs to closely monitor exchange rate developments and factor them into its decisions on setting monetary policy instruments. A depreciation of the exchange rate due to portfolio shocks or a positive terms-of-trade shock requires a tightening of monetary policy in order to keep inflation from rising. On the other hand, a depreciation when there is a negative terms-of-trade shock requires a different response: an easing of monetary policy, as Australia did in 1997.

Does the avoidance of a target for the exchange rate imply that central banks should have a benign neglect of exchange rates. This issue is particularly relevant for emerging market countries as is emphasized in Mishkin (2000) and Mishkin and Savastano (2001). For the reasons discussed earlier, emerging market countries with a lot of foreign currency-denominated debt may not be able to afford sharp depreciations of their currencies, which can destroy balance sheets and trigger a sharp fall in aggregate demand. Central banks in these countries may thus have to smooth "excessive" exchange rate fluctuations, but must make it clear to the public that they will not preclude the exchange rate from reaching its market-determined level over longer horizons. The stated rationale for exchange rate smoothing should be similar to that of interest-rate smoothing, which is practiced by most central banks, even those engaged in inflation targeting: the policy is not aimed at resisting market-determined movements in an asset price, but at mitigating potentially destabilizing effects of abrupt changes in that price.

Stock and Real Estate Prices

With the bursting of the stock market and real estate bubble in Japan at the beginning of the 1990s and the recent stock market boom (and partial reversal) in the United States, there has been a growing debate about how the monetary authorities should react to stock market and real estate fluctuations.[1]) I will argue that central banks should typically respond to real estate and stock price fluctuations in a similar way to how they should respond to exchange rate fluctuations. Depending on the nature of the shocks and the initial conditions, monetary policy should respond in different ways. What is key is that the central bank not be perceived as having a target for any asset price, whether it is an exchange rate, or stock market or real estate prices.

The discussion of the monetary transmission mechanism in the previous section indicates that real estate and stock price movements do have an important impact on aggregate demand and thus must be followed closely to evaluate the stance of monetary policy. Indeed, with a standard loss function in which the central bank minimizes a weighted average of squared deviations of inflation from its target level and output from potential output, optimal monetary policy will react to changes in real estate and stock market prices. However, depending on the nature of the shock to these prices, and depending on whether the shock is considered to be temporary or permanent, the optimal response of monetary policy would differ. Thus, just as targets for exchange rates would be problematic, so too would targets for real estate and stock prices.

But this still begs the question of whether monetary authorities should try to prick asset price bubbles, because subsequent collapses of these asset prices might be highly damaging to the economy, as they were in Japan in the 1990s. Cecchetti, Genburg, Lipsky, and Wadhwani (2000), for example, argue that central banks should at times target asset prices in order to stop bubbles from getting too far out of hand. However, there are serious flaws in their argument. First, it is very hard for monetary authorities to identify that a bubble has actually developed. To assume that they can is to assume that the monetary authorities have better information and predictive ability than the private sector. If the central bank has no informational advantage and if it knows that a bubble has developed which will eventually crash, the market knows this too and then the bubble would unravel and thus be unlikely to develop. Without an informational advantage, the central bank is as likely to mispredict the presence of a bubble as the private market and thus will frequently be mistaken and pursuing the wrong monetary policy. Cecchetti, Genburg, Lipsky, and Wadhwani (2000) find favorable results in their simulations when the central bank conducts a policy to prick asset price bubbles because they assume that the central bank knows the bubble is in progress. This assumption is highly dubious because it is hard to believe that the central bank has this kind of informational advantage over private markets. Indeed, the view that government officials know better than the markets has been proved wrong over and over again.

1 For example, see Cecchetti, Genburg, Lipsky, and Wadhwani (2000) and Bernanke and Gertler (1999).

A second problem with the central bank targeting stock prices is that it is likely to make the central bank look foolish. The linkage between monetary policy and stock prices, although an important part of the transmission mechanism, is still nevertheless a weak one. Most fluctuations in stock prices occur for reasons unrelated to monetary policy, either reflecting real fundamentals or animal spirits. The loose link between monetary policy and stock prices therefore means that the ability of the central bank to control stock prices is very limited. Thus, if the central bank indicates that it wants stock prices to change in a particular direction, it is likely to find that stock prices may move in the opposite direction, thus making the central bank look inept. Recall that when Alan Greenspan made his speech in 1997 suggesting that the stock market might be exhibiting "irrational exuberance," the Dow Jones average was around 6,500. This did not stop the market from rising, with the Dow Jones subsequently climbing to above 11,000.

An additional problem with targeting asset prices is that it may weaken support for a central bank because it looks like it is trying to control too many elements of the economy. Part of the recent successes of central banks throughout the world has been that they have narrowed their focus and have more actively communicated what they can and cannot do. Specifically, central banks have argued that they are less capable of managing short-run business cycle fluctuation and should therefore focus more on price stability as their primary goal. A key element of the success of the Bundesbank's monetary targeting regime was that it did not focus on short-run output fluctuation in setting its monetary policy instruments.[1]) This communication strategy for the Bundesbank has been very successful and has been adopted as a key element in inflation targeting, a monetary regime that has been gaining in popularity in recent years. By narrowing their focus, central banks in recent years have been able to increase public support for their independence.[2]) Extending their focus to asset prices has the potential to weaken public support for central banks and may even cause the public to worry that the central bank is too powerful, having undue influence over all aspects of the economy.

3 Conclusions

The discussion in this paper shows that other asset prices, and not just interest rates, are important elements of the monetary transmission mechanism. Thus, monetary authorities should and do pay a lot of attention to these other asset prices in the conduct of monetary policy. However, this paper has also argued that targeting other asset prices, whether they are exchange rates, real estate or stock market prices, is likely to worsen the performance of monetary policy. This is because the response of monetary policy to asset price fluctuations depends on the nature of the shocks to asset prices and the degree of permanence of the shocks. Furthermore, targeting asset prices is likely to erode support for the independence of

1 *See Bernanke, Laubach, Mishkin, and Posen (1999).*

2 *See Mishkin (1999b) and Bernanke, Laubach, Mishkin, and Posen (1999).*

central banks because control of these asset prices is beyond central banks' capabilities.

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Asymmetric Transmission of Monetary Policy through Bank Lending – Evidence from Austrian Bank Balance Sheet Data

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1 Introduction

The present paper investigates whether monetary policy affects the real economy in Austria through a bank lending channel. Basically, this channel works through competition among banks for reserves and deposits to secure their lending portfolio. When restrictive monetary policy drains reserves, and thus deposits from the banking system, banks usually have to cut their loans to match the decrease in liquidity within the system. The extent of the cut, however, is thought to depend on the exposure of each individual bank to liquidity constraints. Potentially, smaller (and/or more illiquid) banks thus restrict lending more than large (and/or liquid) banks do, as their ability to resort to other forms of financing (bond issues, borrowing on the interbank market) as a substitute for deposits is limited (see e.g. Stein, 1998). In addition to this cross-sectional asymmetric response to monetary policy, we investigate a potential asymmetric effect of monetary policy over time, e.g. over the business cycle. As liquidity constraints are potentially tighter during an economic slowdown, monetary policy should have a greater impact than during an economic recovery. In Kiyotaki and Moore (1997), an initial liquidity shock is amplified and transmitted through the finance system due to partial debt default. In periods of recession, such credit crunch chain reactions are more probable and exaggerate the response of the economy to liquidity shocks.

There are various possibilities to investigate the cross-sectional asymmetric response in bank lending. Within the classical econometric context, Kashyap and Stein (1995) first aggregate individual bank balance sheet data according to relative size classes, and then in a second step regress the growth rate of loans on a measure for monetary policy. Their evidence documents a stronger reaction of small banks to monetary policy impulses. The authors take up a similar two-step approach in Kashyap and Stein (2000), where they investigate the impact of balance sheet strength (measured by the ratio of liquid assets to total assets) on lending. Within the first step, the authors estimate a cross-section equation for each size class and each time period where the growth rate of loans is regressed on liquidity. A pure time-series process is then fitted to the coefficient estimate on liquidity in each size class, where monetary policy is included as explanatory variable. Indeed, they find that for the smallest size class, liquidity constraints are more binding and thus induce stronger effects of monetary policy than for large banks. Another possibility to assess the cross-sectional effect of monetary policy is to use a full panel data set, and estimate a specification including interaction terms of specific bank characteristics with monetary policy. We find evidence on European countries in this line of research in de Bondt (1999). The bank lending channel appears to be strongest in Germany, Belgium and the Netherlands,

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followed by France and Italy. In contrast, the bank lending channel does not seem to be relevant for the United Kingdom.

As an alternative to the approach that classifies banks according to their size in a first step and then estimates reaction functions to monetary policy in a second step, we suggest a model specification with a latent group specification, i.e. a model in which the classification of banks is data driven in the sense that it is part of the model estimation. Traditional cross-sectional asymmetry in bank lending behavior should yield a classification that is related to the size or liquidity strength of an individual bank. To this end, group-specific parameters on the reaction to monetary policy changes are introduced in the model specification. A second latent (unobservable) state process is introduced in our model to account for the asymmetric response of bank lending over time. Here, the latent specification is adopted because the overall state of the economy is usually not observed with certainty. Moreover, we do not know a priori in which periods liquidity constraints are binding. To sum it up, the bank-specific parameters capture the difference between the banks' lending reaction to interest rate changes (cross-sectional asymmetry). The extent of the reaction, however, depends on the overall economic situation, and the difference in lending reaction between the two regimes is captured by the regime-specific parameter.[1])

Only little literature investigates the asymmetric transmission of monetary policy over time within a panel data context. Asea and Blomberg (1997) investigate asymmetric pricing of lending over the business cycle using the Markov switching framework advocated by Hamilton (1989). Kaufmann (2001) investigates the time-varying lending behavior of Austrian banks within a similar setting where cross-sectional asymmetry in the lending reaction is captured by interacting relevant bank characteristics with monetary policy variables. The present stage of this investigation documents only weak evidence for size and/or liquidity to be the relevant bank features that characterize the bank lending channel.

In the present paper, we assess the cross-sectional and the time dimension of monetary policy transmission through the bank lending channel (i.e. through loan supply) by regressing the growth rate of loans to households and nonfinancial enterprises on four lagged values of the first difference of the Austrian three-month interest rate as a measure for monetary policy. For each bank, these coefficients are modeled to be group- and time-specific. In addition, we include four autoregressive lags of the dependent variable, a constant and seasonal dummies. The control variables that account for the overall demand situation and for nominal loan growth are GDP growth and the inflation rate, respectively. The specification with two latent state variables rules out estimation within the classical maximum likelihood framework. Therefore, the estimation is cast into a Bayesian framework, and the inference is obtained using Markov Chain Monte Carlo (MCMC) simulation methods. An introduction to MCMC methods is found in Smith and Roberts (1993). A readable overview on MCMC is provided in

1 *Note that the extent of the lending reaction in each regime is independent of whether interest rates are increased (i.e. monetary policy is restrictive) or decreased (monetary policy is expansive).*

Gelman et al. (1996, chapter 11), applications to economic issues are found in Kim and Nelson (1999), while the more technically interested reader may refer to Gilks et al. (1996). Specifically, we apply an extension of the permutation sampler proposed and discussed in detail in Frühwirth-Schnatter (2001a).

The results document an asymmetric effect of monetary policy over time, whereby the transitory reaction of bank lending is stronger around quarters of below-average growth than during quarters of above-average quarterly growth periods. The banks can be grouped according to the strength of, and their timely reaction to, interest rate changes; an absolute distinction between the groups by means of size and/or liquidity is not possible, however. Most of the banks fall into one group, irrespective of whether we allow for two, three or four groups. In general, banks' transitory lending reaction is not very strong, even nearly insignificant, in quarters of above-average growth, while their lending is restricted significantly after interest rate increases around quarters of below-average growth. All but a few of the remaining banks that form the other groups belong to the credit cooperative sector. They are small in general, but there are also relatively large banks with unusual (high or low) liquidity shares in these other groups. The main difference to the major group is the usually stronger lending reaction to interest rate changes in quarters of above-average growth. Last, it is noteworthy that the classifications turn out to be quite robust with respect to the number of groups we allow.

The next section presents the model and related special cases. Section 3 elaborates on the estimation. The results are discussed in section 4. Finally, as we treat outliers as missing values, we reproduce in the appendix some examples of loan series in which outliers are substituted by an estimate of the unobserved value.

2 The Model

2.1 Model Formulation

Let $\{y_{it}\}, t = 1, ..., T$, be the time series of (quarterly) growth rates in loans (dlo_{it}, computed by the logarithmic differences of the levels) for each bank $i, i = 1, ..., N$. For an individual bank i, the loan growth rate at time t is described by the following model:

$$y_{it} = X^1_{it}\alpha + X^2_{it}\beta^G_{S_i} + X^3_{it}\beta^R(I_t - 1) + \varepsilon_{it}, \qquad (1)$$

where ε_{it} is the unexplained error term. We apply here the most common error model, which is based on the assumption that ε_{it} is normally distributed:

$$\varepsilon_{it} \sim N(0, \sigma^2), \qquad (2)$$

with σ^2 being independent of time and being the same for all banks, and with ε_{it} being uncorrelated between banks and over time.

X^1_{it}, X^2_{it} and X^3_{it} are explanatory variables. Typical examples for such explanatory variables are:

– first differences of the interest rate at time t (dir_t) as well as lagged values of it $(dir_{t-1}, ..., dir_{t-r})$;
– lagged values of the loan growth rate for each bank $i, i = 1, ..., N(dlo_{it-1,}..., dlo_{it-p})$;
– seasonal dummy variables;
– economic indicators such as inflation (dp_t) and real GDP growth rate (dy_t).

From (1) we see that the explanatory variables affect the left-hand variable y_{it} in three different ways.

The fixed effects. X^1_{it} contains the fixed effects, and α is the corresponding parameter quantifying the influence of these effects on the expected mean of y_{it}. The effects are *fixed* in the sense that a change in the jth explanatory variable X^1_{itj} affects y_{it} in the same way for *all* banks. This effect is quantified by α_j. The analysis below will assume the effects of the constant, the seasonal dummies, the control variables, as well as of the autoregressive part to be fixed.

The bank-specific effects. X^2_{it} contains the bank-specific effects, and $\beta^G_{S_i}$ quantifies their influence on the expected mean of y_{it}. The effects are *bank specific* in the sense that a change in the jth explanatory variable X^2_{itj} affects y_{it} in a *different way* for each bank. Of course, an effect is either fixed or bank-specific. So, no variable entering X^1_{it} is found in X^2_{it}. Lagged interest rate changes will be the variables that have group-specific effects on y_{it}.

Of the various ways of modeling the bank-specific effects, we apply here the so-called switching regression (or latent class) model. We assume that the banks form K groups with different effects, and that within a group the effect is fixed. Each of the different parameter vectors β^G_1, ..., β^G_K is thus associated with one group. The most natural allocation is to associate group 1 with parameter vector 1, group 2 with parameter vector 2, and so on. However, note that in general there are $K!$ different ways of allocating the vectors to the different bank groups.

S_i is a group indicator with i running from 1 to N, where N is the number of banks. The indicator S_i takes on one out of K values, $S_i = 1, 2, ..., K$, and associates each bank i to one of the parameter vectors β^G_1, ..., β^G_K: $\beta^G_{S_i}$ thus quantifies the effect of X^2_{it} on y_{it}. In practice, neither the group membership nor the number of groups are known. For a given K, the allocation of each bank to one group is thus part of the estimation procedure.

The regime-specific effects. In the present context we allow the explanatory variables appearing in X^2_{it} (the lagged interest rate changes) to have a different effect on the expected value of y_{it} depending on the economic regime prevailing in t. We assume here the presence of two states of the economy. Our empirical investigation will show that one state of the economy can be associated with periods of above-average GDP growth, while the other state relates broadly to periods of below-average growth.

We summarize all regime-specific effects in X^3_{it}. $I_t, t = 1, ..., T$, denotes the regime indicator that relates to specific economic periods. It is coded as a dummy variable taking the value 0 in one state and the value 1 in

the other state. If $I_t = 1$, the following model for bank i holds:

$$y_{it} = X^1_{it}\alpha + X^2_{it}\beta^G_{S_i} + \varepsilon_{it}. \quad (3)$$

Therefore, α and $\beta^G_{S_i}$ quantify the influence of the corresponding effects when the economy is in regime $I_t = 1$. If regime $I_t = 0$ prevails, the following model holds:

$$y_{it} = X^1_{it}\alpha + X^2_{it}\beta^G_{S_i} - X^3_{it}\beta^R + \varepsilon_{it}. \quad (4)$$

β^R quantifies how much the effect of the variables in X^3_{it} on y_{it} differs between the two states of the economy. Thus, a unit change (corresponding here to a 100 basis point increase) in the jth lagged interest rate, affects y_{it} (the loan growth rate of bank i) by β^G_{kj} % when $I_t = 1$, and by $\beta^G_{kj} - \beta^R_j$ % when $I_t = 0$. As for the group indicator S_i, the regime indicator is not known and has to be estimated along with the parameters from the data.

2.2 Modeling the Indicators

In order to complete the model specification, we have to formulate a probabilistic model for each indicator. These will turn out to be *prior distributions* within the Bayesian approach we use in the present paper.

Prior distribution of the group indicators. We assume *a priori* that the probability of each bank to belong to group k is equal to the relative size η_k of group k:

$$Pr(S_i = k) = \eta_k. \quad (5)$$

The group sizes in $\eta = (\eta_1, ..., \eta_K)$, which obviously sum to 1, are assumed to be unknown and are estimated along with the data.

Prior distribution of the regime indicator. We assume *a priori* that the probability of being in state 1 or 0 at time t depends on the regime prevailing at time $t-1$:

$$Pr(I_t = 1|I_{t-1} = 1) = \eta^{MS}_{11},$$
$$Pr(I_t = 0|I_{t-1} = 0) = \eta^{MS}_{00}.$$

From this, obviously,

$$Pr(I_t = 0|I_{t-1} = 1) = \eta^{MS}_{10} = 1 - \eta^{MS}_{11},$$
$$Pr(I_t = 1|I_{t-1} = 0) = \eta^{MS}_{01} = 1 - \eta^{MS}_{00}.$$

This is the Markov switching prior that is commonly applied in this context (Hamilton, 1989). The specification accounts for periods of potentially different duration. The transition matrix $\eta^{MS} = (\eta^{MS}_{00}, \eta^{MS}_{01}, \eta^{MS}_{10}, \eta^{MS}_{11})$ of the Markov chain I_t is assumed to be unknown, and is estimated along with the data.

2.3 Special Cases and Related Work

Interesting special cases of model (1) are the following:

– *Pooled model without regime indicator.* There is no heterogeneity between the banks and no regime dependence:

$$y_{it} = X_{it}^1 \alpha + \varepsilon_{it}. \tag{6}$$

Note that this is a classical regression model and could be estimated using traditional OLS methods.

– *Pooled model including a regime indicator.* There is no heterogeneity between the banks, but the effects are regime dependent:

$$y_{it} = X_{it}^1 \alpha + X_{it}^3 \beta^R (I_t - 1) + \varepsilon_{it}. \tag{7}$$

We assume that all columns of X_{it}^3 appear inX_{it}^1, the most general case being the one where $X_{it}^3 = X_{it}^1$ for all t. Here, the presence of the unobservable regime indicator I_t, which needs to be estimated along with the data, requires the use of some sophisticated estimation methods which go beyond OLS estimation.

– *K group model without regime indicator.* Heterogeneity between the banks is present without regime dependence of the effects, however:

$$y_{it} = X_{it}^1 \alpha + X_{it}^2 \beta_{S_i}^G + \varepsilon_{it}. \tag{8}$$

Again, the presence of the unobservable group indicator S_i, which is estimated along with the data, requires the use of some elaborated estimation methods.

3 Estimation

3.1 Bayesian Estimation Using MCMC

Because of the two unobservable indicators S_i and I_t, classical maximum likelihood methods are not feasible to estimate the most general model introduced in equations (1) and (2). In principle, we could use the truncation filter described in Kim and Nelson (1999) to approximate the likelihood function. However, we prefer to apply the Bayesian approach and to use MCMC simulation methods. Technically, the model can be viewed as a state space model with discrete state vector I_t where switching (between groups) is present. Frühwirth-Schnatter (2001b) discusses the estimation of state space models with a continuous state vector. Here, we apply an extension to the case of a discrete state vector.

All model parameters are unknown, and need to be estimated from the data. These are, specifically:

– the fixed effects α, the bank-specific effects $\beta_1^G, ..., \beta_K^G$ and the state-dependent parameter β^R;
– the variance σ^2 of the error model in (2);
– the distribution $\eta = (\eta_1, ..., \eta_K)$ of the group indicators S_i as well as the transition matrix η^{MS} of the regime indicator.

Moreover, we also have to estimate the group indicator of each bank and the path of the state variable, $S^N = (S_1, ..., S_N)$ and $I^T = (I_0, I_1, ..., I_T)$, respectively.

To simplify notation in the following, we summarize all model parameters in $\theta = (\alpha, \beta_1^G, ..., \beta_K^G, \beta^R, \sigma^2, \eta, \eta^{MS})$, and ψ denotes the *augmented* parameter vector $\psi = (S^N, I^T, \theta)$. The Bayesian approach treats ψ as a random variable, thereby expressing the belief that the estimation of the parameter, given the data, is subject to uncertainty. The uncertainty is implemented by assigning *a priori* a probability distribution to the parameter. Given the data and using Bayes' theorem, we can then update the prior to get the posterior distribution $\pi(\psi|y^N)$ of the parameter:

$$\pi(\psi|y^N) \propto L(y^N|\psi)\pi(\psi),$$

where $L(y^N/\psi)$ is the classical likelihood function.

Obviously, the analytical derivation of the posterior is not trivial, and is even unfeasible in the present case. Using MCMC simulations, however, yields an estimate of $\pi(\psi|y^N)$, and thus an estimate of the mean of the parameters along with the degree of uncertainty (reflected in some dispersion measure of the distribution, e.g. the standard deviation). The *joint* posterior is estimated by iteratively simulating parameter values and values for S^N and I^T out of *conditional* posterior distributions of the appropriately blocked parameter vector. The sampling steps are the following:

1. sample S^N from the conditional distribution $\pi(S^N|\theta, I^T, y^N)$;
2. sample the group probabilities η from the conditional distribution $\pi(\eta|S^N)$;
3. sample the transition matrix η^{MS} from the conditional distribution $\pi(\eta^{MS}|I^T)$;
4. sample all model parameters $\alpha, \beta_1^G, ..., \beta_K^G, \beta^R$ jointly from the conditional distribution $\pi(\alpha, \beta_1^G, ..., \beta_K^G, \beta^R|\sigma^2, S^N, I^T, y^N)$;
5. sample σ^2 from the conditional distribution $\pi(\sigma^2|\alpha, \beta_1^G, ..., \beta_K^G, \beta^R, S^N, I^T, y^N)$;
6. sample I^T from the conditional distribution $\pi(I^T|\theta, S^N, y^N)$.

Given reasonable starting values for I^T and θ, we first sample a group indicator for each bank out of $\pi(S^N|\theta, I^T, y^N)$, i.e. each S_i takes either value out of {1,2,...,K}. Then, given the sampled values S^N, we simulate values for the group probabilities η. Next, we simulate the transition probabilities η^{MS}, which in fact depend only on I^T. Values for the parameters are simulated out of the posterior distributions given in step 4 and 5, respectively, conditional on the current values of S^N, I^T, η and η^{MS}. The sampling scheme is completed with the simulation of a path for the regime indicator. We obtain numerous simulated values out of $\pi(\psi|y^N)$ by iterating several thousands of times over the steps 1 to 6, and discarding some initial values to reduce the dependence on starting values. It can be proved on a very formal basis that this procedure indeed converges to the joint posterior distribution $\pi(\psi|y^N)$, and that the convergence is independent of the initial state. The interested reader finds the detailed

sampling scheme along with a description of the prior distributions as well as the derivation of the posterior distributions in the research report of the analysis (Frühwirth-Schnatter and Kaufmann, 2001).

4 Results

4.1 The Data

For the analysis we use quarterly individual bank balance sheet data covering the period 1990/1 through 1998/4. They stem from the monthly bank statements reported to the Oesterreichische Nationalbank by each individual bank. The initial sample covers all banks present at the end of the observation period. The computer system of the OeNB compiles the data base in such a way that accounts of banks involved in a merger during the observation period are consolidated, and reported under the absorbing banks from the period when the merger took place onwards. The absorbed banks are canceled and dropped from the data base. Therefore, some balance sheet series of interest, in particular the loan series, display breaks around periods when mergers took place. The original bank sample includes 934 banks, 182 of which were involved in mergers where 268 banks were overtaken. Most mergers took place in the Raiffeisen (rural) credit cooperative *(Raiffeisenkassen)* sector with 118 mergers, the savings banks *(Sparkassen)* and Volksbank (industrial) credit cooperatives *(Volksbanken)* follow with 30 and 18 mergers, respectively. The mergers in the *Raiffeisen* and *Volksbank* sectors are mostly small-scale mergers, where small local banks joined together to improve effectiveness and cost efficiency (Mooslechner, 1989 and 1995; Waschiczek, 1999). Some consolidation on a regional scale has occurred in the former sector, when *Raiffeisen Landesbank Niederösterreich* and *Raiffeisen Landesbank Wien* merged in 1997. The large-scale mergers, however, took place in the savings bank sector. At the beginning of the 1990s, *Länderbank* merged with *Zentralsparkasse* to form *Bank Austria,* the largest Austrian bank. In 1997, the federal government sold its stake in *Creditanstalt,* the second largest bank at the time, to *Bank Austria*. Both banks continued doing business under separate corporate identities in the domestic market, while they merged there activities abroad.

A further characteristic of the original sample are the missing values at the beginning of the observation period. These refer to 130 banks that were newly founded during the 1990s. These banks are dropped from the sample, as the estimation is done for a balanced sample due to computational restrictions. Further outliers are identified in several steps, and are handled differently according to their nature. First, the loan series of banks involved in a merger were inspected visually. This revealed in most cases an extreme value in the loan growth rate recorded for the period coinciding with the merger (see chart 9 in the appendix). Second, "true" outliers were identified as being observations for the loan growth rate lying outside the interval of ± 5 times the interquartile range around the median. In order not to lose the information contained in these series by removing them from the sample, we treat them as missing values. The sampler described above is extended by one step that replaces a missing value in period t by an estimate of the data point given all available information in t (see the appendix).

Finally, a preliminary investigation revealed some banks with very volatile loans series that did not display the usual pattern of most commercial banks. It turned out that these banks belong mainly to two groups, specialized leasing and foreign banks. The first group specializes in leasing contracts (mainly car financing), so their lending is mainly related to the launch of new car series or changes in fiscal regimes. Specialized foreign banks' business activity, on the other hand, might depend more heavily on the international financial situation or on the financial situation of the head office abroad rather than on Austrian monetary policy. Therefore, these 40 banks are removed from the sample, as we think that the information content on bank lending in these banks' series is very limited.

A total of 764 banks remain in the sample for the analysis, covering nearly 65% and 84% of the banking sector at the beginning and at the end of the 1990s, respectively. Table 1 presents some summary statistics on the adjusted, balanced sample for the first quarter of 1996. Only 29 banks account for 78% of the banking sector's total assets, while the 29 smallest banks form only a negligible part of the banking sector. 116 banks form the upper 15th percentile of the relative largest banks, and cover only 10% more of total assets than the largest banks in absolute values. Note finally that the span of the total balance sheet is much larger for big than for small banks. Interestingly, the last columns of the table reveal that on average, large banks are more illiquid than small banks, whereby the span of the liquidity share is again larger for big banks than for small banks (see the second panel of the table). However, there are also small banks that are illiquid, whereas only medium-sized banks happen to be liquid. The bottom panel of the table reveals that the distribution of loans reflects approximately the asset distribution of the banking sector. The market share of the large banks' loans amounts to 75%. Because they fall in the category of illiquid banks, these account for 60% of the loan market. Interestingly, the median loan share is higher for large or illiquid banks, but not very much higher than for small or liquid banks.

Table 1

Summary Statistics of the Balanced Data Set, 1996 (1st quarter)

	Total	big >1601	small <11	big >85th	small <12.5th	liquid >85th	illiquid <12.5th
	EUR million						
Number of banks	764	29	29	116	96	116	96
Total assets	304,132	238,108	206	269,239	1,176	17,514	177,977
Market asset share	1.00	0.78	0.00	0.89	0.00	0.06	0.59
Median size	51	3,527	8	333	13	29	129
95% interval[1])	9/2,613	1,841/46,084	1/11	170/16,785	1/17	8/1,272	5/16953
Median liquidity	19.66	12.01	23.06	14.22	25.37	31.56	11.09
95% interval[1])	6.41/37.84	1.80/31.34	11.18/34.19	2.19/33.40	11.18/40.48	27.95/45.72	0.14/12.82
Total loan/market share	144,280	0.75	0.00	0.86	0.00	0.04	0.60
Median loan share	54.06	56.16	50.38	57.06	47.45	47.56	58.27
95% interval[1])	25.69/77.94	24.95/86.34	23.54/76.60	17.69/81.87	22.77/73.55	21.53/61.90	17.69/91.89

Source: OeNB.

[1]) The 95% interval is measured by the lower and the upper 2.5th percentile, respectively.

Size and liquidity are clearly negatively related in this sample, so the interpretations of the classifications estimated in the analysis below will have to take into account this typical feature of the data. Moreover, nearly 60%

of the banking sector is organized in a multi-tier system (see also IMF, 1998 and 2000; and Kaufmann, 2001) with mutual financial assistance among banks of the same sector, which alleviates the liquidity constraints these banks might be exposed to in times of restrictive monetary policy. This and the fact that the Austrian banking system is dominated by small banks doing business on a local scale, which decreases their informational problems, makes it questionable whether traditional features of a bank lending channel are observable in Austrian bank data.

4.2 Inference for Two Groups

The cleaned data is used to estimate the model introduced in equation (1) and (2), whereby the equation fitted to bank i writes explicitly:

$$dlo_{it} = \alpha_0 + \sum_{j=1}^{3} \alpha_j D_{jt} + \sum_{j=1}^{4} \alpha_{3+j} dlo_{it-j} + \alpha_8 dy_t + a_9 dp_t + \sum_{j=1}^{4} \beta_{ij}^{G} dir_{t-j} + \sum_{j=1}^{4} \beta_{j}^{R} dir_{t-j}(I_t - 1) + \varepsilon_{it},$$

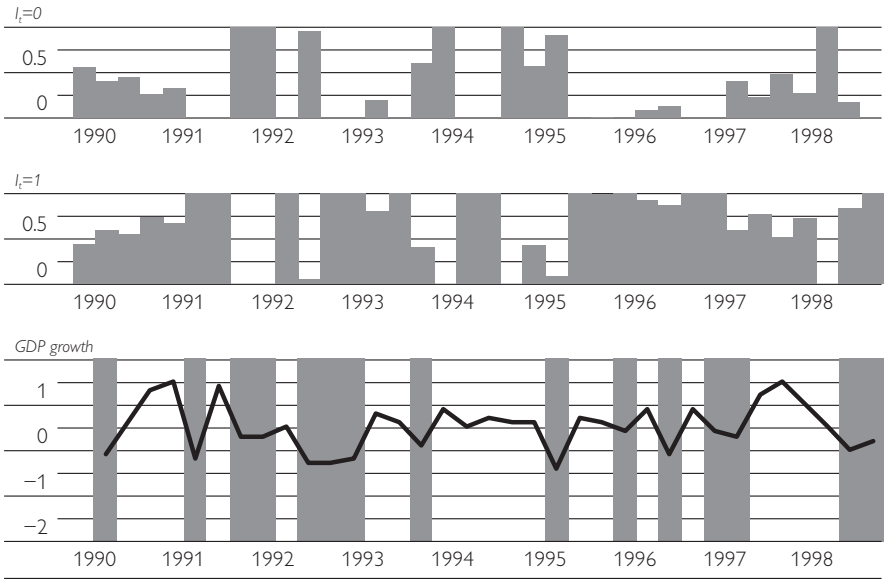
with $\varepsilon_{it} \sim N(0, \sigma^2)$, and where dlo_{it}, dy_t, and dp_t stand for the growth rate of loans, GDP growth rate and inflation rate (all in percentage terms, computed as 100 times the difference of the logarithmic level), respectively. The latter two variables are included to control for the overall demand situation in the economy and for the growth rate in the nominal loan level, respectively. The variable dir_t represents the first difference of the interest rate, and $D_{jt}, j = 1, 2, 3$, is a set of quarterly dummy variables. We only include lagged values of the interest rate in order to alleviate a potential simultaneity and/or endogeneity problem between GDP growth and interest rate movements. Moreover, the specification is in line with the standard identification made in related literature investigating monetary policy effects, where it is assumed that policy moves affect real variables only with a lag while policy itself may react contemporaneously to developments in real variables (see e.g. Bernanke and Mihov, 1998). The investigation period ends precisely in 1998 because the three-month EURIBOR substituted the country-specific interest rates by the beginning of 1999. Finally, the vector β_i^G takes on one out of K values, depending on the group bank i is classified in, $\beta_i^G = \beta_k^G$ iff $S_i = k, k = 1, ..., K$. The interest rate effect is β_i^G iff $I_t = 1$ and $\beta_i^G - \beta^R$ iff $I_t = 0$.

We first discuss in detail the results of a two-group specification we obtained by iterating over the sampler 18,000 times, deleting the first 8,000 to remove dependence on initial values. Then we augment the number of groups to three and four, respectively, and report on the main differences (or similarities) that arise.

The first interesting question is whether we can indeed discriminate between two economic regimes during the 1990s, in other words, whether the parameters in β^R are significantly different from zero. The mean of the parameters of interest along with t-values are found in table 2. The values

Chart 1

K=2, Posterior State Probabilities



Source: OeNB.

are simply computed by taking the mean over all simulated parameter values and by dividing the mean by the standard deviation, respectively. Indeed, the last column documents the significance of the two states with stronger effects of interest rate changes when $I_t = 0$. Chart 1 depicts the posterior state probabilities (again computed by taking the average over all simulated paths for I_t) in the first two panels along with a plot of GDP growth in the bottom panel, where the shaded areas relate to quarters of below-average growth. I_t does not follow the behavior of GDP growth contemporaneously in every period. However, $I_t = 0$ is mostly proponent around quarters of subdued growth. It coincides with quarters of below-average growth at the end of 1991, and during the first and third quarter of 1992. In other instances, $I_t = 0$, in particular shortly after (first quarter of 1994) or before (around the first quarters of 1995 and 1998) periods of below-average growth.

Table 2

K=2, Mean Parameter Estimates (with t-values)

coeff.	$I_t = 1$		$I_t = 0$		
	β_1^G	β_2^G	$\beta_1^G - \beta^R$	$\beta_2^G - \beta^R$	β^R
dir_{t-1}	−4.38	0.40	−3.18	1.60	−1.20
	(−6.61)	(2.66)	(−4.37)	(3.95)	(−2.78)
dir_{t-2}	0.58	0.32	−1.31	−1.57	1.89
	(0.81)	(1.57)	(−1.70)	(−4.61)	(5.82)
dir_{t-3}	4.86	0.41	2.79	−1.66	2.07
	(6.09)	(2.53)	(3.31)	(−4.30)	(6.04)
dir_{t-4}	−1.51	−0.22	0.65	1.94	−2.16
	(−1.81)	(−1.25)	(0.75)	(5.60)	(−5.97)
sum	−0.44	0.91	−1.04	0.30	×
	(−0.66)	(4.81)	(−0.63)	(3.34)	×

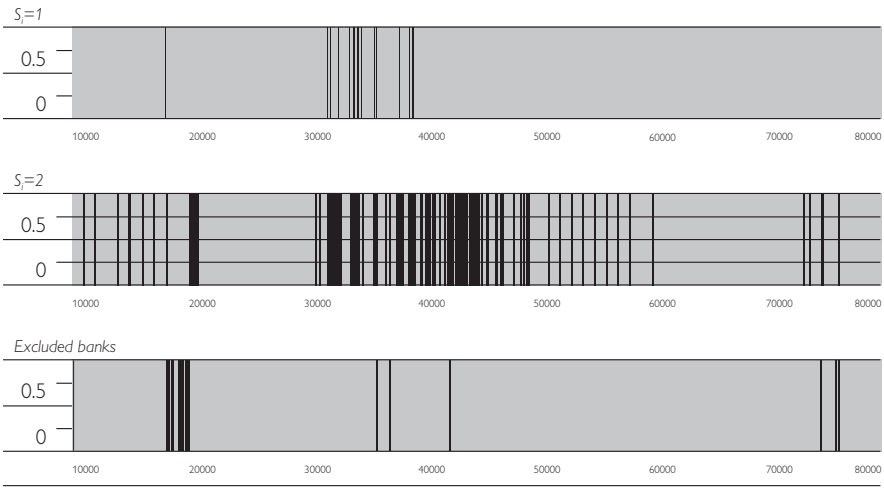
Source: OeNB.

To complete the interpretation of the states, we have to assess the difference in the lending reaction of the banks in the two states. In table 2 we see that the two bank groups differ in the extent of, and their timely lending reaction to, interest rate changes. The first group of banks counteracts the lagged significant negative effect of interest rate changes on loan supply (a 100 basis points increase in the interest rate leads to a lagged contraction in lending of roughly 4.4%) two quarters later. This counteracting effect is smaller when $I_t = 0$, which results in a stronger overall negative reaction in bank lending on average (see the sum of the coefficients) during these periods than during periods when $I_t = 1$. The significance of the overall effect is doubtful in both states, however. For the second group of banks, monetary policy seems to be nearly irrelevant for bank lending behavior when $I_t = 1$. In quarters of above-average growth, these banks moderately expand their lending after interest rate increases. When $I_t = 0$, however, we have a delayed negative effect of interest rate increases that is outweighed by the first period effect and the "adjustment" effect. The first period positive effect might be due to strong customer relationships alleviating the informational problems determining bank lending. The adjustment effect might be an artifact of the period under investigation. During the 1990s, a sustained period of quarterly below-average growth is only recorded for 1992/1993, where the recessionary tendencies affecting major European countries turned out to be quite mild in Austria. For the rest of the observation period, Austria's economy records an overall good performance, with only single quarters of below-average growth. As such, the pressure on banks to adjust their lending permanently after interest rate changes (that were themselves quite smooth) was reduced. These facts potentially reduce the observability of the impact of the interest rate on the lending behavior of banks.

Nonetheless, the results document that group 1 of the banks reacts more strongly to interest rate changes than group 2, and both groups

Chart 2

K=2, Bank Classification, Ranked by Identification Number



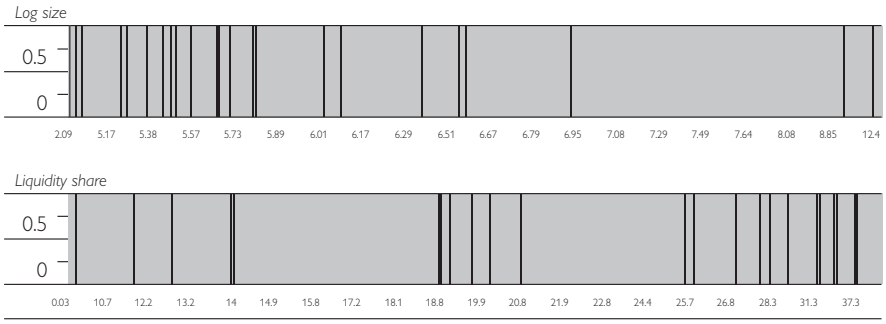
Source: OeNB.

tighten lending transitorily more strongly during periods when $I_t = 0$. Thus, the state variable seems to identify (short) periods where liquidity constraints were binding for the whole banking sector.

Chart 2 yields the last piece of evidence. It depicts the classification of banks (ordered by their identification number) into the two groups. Only a few banks (24) are in group 1, the rest belongs to group 2, and all but 1 of those 24 banks are credit cooperatives. Chart 3 ranks the banks in group 1 by size and liquidity in the first quarter of 1996 in the top and bottom panel, respectively. Chart 4 provides a scatter plot of these variables for banks in group 1. Obviously, size and liquidity are not absolute criteria to discriminate between the two groups. While in general the banks of group 1 are small, two of them are relatively big, with quite unusual (very low and quite high) levels of liquidity.

Chart 3

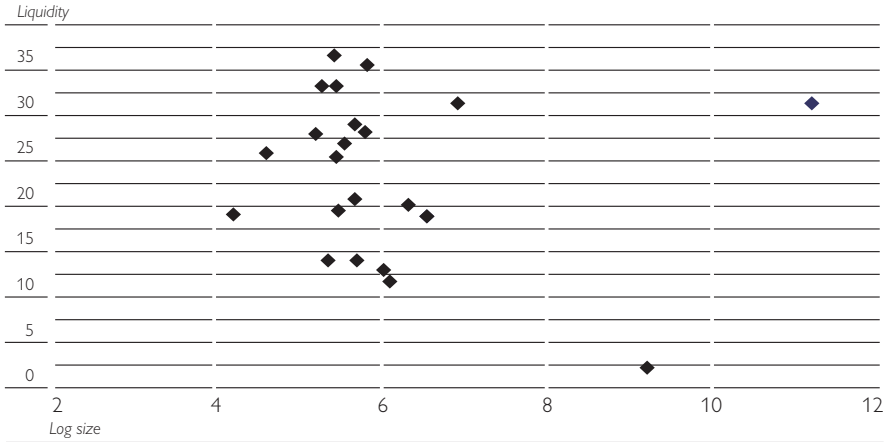
K=2, Banks of Group 1 Ranked Alternatively by Size and by Liquidity as of 1996 (1st quarter)



Source: OeNB.

Chart 4

K=2, Banks of Group 1, Scatter Plot of Size and Liquidity as of 1996 (1st quarter)



Source: OeNB.

4.3 Inference for Three and Four Groups

The visual inspection of the simulated values for the group-specific parameters[1]) suggests that potentially additional groups might be identified for our data set. Therefore, we further investigated on a three-group and a four-group specification. The posterior state probabilities depicted in chart 1 remain essentially unchanged (and the same comments apply) when we augment K to 3 and 4, respectively. Therefore, we do not display them here again.

Table 3

K=3, Mean Parameter Estimates (with t-values)

coeff.	$I_t = 1$			$I_t = 0$			
	β_1^G	β_2^G	β_3^G	$\beta_1^G - \beta^R$	$\beta_2^G - \beta^R$	$\beta_3^G - \beta^R$	β^R
dir_{t-1}	−0.80	0.33	−4.06	0.37	1.49	−2.89	−1.16
	(−0.27)	(0.38)	(−5.25)	(0.13)	(1.61)	(−3.42)	(−2.74)
dir_{t-2}	2.62	0.21	0.03	0.73	−1.68	−1.86	1.89
	(0.92)	(0.45)	(0.02)	(0.26)	(−3.11)	(−1.15)	(5.77)
dir_{t-3}	1.76	0.45	4.60	−0.28	−1.59	2.56	2.04
	(1.14)	(0.97)	(5.19)	(−0.18)	(−2.84)	(2.79)	(6.32)
dir_{t-4}	−2.48	−0.11	−1.22	−0.34	2.04	0.92	−2.14
	(−2.05)	(−0.34)	(−1.17)	(−0.28)	(4.78)	(0.86)	(−6.26)
sum	1.11	0.88	−0.65	0.48	0.25	−1.28	×
	(0.60)	(1.36)	(−0.56)	(0.60)	(1.31)	(-0.55)	×

Source: OeNB.

The parameter estimates for the three-group specification are found in table 3. It appears that group 1 in the two-group specification is now found in group 3, the significant coefficients being nearly the same in both model specifications. Group 2 now reproduces a refined picture of group 2 in the $K = 2$ specification. Apparently, interest rate moves do not affect bank lending significantly when $I_t = 1$, as all coefficients turn out to be insignificant. When $I_t = 0$, the delayed negative reaction to interest rate changes is still outweighed by the adjustment effect four quarters later. However, now the significant positive effect of lagged interest rate changes has disappeared. Last, for the first group, a significant response to monetary policy is evident a year after interest rate moves when $I_t = 1$. However, there are no significant coefficients when $I_t = 0$. On average, the overall reaction to monetary policy is somewhat stronger (less positive for group 1 and 2) when $I_t = 0$ than when $I_t = 1$. Again, the significance is doubtful, however. Note finally that again all elements of β^R are significant, and are nearly the same as in the two-group specification.

The mean parameter estimates of the four-group specification are found in table 4. Generally, group 1 of $K = 3$ is group 4 in this specification, with all parameters on the lagged interest rate changes now being significant, however. Group 3 of $K = 3$ is subsumed in group 1 here. It turns out that four of the banks additionally classified within this specification exclusively form group 2 here (see table 5). This group displays a significant lagged negative reaction to interest rate changes when $I_t = 0$. The classification in chart 5 again reveals that groups 1,2 and 4

1 *Scatter plots of the simulated values of the group- and state-specific parameters are not displayed here in order to save space. The interested reader might refer to Frühwirth-Schnatter and Kaufmann (2001).*

Table 4

K=4, Mean Parameter Estimates (with t-values)

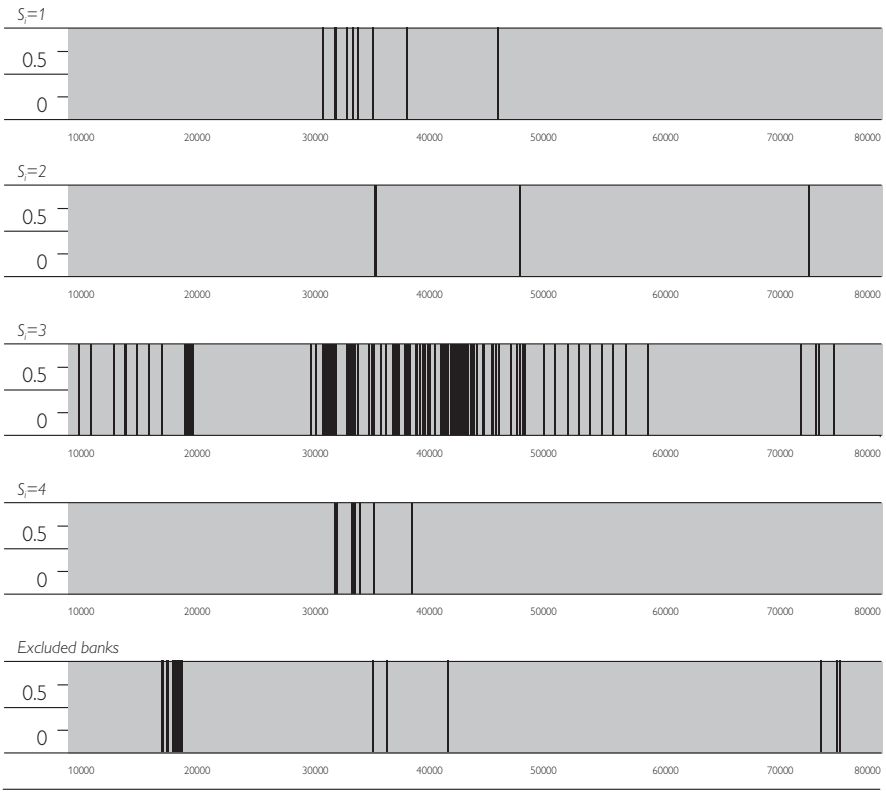
coeff.	$I_t = 1$				$I_t = 0$				
	β_1^G	β_2^G	β_3^G	β_4^G	$\beta_1^G - \beta^R$	$\beta_2^G - \beta^R$	$\beta_3^G - \beta^R$	$\beta_4^G - \beta^R$	β^R
dir_{t-1}	−3.97	3.66	0.44	−2.37	−2.90	4.73	1.51	−1.30	−1.06
	(−4.54)	(1.64)	(0.63)	(−2.10)	(−3.13)	(2.14)	(1.89)	(−1.12)	(−2.65)
dir_{t-2}	−0.82	−0.93	0.19	4.29	−2.69	−2.80	−1.68	2.42	1.87
	(−1.13)	(−0.80)	(0.53)	(3.34)	(−3.49)	(−2.35)	(−3.69)	(1.88)	(5.73)
dir_{t-3}	4.40	−0.53	0.38	2.74	2.40	−2.53	−1.62	0.74	2.00
	(3.61)	(−0.45)	(1.07)	(2.63)	(1.94)	(−2.11)	(−3.48)	(0.69)	(6.46)
dir_{t-4}	−0.88	−2.26	−0.07	−2.74	1.26	−0.11	2.07	−0.60	−2.14
	(−1.04)	(−1.68)	(−0.28)	(−2.57)	(1.42)	(-0.08)	(5.50)	(−0.55)	(−6.48)
sum	−1.27	−0.05	0.95	1.93	−1.93	−0.72	0.28	1.26	×
	(−1.14)	(−0.03)	(2.20)	(2.03)	(−1.14)	(−0.03)	(2.05)	(2.03)	×

Source: OeNB.

contain only few banks, all but one, as before, belonging to the credit cooperative sector.

Chart 5

K=4, Bank Classification, Ranked by Identification Number

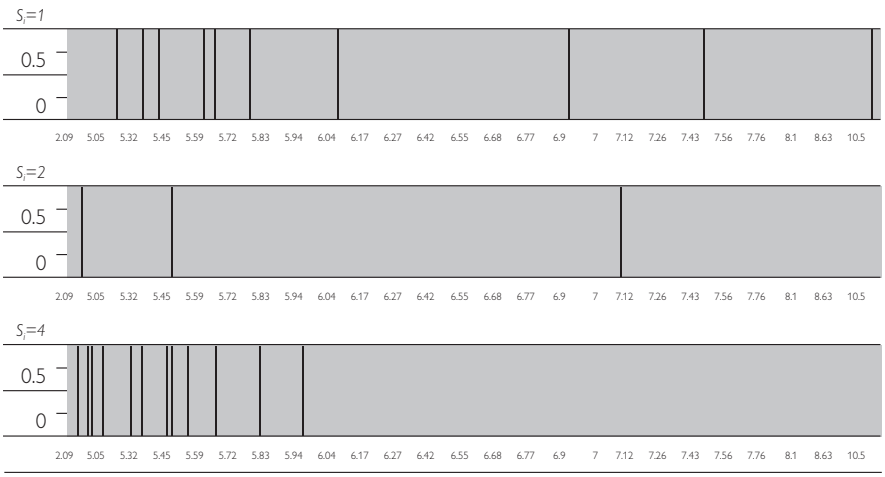


Source: OeNB.

Charts 6 and 7 rank the banks of groups 1, 2 and 4 according to size and liquidity as of the first quarter of 1996, and chart 8 provides a scatter plot of these banks' variables. Again, size and liquidity are not typical characteristics that define the various bank groups. What one can say at most is that if large banks are included in either group, they have either unusually low or high liquidity shares.

Chart 6

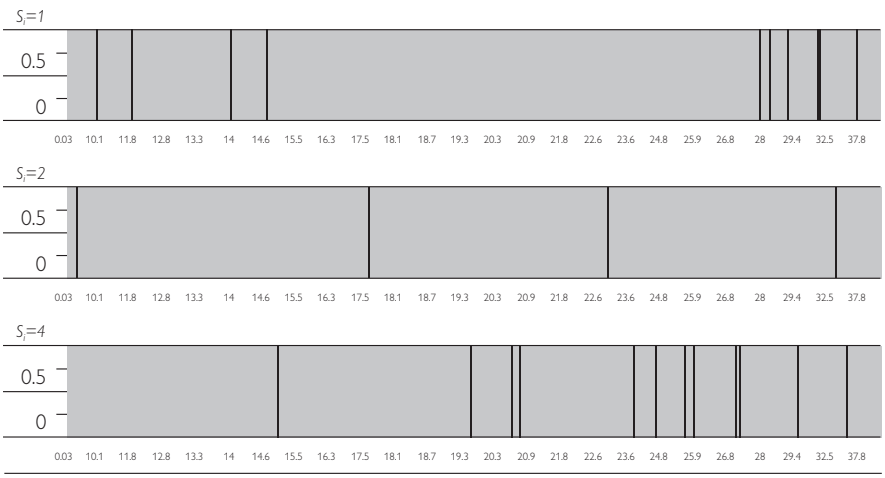
K=4, Classification Ranked by Size as of 1996 (1st quarter)



Source: OeNB.

Chart 7

K=4, Classification Ranked by Liquidity as of 1996 (1st quarter)

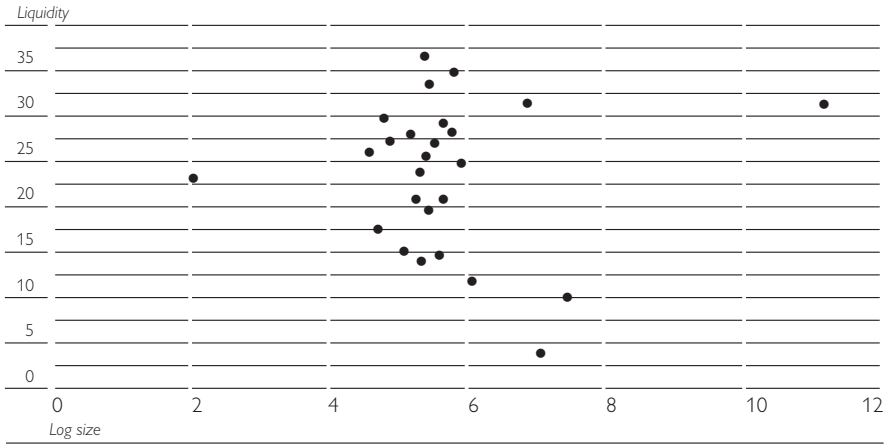


Source: OeNB.

Finally, note that banks were strictly classified into a group if the bank's posterior group probability (computed by averaging over all simulated values for S_i) exceeded 0.5. When $K = 4$, some banks do not reach a group probability higher than 0.5 in either group. Therefore, these banks do not show up in charts 5 to 8. They are not taken into account in compiling table 5, either, which summarizes the changes in the classifications that we obtain when we increase the number of groups from two to three and four, respectively. This explains why apparently only three more banks are classified when we estimate a four-group model rather than a two-group model. However, as already noted before, table 5 reveals that the various classifications are quite robust with respect to the number of groups we allow. Most of the 23 banks forming the first group in the $K = 2$ specification fall into groups 3 and 1 in the $K = 3$ and $K = 4$

Chart 8

K=4, Banks of Group 1, 2 and 4, Scatter Plot of Size against Liquidity as of 1996 (1st quarter)



Source: OeNB.

specification, respectively. 14 and 6 additional banks are classified when K is increased to 3 and 4, respectively. While the first banks are subsumed in the fourth group when $K = 4$, four of the additional six classified banks when $K = 4$ form a group of their own.

Table 5

Number of Banks in "Subgroups"

	K=3: 34 of which in	K=4: 26 of which in
K=2: 23 of which in	1st: 4 3rd: 16	1st: 8 4th: 5
additionally classified	1st: 11	
K=3: 14	3rd: 3	4th: 7
additionally classified	×	1st: 2
K=4: 6	×	2nd: 4

Source: OeNB.

Table 6

K=1, Mean Parameter Estimates (with t-values)

coeff.	$I_t = 1$ β_1^G	$I_t = 0$ $\beta_1^G - \beta^R$	β^R
dir_{t-1}	0.20 (1.13)	1.25 (3.22)	−1.05 (−2.40)
dir_{t-2}	0.29 (1.69)	−1.60 (−4.92)	1.89 (5.62)
dir_{t-3}	0.65 (4.21)	−1.33 (−3.72)	1.98 (5.90)
dir_{t-4}	−0.29 (−1.56)	1.86 (5.54)	−2.15 (−6.03)
sum	0.85 (2.91)	0.19 (2.73)	× ×

Source: OeNB.

4.4 Comparison to Pooled Regression

Table 6 summarizes the estimates for the $K = 1$ specification (a variant of the pooled model with regime-dependent parameters, see equation (7)). The estimates are quite similar to the ones of the group containing most of the banks in the $K = 2, 3, 4$ specifications, respectively. However, allowing for more than two groups refines the picture substantially, as the significant positive parameters on dir_{t-3} and on dir_{t-1} in the present specification become insignificant in the $K = 3, 4$ specifications when $I_t = 1$ and $I_t = 0$, respectively.

5 Conclusion

In the present paper we investigate the bank lending channel using a panel data set of Austrian banks' balance sheet data that covers on average 75% of the banking sector during the 1990s. Size and liquidity are typical bank characteristics thought to influence the different reaction in each bank's lending to changes in monetary policy (measured here by changes in the three-month Austrian interest rate). Our model specification allows for different groups of banks (from two up to four groups) that are discriminated by means of their reaction to interest rate changes. In contrast to the traditional approach in the literature, where banks are classified a priori into groups according to their size or their liquidity strength, here, the classification of each bank into a specific group is data driven in the sense that it is part of the model estimation. Moreover, we allow for state-dependent parameters to assess whether bank lending reacts differently according to the economic regime prevailing over time. The economic regime is also part of the model estimation, because usually, the "relevant" economic regime is not observable with certainty. The presence of two unobserved indicator variables, the group and the state indicator, makes standard maximum likelihood methods unfeasible. Therefore, we use Bayesian simulation methods to estimate the model parameters, the classification, and the state variable as well.

The results document a significant time-varying effect of monetary policy, whereby interest rate changes have stronger effects on bank lending in periods broadly related to quarters of below-average growth. The time-varying effect remains unchanged whether we allow for one, two, three, or four groups of banks, respectively. Augmenting the number of groups to four, however, substantially refines the picture on the group most of the banks fall into. Specifically, the apparently positive reaction of bank lending to interest rate increases disappears as we allow for more than two groups. During periods of above-average growth, monetary policy does not affect bank lending in a significant manner,[1]) whereas bank lending is reduced transitorily after interest rate increases around periods of below-average growth. The few banks forming the remaining groups mostly belong to the

1 *Note that this might be an artifact of the observation period, during which the Austrian economy records an overall good performance. Consequently, banks do not have to adjust their lending after interest rate changes permanently (which themselves were very smooth). Therefore, the expected negative effect of monetary policy on bank lending might not be observable in the present sample.*

credit cooperative sector. Usually, they are small. Some large banks with unusually high or quite low liquidity shares also fall into these groups, however. All in all, the banks can be discriminated by the strength of, and their timely reaction to, interest rate changes. A characterization of the bank lending channel according to traditional bank features like size and liquidity is not possible, however. This result, which contrasts with traditional results in the literature, might be reconciled with the fact that around 60% of the banking sector is dominated by small banks doing local business, which reduces their informational problems with regard to customers. Furthermore, the multi-tier system within which these banks are embedded alleviates the liquidity constraints they are exposed to in times of restrictive monetary policy.

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Annex

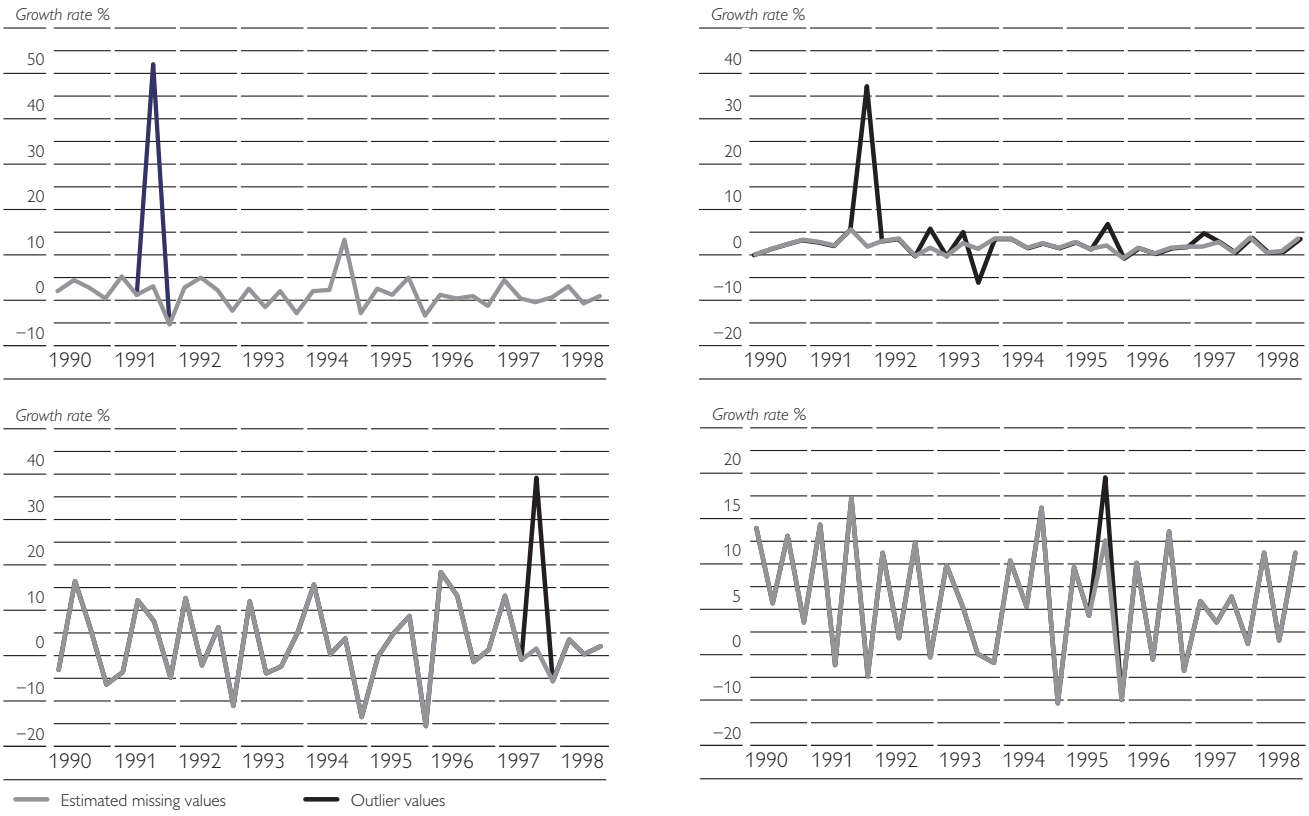
How to Deal with Mergers and Missing Values

Data augmentation allows one to treat extreme values (due to mergers or being "true" outliers) in the loans series for each bank as missing values. This means that we replace the extreme value by an estimate of y_{it} that is consistent with the time series properties and the information available at time t for bank i. This amounts to adding one step to the sampling scheme described in section 3.1, in which we simulate missing values of y_{it} for all banks out of their posterior distribution conditional on the observed data and the currently simulated parameter vector $\psi, \pi(\tilde{y}_1, ..., \tilde{y}_N|\psi, y_1^*, ..., y_N^*)$, where $\tilde{y}_i$ and $\tilde{y}_i^*$ gather the missing and the remaining values of the loans series for bank i, respectively.

The interested reader finds a detailed discussion on the estimation of missing values in the last appendix of the research report (Frühwirth-Schnatter and Kaufmann, 2001). Here we only reproduce a figure that gives some examples where estimated missing values are substituted for the outlier present in the series.

Chart 9

K=2, Substitution of Outliers with an Estimate of the Missing Value



Source: OeNB.

Balance Sheet and Bank Lending Channels: Some Evidence from Austrian Firms[1])

Maria Teresa Valderrama[2])

1 Introduction

According to the credit channel view of the transmission mechanism, monetary policy will have stronger real effects than the money view suggests and, more importantly, it will have distributional effects by affecting firms' spending on investment.[3]) At the center of this view is the idea that businesses' investment decisions are closely related to their financing decisions because internal and external funds are not perfect substitutes, and because there is no perfect substitution between bank loans and other sources of funds. Thus, if capital market imperfections exist, both the supply and the cost of external funds a firm faces will depend not only on the monetary stance but also on the firm's financial structure and other individual characteristics that determine the firm's access to external funds. These may include size, age, the level of indebtedness, credit rating, dividend payout, and a customer relationship to another firm or to a bank.

This study attempts to find evidence of a credit channel by estimating an accelerator investment demand equation using a panel data set of Austrian firms. Wesche (2000) used a similar data set to estimate an accelerator error correction model of investment to test for the existence of a credit channel in Austria. While Wesche included the long-term interest rate as a proxy for the user cost of capital, the approach followed here to account for the variation across firms is to explicitly calculate the user cost of capital for each firm.[4]) To account for capital market access, Wesche split the sample according to size and included variables such as the debt ratio and cash flow as control variables. These variables were found significant, which implies the existence of financial restrictions. Due to the very distinct implications that the balance sheet and the bank lending channels may have for monetary policy, an attempt is made here to distinguish between the effects of each of these channels on investment demand.[5]) The effects of the existence of the balance sheet channel are investigated by including the cash level ratio and the debt ratio as indicators of a firm's net worth in the investment demand equation.[6]) To test for the bank lending channel, indicator variables are included in the investment demand equation in order to split the sample according to criteria that may determine the firm's access to external funds, such as company size and age, the share of trade credit as a percentage of short-term liabilities,[7]) and the share of loans from the company's main

1 *The author would like to thank Arturo Estrella, Franz Partsch, Helene Schuberth, Martin Schürz and Jack Selody for helpful comments and suggestions.*

2 *The views presented here do not necessarily reflect those of the OeNB.*

3 *See Bernanke and Gertler (1995); for literature surveys see Hubbard (1994) and Mojon, Smets and Vermeulen (2000).*

4 *Chirinko, Fazzari and Meyer (1999).*

5 *Through the balance sheet channel, monetary policy will have larger real effects on firms than the traditional money view, and will also affect financial stability. Under the bank lending channel, monetary policy will have distributional effects.*

6 *See Bernanke, Gertler and Gilchrist (1994), Bond and Meghir (1994), and Oliner and Rudebusch (1996).*

7 *See Marotta (1997), Nilsen (1999) and Kohler, Britton and Yates (2000).*

bank in total debt.[1]) Since there is no predetermined level for each of these criteria that characterizes a financially constrained firm, tests are done to find the level at which a firm starts behaving like a financially constrained firm.

Recognizing the existence of a credit channel will be important for policymakers because the fine-tuning of monetary policy should take into account, first, that changes in the monetary stance or in the risk perception may trigger the balance sheet channel, which has important implications for financial stability; and second, that due to the bank lending channel there are firms which are financially constrained and will thus react stronger to monetary policy, even if the aggregate effect on the price of loans is small. Implicit in this view of the transmission mechanism is that when firms become financially constrained, the effect of monetary policy will be larger. Since in an economic slowdown it is more likely that firms become financially constrained, the effect of monetary policy will be larger during a downturn. This is important not only due to the potential size of the monetary policy effect, but also because such distributional effects may be undesirable. Although policymakers may be able to do very little about the effects of the bank lending channel, taking into account the effect of the balance sheet channel may be important given the implications it has for financial stability.

The paper is organized as follows: The next section presents the model used to test for the existence of a balance sheet channel and a bank lending channel. Section 3 presents the estimation and the results. Summary and conclusions follow.

2 Model and Estimation

In a world of perfect capital markets the investment decision of a firm is independent of its financing decision. However, in a world with asymmetric information, moral hazard, agency costs and other market imperfections, the cost of internal and external funds will differ. Under these circumstances a tightening of monetary policy will affect firms with limited access to capital markets more strongly, because it raises the cost of external funds more than the cost of internal funds and more strongly than for firms that are not financially constrained. In addition, financial intermediaries may ration some creditors out of the market. If a firm has limited access to the capital market due to market imperfections and does not have sufficient internal funds to finance its desired level of investment, it will be financially constrained and will cut down on investment. Therefore, the investment decision of a firm is not independent of its financing, and therefore the monetary stance can have real effects on investment as it influences the cost and supply of, as well as the demand for, external funds. This can happen either by affecting the supply of, and the demand for, external funds since the financial position of the firm worsens after an interest rate hike (balance

1 *See Petersen and Rajan (1994), Conigliani, Ferri and Generale (1997), Elsas and Krahnen (1998), Degryse and Van Cayseele (1998), and Dell'Ariccia and Marquez (2001).*

sheet view), or by affecting the allocation of loans due to a fall in deposits (bank lending view).

In order to find empirical evidence for the existence of a credit channel, a number of studies have tested whether demand for investment by firms that are considered financially constrained is more highly dependent on the monetary policy stance. Since observing the interest rate alone does not take into account these market imperfections, the credit channel has been investigated by including financial variables as determinants of investment demand.[1]) Moreover, due to these market imperfections, the effect of an interest rate change on investment will not be the same for all firms, but it will vary according to the financial conditions of the individual firms. In particular, it will depend on the degree of access to external financing, which is usually inversely related to the degree of information a lender has on a firm. The working hypothesis is that the sensitivity of investment to its determinants will depend on whether the firm is financially constrained or not. Studying this kind of distributional effects has usually been done by comparing the investment demand equation across different groups of firms.[2])

The starting point of this analysis is an investment demand specification derived from the optimization problem of the firm. Assuming a Cobb-Douglas production function, the desired capital stock of firm i at time $t, K^*_{i,t}$, will be given by the first-order condition of profit-maximizing behavior, which sets marginal productivity of capital to be equal to its marginal cost. The marginal cost is taken here to be the user cost of capital. The following expression is obtained by rewriting the first-order conditions in terms of the desired capital stock:[3])

$$K^*_{i,t} = \alpha_i \frac{S_{i,t}}{UC_{i,t}} \tag{1}$$

where $S_{i,t}$ is output or net sales, $UC_{i,t}$ is the user cost of capital and α_i is the share of capital in the production function. Denoting the logarithms of $K^*_{i,t}$[4]) and $S_{i,t}$[5]) by lower case letters, using ρ for the log of the user cost of capital and relaxing the constraints of a proportional reaction of capital to output and user cost, equation (1) can be linearized:

$$k^*_{i,t} = \alpha_i + \beta s_{i,t} - \gamma \rho_{i,t} \tag{2}$$

The accelerator specification for investment demand is obtained by using the following expression as an approximation $\Delta k_{i,t} \approx I_{i,t}/K_{i,t-1} - \delta$ (with I and δ denoting investment and depreciation, respectively). Since the

1 *See Bond et al. (1997), Mairesse, Hall and Mulkay (1999), Mojon, Smets and Vermeulen (2000), Vermeulen (2000), and Oliner and Rudebusch (1996).*

2 *See Vermeulen (2000), Bond, Harhoff and Van Reenen (1999), Bernanke, Gertler and Gilchrist (1994).*

3 *For detailed derivations of the profit maximizing behavior see for example Bond et al. (1997) and Mairesse, Hall and Mulkay (1999).*

4 *The stock of capital was calculated using the perpetual inventory method with a depreciation rate of 10%.*

5 *Output is defined as net sales.*

adjustment to the desired capital stock level is not instantaneous, this equation is generally nested within the following general dynamic regression, where η_i denotes a firm specific constant and υ_t represents the error term:

$$\frac{I_{i,t}}{K_{i,t-1}} = \lambda\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \sum_{j=0}^{T}\beta_j s_{i,t-j} - \sum_{h=0}^{T}\gamma_h \rho_{i,t-h} + \eta_i + \upsilon_t \quad (3)$$

To prove empirically that a credit channel exists, it is necessary to test whether monetary policy affects the firm's investment decision. Since the user cost of capital depends on the interest rate, the natural way of doing this would be by measuring the sensitivity of investment to the user cost of capital.[1]) The variation of the user cost of capital across firms is not captured by including firm-specific effects, but it is explicitly modeled using the firm-specific apparent interest rate. The user cost of capital is defined as:

$$UC_{i,t} = (\frac{p_t^I}{P_t})(r_{i,t} - \frac{\Delta p_{t+1}^I}{p_t^I} + \delta) \quad (4)$$

where, r_{it} is the apparent interest rate, which is defined as the ratio of interest and similar charges to gross debt $B_{i,t}$, p_t^I is the economy-wide price deflator for gross investment and P_t is the GDP deflator. This definition of the user cost of capital includes three additive elements: the opportunity cost of capital given by the apparent interest rate, a speculative or forward looking component given by the term $\Delta p_{t+1}^I / p_t^I$ and the depreciation cost δ.[2])

However, according to the credit channel view, monetary policy will affect investment not only through the interest rate channel, but also through the financial conditions faced by the firm. The credit channel usually refers to both the balance sheet and the bank lending view. Although these are two distinct channels, in empirical work it is hard to separate their effects on investment demand. In the following an attempt is made to distinguish between them.

2.1 The Balance Sheet Channel

Under the balance sheet channel, due to moral hazard and agency costs, the cost of external funds and the demand for investment will depend on the financial structure of the firm. The lender will charge a higher premium to firms for which less information is available, but this premium will be lower the larger the net worth of the firm that can be used as collateral. Due to moral hazard, if the firm is highly indebted, the bank will raise the external finance premium. Additionally, in the balance sheet view, the effect of monetary policy is also characterized by a decrease in the demand for funds due to the worsening of the firm's financial position. The empirical

1 *Chirinko, Fazzari and Meyer (1999).*

2 *See Valderrama (2001) for a case in which the financial structure as well as tax effects are included in the user cost of capital.*

estimation of the balance sheet channel has often been based on the financial accelerator theory of investment, which states that weak balance sheets can amplify adverse shocks on firm investment, thus causing a reallocation of funds to place, as the effect of monetary policy will be larger for financially constrained firms.[1]) In this framework, the investment demand equation in (3) is augmented by factors that account for the firm's net worth such as the cash level ratio and the debt ratio. Thus, the augmented investment demand equation can be written as:

$$\frac{I_{i,t}}{K_{i,t-1}} = \lambda\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \sum_{j=0}^{T}\beta_j s_{i,t-j} - \sum_{h=0}^{T}\gamma_h \rho_{i,t-h} + \sum_{m=0}^{T}\omega_m \frac{C_{i,t-m}}{p^I_{t-m}K_{i,t-1-m}} - \sum_{n=0}^{T}\psi_n \frac{B_{i,t-n}}{p^I_{t-n}K_{i,t-1-n}} + \eta_i + \upsilon_t \tag{5}$$

where $C_{i,t}$ represents cash level, which is defined as liquid assets of the firm, and $B_{i,t}$ is gross debt.[2]) If the financial variables are significant determinants of investment demand, a balance sheet channel is said to exist. A monetary tightening will reduce investment not only through a higher user cost of capital but also through higher interest rate payments, which will reduce the cash level a firm will have. If this induces firms to increase their level of indebtedness, and the debt ratio is found to be significant, then this will also trigger a reduction in investment demand. The implication for monetary policy is that even relatively small increases in interest rates will have relatively large negative effects on investment for firms with a weak financial structure. Since in a downturn the number of firms with weak balance sheets increases, this effect will be especially relevant for financial stability during a recession.

2.2 The Bank Lending Channel

Under the bank lending channel, a change in the monetary stance will affect the amount and price of loans banks will supply. Banks will react in different ways to tighter monetary conditions:[3]) They may increase the price of loans at least for some high-risk borrowers;[4]) however, there may also be situations in which, due to adverse selection and moral hazard problems, credit agencies are not willing or not able to increase interest rates for high-risk firms but will rather ration the quantity supplied to them.[5]) Under this view, firms which face higher asymmetric information and moral hazard problems are more likely to be rationed from credit (either price- or quantity-rationed) than firms on which the lender has more information. If

1 *See Bond et al. (1997), Mairesse, Hall and Mulkay (1999), Mojon, Smets and Vermeulen (2000), Vermeulen (2000), and Oliner and Rudebusch (1996).*

2 *The ratio to the capital stock.*

3 *See Frühwirth-Schnatter and Kaufmann (2001) in this issue for an investigation of the behavior of bank lending in Austria.*

4 *This is the so-called "flight to quality"; see Bernanke, Gertler and Gilchrist (1994).*

5 *Although credit rationing in the sense of Stiglitz and Weiss (1981) is not necessary for a credit channel to exist, the fact that firms are bank dependent will result in a credit rationing as well. See Cecchetti (1995).*

these firms are bank dependent, their investment demand will decrease as a result. Due to the special role that banks play in overcoming information asymmetries, it is expected that firms facing a severe asymmetric information or agency problem will also be bank dependent.

Therefore, since there is no straightforward way of testing directly for the effect of a loan supply shock on investment, finding evidence of a bank lending channel is done by testing whether the investment demand of firms that are more bank dependent (and/or have higher asymmetric information problems) is also more sensitive to the user cost of capital and to variables that account for the net worth of the firm.

Three assumptions have been made here: First, monetary policy is assumed to affect the supply of loans and the appetite for risk of lenders;[1]) second, that lenders will ration credit not only by increasing the price of loans but also by rationing the quantity of loans at least for some firms. This means that the effect on investment will be seen not only through the user cost of capital but also through the financial variables. The final assumption is that firms that are more bank dependent or face higher asymmetric information problems will more likely be the ones that are rationed, and as such the ones being more likely to cut their investment plans. Thus, to test for the bank lending channel, indicator variables that account for the firm's access to the capital market are interacted with the determinants of investment.[2]) Therefore, the equation that will be estimated can be written as:

$$\begin{aligned}\frac{I_{i,t}}{K_{i,t-1}} &= \lambda\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \sum_{j=0}^{T}\beta_j s_{i,t-j} + \sum_{j=0}^{T}\beta_j^D s_{i,t-j} D_{i,t}^G \\ &- \sum_{h=0}^{T}\gamma_h \rho_{i,t-h} - \sum_{h=0}^{T}\gamma_h^D \rho_{i,t-h} D_{i,t}^G + \\ &\sum_{m=0}^{T}\omega_m \frac{C_{i,t-m}}{p_{t-m}^I K_{t-1-m}} + \sum_{m=0}^{T}\omega_m^D \frac{C_{i,t-m}}{p_{t-m}^I K_{t-1-m}} D_{i,t}^G - \\ &\sum_{n=0}^{T}\psi_n \frac{B_{i,t-n}}{p_{t-n}^I K_{t-1-n}} - \sum_{n=0}^{T}\psi_n^D \frac{B_{i,t-n}}{p_{t-n}^I K_{t-1-n}} D_{i,t}^G + \eta_i + \upsilon_t\end{aligned} \tag{6}$$

where $D_{i,t}^G$ represents a dummy variable that takes into account the firm's access to the capital market. The variables studied here are: size, age, share of trade credit as a percentage of short-term liabilities, and the share of loans from the firm's main bank in total debt. Size and age have often been used as a proxy for capital market access, since small and young firms will face more difficulties in accessing capital markets by issuing shares, bonds or commercial papers. The size variable used here is the logarithmic level of employment. Lenders will also have less information on young firms, and therefore young firms will very likely be considered to bear a higher risk than older firms. To

1 *See Frühwirth-Schnatter and Kaufmann (2001).*

2 *See Bernanke, Gertler and Gilchrist (1994), Bond, Harhoff and Van Reenen (1999), and Vermeulen (2000).*

test whether age may influence investment, the squared logarithm of the number of years since the firm was established is used.

Since investment financing in the capital markets through issues of shares and bonds is not widely used in Austria, an alternative source of finance that indicates a lower degree of bank dependency is trade credit as a percentage of short-term debt. In the literature the demand for trade credit has been explained by the transaction motive and the finance motive. Although they are not mutually exclusive, the interest here lies in the finance motive. The hypothesis is that in the presence of credit market imperfections, when a bank reduces its supply of loans, firms will use trade credit to overcome liquidity shortages. Since trade credit is usually extended for short periods, the hypothesis is that firms that have a larger share of trade credit as a percentage of short-term loans will be less dependent on bank lending since they can temporarily replace bank credit with trade credit even if the latter comes at a higher cost.[1])

Although the existence of a "house bank," i.e. heavy reliance on a single main bank, is difficult to substantiate, the practice of long-standing loyalty to a bank prevails in Austria and has often been seen as being responsible for the absence of a credit channel in Austria.[2]) While the effect on the user cost of capital may be small, the existence of a lending relationship should render investment less sensitive to changes in the financial position of the firm. The hypothesis is that firms which have one bank with which they do most of their business will suffer less from credit restrictions, because the problem of asymmetric information is overcome through a long-standing relationship. Information on the share of loans from the main bank in total debt is not available before 1994. For this reason it is not possible to identify a "house bank" judging from the duration of the lending relationship.[3]) Instead, the largest share in the total credit given by a single bank is used as a proxy for the existence of a main bank. Since the Austrian financial sector has been characterized as being overbanked, a high share of a single bank in total debt could be taken as an indicator of the existence of a "house bank" relationship. In order to use this variable for the whole sample, the average of the share of the main bank in total debt for the years 1994 to 1998 was taken as a constant for the whole sample period.

3 Estimations and Results

The estimation was done using the two-step Arellano-Bond-GMM-type estimators, which account for the bias due to unobserved firm-specific effects and lagged endogenous variables.[4]) The equations were regressed using first differenced data to remove the firm specific effects η_i and time dummies were included to control for exogenous shocks in the data. Several estimations which are not presented here were carried out to determine the number of lags. All lagged levels of the investment ratio are used as

1 *Elliehausen and Wolken (1993).*

2 *See Quehenberger (1997), and Delbreil et al. (2000).*

3 *Petersen and Rajan (1994).*

4 *See Arellano and Bond (1991), and Arellano and Honoré (2001).*

instrumental variables. Due to the nature of the investment demand equation all variables are treated as predetermined variables. Since treating all variables as predetermined increases the size of the instrument matrix, the lagged levels of the predetermined variables were restricted to a maximum of three. Tests not shown here were also done with higher lags, but the best results were obtained by restricting the instrument matrix to only three lags of the predetermined variables in levels. The validity of the instruments was tested with a Sargan test of overidentifying restrictions and tests of serial correlation in the residuals.

The data used come from balance sheets and income statements of Austrian nonfinancial institutions collected by the OeNB. Commercial banks usually present collateral from companies which they expect will satisfy the OeNB's solvency requirements. Therefore, the sample is not a statistical sample, and there is a bias in the database. Sound enterprises are thus overrepresented in the sample. Moreover, the bias becomes more severe when only those firms for which longer time series are included, since these are comparatively large firms.[1]) The database contains annual data for the years 1979 to 1999. The sample used contains firms continuously present at least during five years, which gives a total of 12,874 observations.

It can be seen from table 1 that in general the investment demand equation is well specified, with coefficients having the expected signs and being mostly significant. The coefficient for net sales is relatively low compared to similar studies done for other countries. However, the study done by Wesche (2000) for Austria obtained similarly small coefficients, which confirms that the model used here is appropriate. In all four equations, the Sargan test as well as the tests for serial correlation confirm the validity of the instrumental variables chosen. The cash level ratio as well as the debt ratio are significant both when included separately or jointly. According to the Sargan test, including these financial variables improves the demand equation.

As a result of including the cash level ratio, the total effect of net sales falls to 1.6% compared to 5.4% in the initial regression. The total effect of the user cost of capital also changes from 15.5% in the first regression to 12.9%. Including the debt ratio also reduces the total effect of sales, but the coefficients become insignificant, whereas almost no effect on the sensitivity of investment to the user cost of capital can be observed. Including both the cash level ratio and the debt ratio in the investment equation results in a total negative effect of sales on investment and a smaller effect of the user cost of capital on investment. It is worth mentioning that in the last three regressions the variables that account for the financial position of the firm are always significant and show the expected sign. Therefore, a tightening of monetary policy will not only have an effect on investment demand through the effect of the user cost of capital, but also through a lower cash level ratio and higher indebtedness.

1 See Appendix.

The analysis of the bank lending channel is based on the equation including both the cash level ratio and the debt ratio. This is done by splitting the sample using dummy variables interacted with the determinants of investment demand. The idea is to capture the differences in the behavior of groups of firms compared to the benchmark which includes all firms in the sample (table 1, specification 4). Since there is no predetermined level at which a firm is considered too small or too young, in what follows tests are done to determine the level of size and age at which a firm can be considered financially constrained. The same is done for the other two criteria investigated here: the share of trade credit in short-term liabilities and the concentration of loans from the main bank on total debt. As a result, there are five regressions for each criterion. In each table the first regression is done for a very strict criterion to determine the cut point between financially constrained firms and firms with no financial restrictions. Each following regression relaxes the criterion and allows more firms in the group than the prior regression.

Table 2 contains the results obtained with a dummy variable that represents the size of the firm. The total effect of the user cost of capital on investment is higher for all firms with up to 148 employees, whereas for the sample that includes firms with up to 245 employees the total effect of the user cost of capital is much smaller. Interestingly, cutting the sample at 90 employees, as was done in Wesche (2000), would have shown almost no change in the effect of the user cost of capital on investment. Taking into account only small firms (fewer than 55 employees), we find larger differences in the interest rate channel effect. In general, the changes in the effect of the cash level are not directly related to the size of the cut point. The effect is similar for very small firms; it decreases notably for a more relaxed size criterion; and increases and decreases again the more firms are included. The effect of indebtedness, finally, does not follow a pattern that changes with the cut point for size.

Table 3 contains the same kind of estimation but includes a dummy variable that splits the sample according to the age of the firm. Two interesting results emerge: the effect of the user cost of capital on investment is much larger for firms which were established in the last 22 years, but it decreases notably if the age criterion is relaxed to include firms established in the last 47 years. Second, the effect of a company's liquidity on investment, however, is only stronger for firms established in the last 10 years. Although at first sight a high indebtedness seems to affect mostly very young firms (up to 10 years old), this effect increases again for firms that were established in the last 60 years.

These results show that to understand the effect of monetary policy on investment, it is not sufficient to classify firms according to size or age. Indeed, it seems that within the sample there may be large or old firms that should be less affected by monetary policy, but this is in fact not the case.

On the other hand, table 4 appears to provide evidence that firms that are able to replace bank lending with other types of financing will be less affected by a monetary tightening. The first regression includes all those firms that have at least a 50% share of trade credit in short-term debt,

whereas the last regression includes only those firms that have a share of 90%. As can be seen from table 4, the total effect of the user cost of capital is significantly smaller if the presence of trade credit is taken into account. The total effect falls from 12.6% in the benchmark equation to 9.6% for firms with a share of 50% and to only 2.5% for firms with a share of 90%. While the effect of cash flow remains rather stable across groups, a large difference is also seen in the effect of the level of indebtedness on investment.

Finally, table 5 contains estimations done with a proxy for a "house bank" relationship. As before, there are differences in the total effect of the user cost of capital on investment but the direction is not quite clear. A very interesting result is, however, that the effects of the cash level ratio and the debt ratio decrease considerably for firms with a high share of indebtedness to a single bank. In the case of the cash level ratio, the effect is smaller the larger the share of loans from the main bank in total debt. Although in the case of the debt ratio, as before, no clear pattern has emerged in the change of the effect, firms with a share of loans from a single bank in total debt of at least 50% are less affected by monetary policy than the whole sample.

4 Conclusions

Recognizing the existence of a credit channel is important for policymakers not only due to the larger real effects of monetary policy compared to the traditional interest rate channel but also due to its distributional effects. This paper attempts to find evidence of such a channel in Austria, by looking first at the effect of the balance sheet channel. The results of the estimations show that financial variables are indeed significant determinants of investment demand in Austria, which amplify the effects of interest rate changes on the real economy.

Despite the fact that the sample of firms used may be biased toward solvent firms, it can be concluded from the results that monetary policy does not have equal effects on firms' investment decision, with some firms' investment spending reacting more strongly to monetary policy than others. Given that the sample of firms used for this study is biased toward solvent firms, it could be expected that the effects may even be larger.

The estimations done show that the effect of the user cost of capital and financial variables on investment is different for various groups of firms. However, it cannot be said that large firms or old firms will be less affected by monetary tightening. Indeed, it is shown here that having a prior notion of what determines a financially constrained firm may be misleading. Contrary to the common belief that small and young firms are financially constrained, this estimation shows that the sensitivity of investment demand to its determinants is not a function of size or age. What seems to matter more, i.e. what can dampen the effects of monetary policy on investment, are relationships with a "house bank" or with another firm, measured with the trade credit variable.

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Appendix

A Database

The Oesterreichische Nationalbank collects data on balance sheets and income statements of Austrian firms in the course of its refinancing activities. To check the solvency of nonfinancial enterprises involved in the collateralization of monetary policy operations, the OeNB relies on annual accounts. These annual accounts are submitted to the OeNB by the enterprises themselves or by commercial banks doing business with the enterprises in question. Consolidated financial statements are collected in exceptional cases only.[1])

The database contains annual data for the years 1979 to 1999, which provide a total of 42,870 observations. Although after 1987 the sample includes more than 2,000 firms per year, the time series dimension of the sample is comparatively small for most firms. For instance, only 88 firms are observed over the whole sample period and 3,959 firms appear in the data only once.

After adjusting the database for observations with negative values of sales or net sales, total assets, the stock of capital K, total debt, number of employees, and investment ratios larger than 1, and after removing outliers[2]) and selecting a sample with firms continuously present at least during five years, only 12,874 observations remain, of which 8,491 belong to the manufacturing industry. The service sector accounts for 24% of the sample, while other industries account for 10% of the sample. Up to 1988 the sample contains less than 500 firms per year, and around 1,000 firms per year from 1989 until 1999. Only 52 firms are observed during the whole sample period.

Due to the specific structure of the source material the sample is not a statistical sample and there is a bias in the database. Commercial banks usually present collateral from companies which they expect will satisfy the OeNB's solvency requirements. Sound enterprises are thus overrepresented in the sample. Moreover, the bias becomes more severe when only those firms are regarded for which longer time series exist, since these are comparatively large firms.[1]) Only 12.5% of the firms have less than 50 employees, while 17.9% of the firms have more than 500 employees. In the same way very young firms are also underrepresented: only 4.2% of the firms were established in the last 5 years, while 14.4% of the firms are more than 50 years old.

1 The individual data are strictly confidential and have to be aggregated for any publication in order to comply with data secrecy legislation.

2 It was done by excluding data which exceeded 5 times the interval between quartiles around the median.

Annex

Table 1

Investment Demand

GMM Two-Step Estimators in First Differences[1])

	Specification			
	1 (as equation 3)	2 (as equation 4)	3 (as equation 4)	4 (as equation 4)
Variables				
I_{t-1}/K_{t-2}	0.196***	0.127***	0.183***	0.111***
Log S_t	0.024*	−0.019*	0.001	−0.031***
Log S_{t-1}	0.020	0.033**	0.013	0.019*
Total effect	0.054**	0.016**	0.018	−0.014***
Log UC_t	−0.180***	−0.142***	−0.161***	−0.131***
Log UC_{t-1}	0.038***	0.019	0.026**	0.007
Log UC_{t-2}	0.018***	0.011*	0.016***	0.012**
Total effect	−0.155***	−0.129***	−0.146***	−0.126***
C_t/K_{t-1}	–	0.118***	–	0.119***
C_{t-1}/K_{t-2}	--	0.058***	–	0.062***
Total effect	–	0.202***	–	0.204***
B_t/K_{t-1}	–	–	0.044	0.058**
B_{t-1}/K_{t-2}	–	–	−0.141***	−0.140***
Total effect	–	–	−0.119**	−0.091***
Percentage of firms	100%	100%	100%	100%
Sargan Test	0.4390	0.5414	0.3639	0.5650
m1	−16.49***	−16.09***	−16.40***	−15.98***
m2	0.83	0.40	0.88	0.38
Number of observations	8,422	8,422	8,422	8,422
Number of groups	1,328	1,328	1,328	1,328

[1]) Time dummies and a constant were included but not reported.
Instrumental variables: lagged levels of investment ratio and a maximum of three lags for the levels of sales, user cost of capital, cash level ratio and debt ratio.

* *Significant at the 10% level.*

** *Significant at the 5% level.*

*** *Significant at the 1% level.*

Table 2

Investment Demand According to Size Groups

GMM Two-Step Estimators in First Differences[1])

	Group[2])				
	1 (as equation 5)	2 (as equation 5)	3 (as equation 5)	4 (as equation 5)	5 (as equation 5)
Variables					
I_{t-1}/K_{t-2}	0.091***	0.093***	0.089***	0.088***	0.088***
Log S_t	−0.043***	−0.029***	−0.019***	−0.012**	−0.013**
Log S_{t-1}	0.012***	0.012**	−0.006	−0.015**	−0.018***
Log S_t* D	0.014*	0.000	−0.002	−0.008***	0.001
Log S_{t-1}* D	−0.013***	−0.003**	0.004***	0.009***	0.008***
Total effect	−0.033***	−0.022***	−0.025***	−0.029***	−0.024***
Log UC_t	−0.150***	−0.125***	−0.139***	−0.136***	−0.114***
Log UC_{t-1}	0.017**	0.003	0.016***	0.008	−0.009
Log UC_{t-2}	0.012***	0.011***	0.011***	0.011***	0.011***
Log UC_t* D	0.036***	−0.016*	0.002	−0.028***	0.002
Log UC_{t-1}* D	−0.046***	−0.022***	−0.003	0.018***	0.020***
Log UC_{t-2}* D	−0.001	−0.010***	−0.005***	−0.001	−0.006***
Total effect	−0.144***	−0.175***	−0.130***	−0.140***	−0.105***
C_t/K_{t-1}	0.106***	0.097***	0.099***	0.089***	0.096***
C_{t-1}/K_{t-2}	0.077***	0.077***	0.078***	0.102***	0.082***
C_t/K_{t-1}* D	−0.007	−0.080***	−0.063***	0.012	−0.028**
C_{t-1}/K_{t-2}* D	0.011	0.037***	0.050***	−0.009	0.019
Total effect	0.206***	0.144***	0.180***	0.213***	0.185***
B_t/K_{t-1}	0.094***	0.060***	0.076***	0.028*	0.050***
B_{t-1}/K_{t-2}	−0.133***	−0.153***	−0.080***	−0.067***	−0.061***
B_t/K_{t-1}* D	−0.146***	−0.011	0.036***	0.000	−0.009***
B_{t-1}/K_{t-2}* D	0.048***	0.001	−0.060***	−0.055***	−0.073***
Total effect	−0.151***	−0.114***	−0.031***	-0.103***	−0.102***
Percentage of firms	8%	14%	28%	46%	63%
Sargan Test	0.9994	0.0000	0.7722	0.7413	0.3621
m1	−15.59***	−15.82***	−15.89***	−15.67***	−15.67***
m2	− 0.08	0.28	− 0.15	− 0.17	− 0.20

[1]) Time dummies and a constant were included but not reported.
Instrumental variables: lagged levels of investment ratio and a maximum of three lags for the levels of sales, user cost of capital, cash level ratio and debt ratio.
[2]) Group 1: firms with less than 35 employees.
Group 2: firms with less than 55 employees.
Group 3: firms with less than 90 employees.
Group 4: firms with less than 148 employees.
Group 5: firms with less than 245 employees.
* *Significant at the 10% level.*
** *Significant at the 5% level.*
*** *Significant at the 1% level.*

Table 3

Investment Demand According to Age Groups

GMM Two-Step Estimators in First Differences[1])

	Group[2])				
	1 (as equation 5)	2 (as equation 5)	3 (as equation 5)	4 (as equation 5)	5 (as equation 5)
Variables					
I_{t-1}/K_{t-2}	0.089***	0.085***	0.106***	0.104***	0.092***
Log S_t	−0.023***	−0.015***	−0.021***	−0.031***	−0.025
Log S_{t-1}	−0.005	−0.012***	0.007	0.006	0.013
Log S_t* D	0.006***	0.007***	−0.005***	0.000	0.007
Log S_{t-1}* D	−0.009***	−0.009***	0.001	0.001	−0.008
Total effect	−0.033***	−0.016***	−0.020***	−0.027***	−0.013***
Log UC_t	−0.118***	−0.128***	−0.135***	−0.118***	−0.118***
Log UC_{t-1}	−0.003	0.003	0.012*	0.005	0.002
Log UC_{t-2}	0.009**	0.012***	0.011***	0.011***	0.010***
Log UC_t* D	−0.015	0.029***	0.000	−0.001	−0.002
Log UC_{t-1}* D	−0.024***	−0.058***	−0.028***	−0.002	−0.009
Log UC_{t-2}* D	−0.008***	0.000	0.004***	0.007***	0.001
Total effect	−0.175***	−0.155***	−0.152***	−0.109***	−0.127***
C_t/K_{t-1}	0.130***	0.121***	0.130***	0.130***	0.131***
C_{t-1}/K_{t-2}	0.065***	0.090***	0.072***	0.056***	0.066***
C_t/K_{t-1}* D	−0.034***	0.037***	0.025**	−0.021	−0.040***
C_{t-1}/K_{t-2}* D	0.055***	−0.050***	−0.040***	0.012	0.020
Total effect	0.237***	0.216***	0.209***	0.197***	0.196***
B_t/K_{t-1}	0.059***	0.024***	−0.006	−0.027	0.056***
B_{t-1}/K_{t-2}	−0.140***	−0.105***	−0.054***	−0.058***	−0.151***
B_t/K_{t-1}* D	−0.098***	−0.039***	0.050***	0.010	−0.089***
B_{t-1}/K_{t-2}* D	0.036***	0.023***	−0.050***	−0.043**	0.059***
Total effect	−0.156***	−0.106***	−0.067***	−0.133***	−0.138***
Percentage of firms	4%	17%	53%	84%	89%
Sargan Test	0.9968	0.7589	0.6373	0.5520	0.7564
m1	−15.51***	−15.67***	−16.04***	−15.99***	−15.78***
m2	− 0.15	− 0.20	0.14	0.16	0.10

[1]) Time dummies and a constant were included but not reported.
Instrumental variables: lagged levels of investment ratio and a maximum of three lags for the levels of sales, user cost of capital, cash level ratio and debt ratio.

[2]) Group 1: firms which were established in the last 5 years.
Group 2: firms which were established in the last 10 years.
Group 3: firms which were established in the last 22 years.
Group 4: firms which were established in the last 47 years.
Group 5: firms which were established in the last 60 years.

* *Significant at the 10% level.*
** *Significant at the 5% level.*
*** *Significant at the 1% level.*

Table 4

Investment Demand According to Trade Credit Groups

GMM Two-Step Estimators in First Differences[1])

	Group[2])				
	1 (as equation 5)	2 (as equation 5)	3 (as equation 5)	4 (as equation 5)	5 (as equation 5)
Variables					
I_{t-1}/K_{t-2}	0.079***	0.077***	0.083***	0.089***	0.086***
Log S_t	−0.016***	−0.011	−0.020***	−0.008***	−0.017***
Log S_{t-1}	−0.013**	−0.006	0.000	−0.015**	−0.006
Log S_t* D	−0.004***	0.001	0.002	0.007***	0.009***
Log S_{t-1}* D	0.005***	0.002**	0.003***	0.006***	0.005***
Total effect	−0.031***	−0.014**	−0.015***	−0.010***	−0.010***
Log UC_t	−0.088***	−0.128***	−0.124***	−0.111***	−0.105***
Log UC_{t-1}	−0.035***	−0.001	−0.006	−0.014***	−0.009**
Log UC_{t-2}	0.009**	0.010***	0.007**	0.005**	0.004
Log UC_t* D	0.011	0.042***	0.036***	0.065***	0.067***
Log UC_{t-1}* D	0.020***	0.005	0.013***	0.024***	0.024***
Log UC_{t-2}* D	−0.005***	−0.005***	−0.006***	−0.003***	−0.004***
Total effect	−0.096***	−0.084***	−0.086***	−0.037***	−0.025***
C_t/K_{t-1}	0.110***	0.097***	0.112***	0.103***	0.105***
C_{t-1}/K_{t-2}	0.070***	0.090***	0.080***	0.075***	0.073***
C_t/K_{t-1}* D	0.020	0.024***	−0.013*	0.021***	−0.034***
C_{t-1}/K_{t-2}* D	−0.006	−0.019**	−0.013**	−0.011***	0.012***
Total effect	0.212***	0.208***	0.180***	0.207***	0.171***
B_t/K_{t-1}	−0.013	0.041***	0.033***	0.024***	0.043***
B_{t-1}/K_{t-2}	−0.090***	−0.112***	−0.110***	−0.090***	−0.102***
B_t/K_{t-1}* D	0.051***	0.042***	0.045***	0.011	0.066***
B_{t-1}/K_{t-2}* D	0.003	0.003	−0.003	−0.023***	−0.034***
Total effect	−0.054***	−0.029***	−0.038***	−0.085***	−0.031***
Percentage of firms	37%	25%	16%	11%	7%
Sargan Test	0.2761	0.4115	0.5982	0.2464	0.5651
m1	−15.51***	−15.81***	−15.96***	−15.73***	−15.56***
m2	− 0.07	− 0.10	0.12	− 0.12	− 0.31

[1]) Time dummies and a constant were included but not reported.
Instrumental variables: lagged levels of investment ratio and a maximum of three lags for the levels of sales, user cost of capital, cash level ratio and debt ratio.

[2]) Group 1: firms which have a share of trade credit in short-term debt of more than 50%.
Group 2: firms which have a share of trade credit in short-term debt of more than 60%..
Group 3: firms which have a share of trade credit in short-term debt of more than 70%.
Group 4: firms which have a share of trade credit in short-term debt of more than 80%.
Group 5: firms which have a share of trade credit in short-term debt of more than 90%.

* *Significant at the 10% level.*
** *Significant at the 5% level.*
*** *Significant at the 1% level.*

Table 5

Investment Demand According to Main Bank Groups

GMM Two-Step Estimators in First Differences[1])

	Group[2])				
	1 (as equation 5)	2 (as equation 5)	3 (as equation 5)	4 (as equation 5)	5 (as equation 5)
Variables					
I_{t-1}/K_{t-2}	0.094***	0.102***	0.096***	0.085***	0.080***
Log S_t	−0.004	−0.010	−0.018**	−0.030***	−0.021***
Log S_{t-1}	−0.034***	0.007	−0.008	0.008	0.004
Log S_t* D	−0.024***	−0.018	−0.014	0.007	0.028
Log S_{t-1}* D	0.035***	0.005	0.025**	−0.008	−0.011***
Total effect	−0.030***	−0.018**	−0.017***	−0.026***	−0.001***
Log UC_t	−0.106***	−0.130***	−0.128***	−0.129***	−0.121***
Log UC_{t-1}	−0.004	0.045***	0.020***	0.004	0.004
Log UC_{t-2}	0.012***	0.013***	0.013***	0.009*	0.004
Log UC_t* D	0.011*	0.002	0.015	0.008	0.006
Log UC_{t-1}* D	−0.008	−0.041***	−0.028***	0.002	0.001
Log UC_{t-2}* D	−0.005	−0.007	−0.006	0.005	0.006
Total effect	−0.111***	−0.133***	−0.126***	−0.110***	−0.108***
C_t/K_{t-1}	0.142***	0.148***	0.165***	0.152***	0.131***
C_{t-1}/K_{t-2}	0.041***	0.026**	0.056***	0.086***	0.104***
C_t/K_{t-1}* D	−0.045***	−0.097***	−0.143***	−0.126***	−0.161***
C_{t-1}/K_{t-2}* D	0.025**	0.076***	0.045***	−0.006	−0.001
Total effect	0.180***	0.170***	0.136***	0.116***	0.080***
B_t/K_{t-1}	0.031***	0.080***	0.042**	0.103***	0.110***
B_{t-1}/K_{t-2}	−0.092***	−0.068***	−0.095***	−0.147***	−0.161***
B_t/K_{t-1}* D	0.057***	−0.012	−0.001	−0.056**	−0.080***
B_{t-1}/K_{t-2}* D	−0.065***	−0.060***	0.023	0.099***	0.180***
Total effect	−0.077***	−0.067***	−0.035***	0.000***	0.053***
Percentage of firms	79%	65%	51%	39%	27%
Sargan Test	0.7158	0.7604	0.5701	0.8551	0.6239
m1	−15.71***	−15.75***	−15.71***	−15.71***	−15.52***
m2	− 0.13	0.10	− 0.02	− 0.13	− 0.17

[1]) Time dummies and a constant were included but not reported.
Instrumental variables: lagged levels of investment ratio and a maximum of three lags for the levels of sales, user cost of capital, cash level ratio and debt ratio.
[2]) Group 1: firms with a share of loans from main bank in total debt of more than 50%.
Group 2: firms with a share of loans from main bank in total debt of more than 60%.
Group 3: firms with a share of loans from main bank in total debt of more than 70%.
Group 4: firms with a share of loans from main bank in total debt of more than 80%.
Group 5: firms with a share of loans from main bank in total debt of more than 90%.
* *Significant at the 10% level.*
** *Significant at the 5% level.*
*** *Significant at the 1% level.*

Financial Innovation and the Monetary Transmission Mechanism

Arturo Estrella[1])

1 Introduction

Monetary policy starts out as an inherently financial process, even though its goals have more to do with macroeconomic variables. In particular, its ultimate goal may be to control inflation, with other macroeconomic variables such as real growth and unemployment possibly playing a role along the way. However, the interface between the monetary authority and the real economy is situated in the financial markets. Thus, any phenomenon that affects the structure and condition of the financial markets has the potential to affect the transmission mechanism through which the direct actions of the monetary authority are translated into indirect macroeconomic effects.

Over the last two decades, financial markets in most industrial economies have been transformed by various waves of financial innovation. Of course, financial innovation did not begin in the 1980s, but the pace of innovation has accelerated since then, and the extent of innovation has reached a broad spectrum of financial activity worldwide. Hence, it makes sense to ask whether that innovation has affected the monetary transmission mechanism, particularly in industrial economies.

This paper lays out an analytical framework, based on recent research, to examine the transmission mechanism, and asks how each of several forms of financial innovation has affected the elements of the framework in recent decades. From a broad perspective, the analytical framework is based on three channels of monetary transmission: the interest rate channel, the valuation channel, and the credit channel. Each of these is subdivided in turn into narrower aspects related to the cost of capital, market liquidity, wealth effects, firm valuation, exchange rates, financial health, and bank lending.

The innovations examined fall into four main categories: financial deregulation, securitization, derivative instruments, and financial risk management. These categories are not to be interpreted as mutually exclusive, since there are some phenomena that may be thought to fall in more than one category. It is also difficult to approach some of the categories independently of one another. Nevertheless, this classification scheme facilitates the discussion of the various types of innovation and of how each type impinges on the components of the monetary transmission framework.

Each of the categories of innovation may affect more than one channel of monetary transmission. In addition, the innovations can shift the relative importance of the channels. For example, if one innovation reduces the effectiveness of a particular channel, the relative importance of the other channels may be enhanced.

Where possible, empirical evidence is brought to bear on the discussion. Some of this evidence is cited in connection with earlier papers, and some new evidence is also presented. Although the literature on both the transmission mechanism and on financial innovation is extensive, not much

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research has addressed the relationship between the two. Hard empirical evidence is difficult to obtain in this field, primarily because of a lack of sufficiently detailed data. Much of the evidence tends to be circumstantial, of the sort that motivates certain conclusions, but does not illustrate them directly. Nevertheless, some of the evidence is sufficiently clear as to suggest that innovation has indeed affected monetary transmission.

Section 2 of the paper presents the analytical framework of the monetary transmission mechanism. Then, sections 3, 4 and 5 consider the effects of financial deregulation, securitization, derivative instruments, and financial risk management. Section 5 combines the discussion of the last two categories of innovation, since the two – although conceptually distinct – are intimately connected in practice. Section 6 presents some conclusions.

2 The Transmission Mechanism: An Analytical Framework

Almost every textbook on macroeconomics or money and banking has some discussion of at least one view of the transmission mechanism. It is not unusual for the author or authors to emphasize particular elements that they feel are more important. In fact, a few decades ago the ideological dispute between Keynesians and Monetarists could be viewed as hinging on a difference in views about the transmission mechanism.[1]) Recent discussion is perhaps less ideologically charged, focusing instead on an array of possible channels of monetary policy.[2])

The objective of this section is to define a structured framework for discussing the elements of the transmission mechanism, particularly in the context of financial innovation, as in the next few sections. As noted earlier, three broad channels of transmission are identified: the interest rate channel, the valuation channel, and the credit channel. Each of these is subdivided into finer categories.

The *interest rate channel* is closely associated with the traditional Keynesian view of monetary policy. However, models that combine an "IS curve" with an interest rate-based "Taylor rule" are common in the recent literature, and these models implicitly acknowledge the importance of the interest rate channel.[3])

In the interest rate channel, the monetary authority sets the level of the interest rate, perhaps by affecting the supply of bank reserves or of broader monetary aggregates. The change in the interest rate in turn affects the cost of capital and thus the demand for interest-sensitive components of aggregate demand, notably investment. The change in investment spending leads to a corresponding change in aggregate output in the same direction. We can think of this story as describing a *cost of capital effect*.

The simple textbook Keynesian model has a single interest rate and does not distinguish between real and nominal quantities or rates. More recent

1 *See, for example, the debate in Gordon (1974).*

2 *A recent brief exposition with a limited bibliography is found in Mishkin (1995). Bibliographical references may be found in other papers in the same issue of the Journal of Economic Perspectives.*

3 *See, for example, Clarida, Gertler, and Gali (1999). The Taylor rule was defined in Taylor (1993).*

approaches do incorporate the real-nominal distinctions, and some even introduce interest rates for instruments of different maturities. The net effect, however, is essentially the same. For example, suppose that the central bank raises a short-term nominal interest rate. The whole term structure of nominal interest rates then moves in the same direction (although generally not by the same amount for different maturities). If prices are sticky and inflation moves sluggishly, which are stylized empirical facts, long-term real rates also rise. Investment, which is assumed to be most sensitive to long-term real rates, contracts as in the simpler story.

Another aspect of the interest rate channel is the *market liquidity effect*. The monetary authority engineers an interest rate drop by adding liquidity to the market, and a drop in the short-term interest rate makes it less expensive to raise short-term funds and to add to short-term liquidity. One aspect of this effect is considered below in the context of the bank lending channel. However, the effect applies to the liquidity of virtually all economic participants, not just banks, and is therefore potentially more pervasive.

We now turn to the *valuation channel,* in which monetary policy is seen to affect the values of certain assets, which then affect overall economic activity in a predictable way. We consider three particular forms of the valuation channel, which are related to the three private sector components of aggregate demand: consumption, investment, and net exports.

One of the typical effects of monetary policy is to affect the pricing of equity positions, for instance of traded corporate equities and housing equity. It is difficult, perhaps impossible, for the monetary authority to control precisely the level of equity or housing prices, but at least some components of movements in these prices are systematically related to changes in short-term interest rates, which are under the authority's control.

Thus, after a monetary easing, equity prices tend to increase. This increase, especially if it is viewed as permanent by consumers, may trigger a *wealth effect* whereby consumers spend a portion of the increased value of their asset positions. The empirical importance of this effect is debatable, though there is some consensus about its directionality.[1])

A *capital valuation effect* arises from the influence of monetary policy on the market value of firms. One model of investment is based on Tobin's q, the ratio of the market value of a firm to the replacement cost of its capital. When q is large, which generally follows a monetary easing, it is relatively cheap to put new capital in place, and investment increases.

A third element in the valuation channel is the *exchange rate effect*. An increase in the value of domestic currency makes the assets of foreign trading partners relatively less valuable, and decreases their purchasing power. In those circumstances, exports tend to decline, with a negative effect on aggregate output. Similarly, domestic assets are relatively more valuable and their power to purchase foreign goods and services increases, affecting net exports and aggregate output in the same direction.

1 *For a recent discussion of the wealth effect, see Ludvigson, Steindel, and Lettau (2001).*

The inability of economists to explain recent macroeconomic data using only the interest rate and valuation channels led to work on the *credit channel* of monetary policy. The emphasis in these theories is less on prices (interest rates and asset prices) and more on quantities (the flow of credit to firms). Two versions of the credit channel are most frequently discussed: the balance sheet and the bank lending channels.

The *balance sheet effect* refers to the financial health of firms' financial positions, which tends to deteriorate when the monetary authority tightens policy. The deterioration occurs both directly, as with increasing costs of carrying short-term liabilities and decreased value of collateral, and indirectly, by reducing cash flow from other firms affected by the tightening. The result is that the firm is riskier as a counterparty and experiences difficulty in raising funds, be they from the financial markets or from bank lenders.

The *bank lending effect* arises as a result of changes in the availability of loanable funds to banks. In this type of theory, monetary tightening is accomplished by reducing the flow of reserves to commercial banks, which face a decrease in deposits, and ultimately in lending to firms. This model was probably fairly accurate for U.S. banks up to about 1980, but even proponents of the theory acknowledge that it may be less appropriate now. We will see some reasons for this in subsequent sections.

An alternative interpretation of the bank lending channel combines bank lending with the balance sheet effect applied directly to banks. One of the effects of monetary tightening is a deterioration of bank balance sheets. In particular, the regulatory capital positions of banks may suffer. In those circumstances, it may be difficult for a bank to embark on risky asset positions that require more regulatory capital, for instance on commercial lending. One version of this principle is examined by Van den Heuvel (2001), who calls it "the bank capital channel" of monetary policy.

The foregoing is not intended as a complete description of the monetary transmission mechanism, but as a framework that we can use to consider the effects of various forms of financial innovation. For each type of innovation, we will identify portions of the transmission framework that are likely to be affected. For convenience, table 1 summarizes the elements of the framework.

Table 1

Components of the Transmission Mechanism

Channels	Effects
Interest rate	Cost of capital Market liquidity
Valuation	Wealth (consumption) Capital valuation (investment) Exchange rate (net exports)
Credit	Balance sheet Bank lending

3 Financial Deregulation

The first source of financial innovation we consider is financial deregulation, which is the category of innovation whose relationship with the transmission mechanism has been examined most often in the earlier literature. The term "financial deregulation" is quite broad and may be interpreted in different ways. For our purposes here, we define financial deregulation as a change in the legal or regulatory structure that reduces constraints on financial activity and makes it more subject to market forces. Some earlier work has also included under this rubric the development of new financial instruments, but many of those instruments are examples of securitization and of financial derivatives, which are covered in the next two sections.

A frequently cited example of financial deregulation is the elimination in 1980 of constraints on deposit interest rates in the United States (known as Regulation Q), which is generally acknowledged to have had important effects on the transmission mechanism. More generally, we classify as deregulation the easing of legal or regulatory restrictions on the pricing and flows of financial instruments. In the first instance, deregulation is introduced by legislative and regulatory authorities, but its effects generally lead to financial innovation on the part of private sector agents. The analysis of deregulation is dependent on the particular circumstances involved, which vary from country to country. Thus, work in this field, whether empirical or not, tends to focus on a particular country.

Although it is conceivable that financial deregulation could affect almost any portion of the transmission mechanism, its effects are likely to be concentrated in the interest rate and credit channels. The interest rate channel could be affected, for example, because pricing restrictions may offer the monetary authority a greater degree of control over credit flows. The constraints could extend the range of instruments over which the central bank has pricing control, or could affect the ability of private sector participants to adjust to interest rate changes introduced by the central bank. Thus, deregulation could impinge on both the cost of capital effect and the liquidity effect within the interest rate channel.

The credit channel could be affected – especially in the context of the bank lending effect – because restrictions on the funding of depository institutions may affect significantly their ability to generate and fund loans of various types. If the restrictions are eliminated, the central bank may still retain direct control over short-term interest rates, but the ability of banks to fund themselves by offering competitive rates on deposits could drastically reduce the impact of the bank lending channel. Consider the example of Regulation Q in the United States.

Until the Depository Institution Deregulation and Monetary Control Act was passed in 1980, U.S. banks and other depository institutions were subject to ceilings on the interest rates that they could pay on deposits. These ceilings gave the Federal Reserve substantial power to affect the real economy through changes in interest rates. When the Federal Reserve raised rates, not only was there a direct effect on the cost of capital, but it became harder for banks to fund themselves with deposits, whose rates became less competitive.

The result was disintermediation: Rather than placing funds with depository institutions, investors turned to instruments that could offer higher market rates. These funding problems then led to cutbacks in the amount of mortgages and other traditional bank assets, producing a greater impact for any given interest rate change. The implications for the transmission mechanism are clear cut. With the elimination of Regulation Q in 1980, it makes sense to expect that a larger policy action would be required to obtain a particular result.

The effects of the 1980 Act on the transmission mechanism are examined by Ryding (1990), who looks at the impact of monetary policy changes on housing investment as a function of the spread between Treasury rates and Regulation Q ceilings. His empirical results suggest that the effects of deregulation were significant and that the impact of monetary policy moves was in fact reduced.

More recently, McCarthy and Peach (2001) have looked at a lengthy chronology of events related to innovation in housing finance. Central among these events is the repeal of Regulation Q in 1980, but they include the creation of new instruments, other legislation in the 1980s, and the introduction of some forms of securitization (which we examine in the next section). McCarthy and Peach note that:

"Deregulation and more intense competition have produced an array of mortgage products designed to match the characteristics of a wide variety of borrowers. As a result of these developments, we suspect that a tightening of overall credit conditions in the economy is less likely to result in prospective mortgage borrowers being rationed out of the housing market."

To demonstrate the effects of deregulation on the housing market, they construct both a vector autoregression (VAR), using variables related to housing demand, and a structural model of housing demand, and they present evidence that a break in the models after Q4 1985 cannot be statistically rejected. The specific break date is admittedly arbitrary, but it falls within the period of intense deregulation affecting housing finance.

Similar exercises have been performed with events and data from other countries. For instance, Swamy and Tavlas (1989) construct a chronology of deregulation in Australia, starting with changes in 1979. When they look at a model of money demand in Australia, which is an integral component of the transmission mechanism, they find that deregulation contributed to a breakdown of the traditional relationships between monetary aggregates and GDP.

Fahrer and Rohling (1992) also consider the effects of deregulation in Australia, focusing on the stability of reduced-form relationships contained in a VAR. In contrast to most other research in this area, they conclude that deregulation made very little difference to the reduced-form VAR estimates. They compare results for the VAR before and after an assumed break in August 1984, which is the date when all remaining bank deposit controls were eliminated in Australia. This break date, which is later than that considered by Swamy and Tavlas (1989), may explain some of the discrepancies in the results.

Some work has focused on data for Europe. Using evidence from France, Icard (1994) obtained results that suggest that money demand became unstable in a period of deregulation starting in 1985. The results are mixed, however, in that Icard also finds that money demand functions based on broader aggregates, such as M3, show signs of stability even in the face of deregulation.

Juselius (1998) employs a cointegrated VAR model to investigate the determination of money, income, prices and interest rates in a few European Union countries (Germany, Denmark and Italy). The results, particularly for Germany and Italy, suggest that deregulation may have had a significant effect on the transmission of monetary policy. The break considered in this study occurs after the "second ERM" in March 1983. In Germany, where deregulation took hold more strongly in that period, Juselius finds a significant break in money demand and the transmission mechanism. In Italy, where capital controls were in place until March 1990, a break is not detected in 1983.

To supplement these results, we examine a VAR model for the United States to try to detect a break related to deregulation. Rather than specifying an arbitrary break date, as essentially all of the earlier analysis has done, we search for an unknown break point using econometric methodology introduced by Andrews (1993). Once a break date has been estimated, we look at the statistical significance of the estimate and compare the date with deregulatory events in the United States to determine whether a connection can be established.

The variables in the VAR are the output gap, aggregate inflation, commodity price inflation, the short-term interest rate, and the mortgage rate. The output gap is defined as the log difference between actual and potential real GDP, the latter as constructed by the Congressional Budget Office. Aggregate inflation is measured as the log change in the GDP deflator. Commodity price inflation is the log change in the component of the Producer Price Index corresponding to raw materials for further processing. The short-term interest rate is the federal funds rate and the mortgage rate is the secondary market yield on FHA[1])-insured mortgages. All data are quarterly, from Q1 1966 to Q2 2000, and four lags of each variable are included.

Table 2

P-Values of Variables in VAR Equations

Equation	Effect of				
	Commodity inflation	Aggregate inflation	Output gap	Federal funds rate	Mortgage rate
Commodity inflation	0.216	0.343	0.168	0.314	0.900
Aggregate inflation	0.019	0.000	0.255	0.469	0.854
Output gap	0.072	0.812	0.000	0.001	0.562
Federal funds rate	0.045	0.028	0.000	0.000	0.013
Mortgage rate	0.850	0.524	0.048	0.052	0.000

1 *FHA: Federal Housing Administration.*

Because lagged values are required, the VAR is estimated from Q2 1967 to Q2 2000. To summarize the estimation results, table 2 reports p-values of Granger causality tests for each of the five equations in the VAR. The results are fairly standard. Commodity prices are not affected by the other variables, but they influence aggregate prices and the federal funds rate. The federal funds rate is highly significant in the output gap equation, in the spirit of an IS curve. The federal funds rate in turn is influenced by prices and output, as in a reaction function of the Taylor (1993) rule type. Finally, the mortgage rate is affected by output and by the federal funds rate.

The procedure for the break test follows Andrews (1993). First, the VAR is estimated over the full period (Q2 1967 to Q2 2000). Then, the set of possible break points is selected by dropping 16.541% of the sample (22 observations) from each end. It is necessary to drop a certain portion of the sample from consideration as a break point, in order to achieve convergence. Smaller fractions of the data (5% or 10%) are frequently used, but the large number of parameters to be estimated in each equation require that at least 22 observations be dropped in this case.

For each candidate break point, a standard likelihood ratio test is performed by computing unconstrained estimates using data up to the breakpoint and after the breakpoint. The likelihood ratio statistic is given by:

$$LR = (T - c)|log|\Sigma_1| - log|\Sigma_2||, \qquad (1)$$

where T is the number of observations in the sample, c is a small-sample adjustment suggested by Sims (1980), and Σ_1 and Σ_2 are the covariance matrices of the residuals of the constrained and unconstrained models, respectively. Here $T = 133$ and $c = 42$. The values of LR for the candidate breakpoints, from Q3 1972 to Q4 1994, are shown in chart 1.

The maximum value of LR is obtained for a breakpoint at Q1 1981. The asymptotic significance level for the statistic is not given by the standard chi-squared distribution of LR, corresponding to a known breakpoint. Andrews (1993) shows that the distribution of the supremum of the LR values is based on a Bessel process, and is a function of the number of constraints (105, which is also the number of parameters in the full VAR) and of the proportion of the sample dropped (16.541%). A 5% critical value for this statistic is 151.65 and a 1% critical level, which is plotted in chart 1, is 162.30. The breakpoint estimate corresponding to the supremum of LR (195.36) is Q1 1981, and it is clearly significant at the 1% level.

One interpretation of the foregoing results is that deposit deregulation in 1980 had significant repercussions on the monetary transmission mechanism. The timing of the estimated breakpoint is almost exactly right for this interpretation, and the evidence for the subsequent breakpoints that have been assumed in the earlier literature is clearly weaker. However, many other changes that occurred during the 1980s may also have contributed to the strength of the results in chart 1. This test is only able to identify timing and cannot discriminate among a range of competing hypotheses. In the

following section, we examine the effects of securitization, which constitutes a rival hypothesis, and show that the time pattern for securitization is somewhat different from that observed in figure 1. Thus, these results give some support to the claim that deregulation, particularly in the form of the repeal of Regulation Q, had a major effect on monetary transmission.

4 Securitization

Securitization is the transformation of illiquid assets, typically from bank balance sheets, into tradable securities that may have a much greater degree of liquidity. The transformation is generally accomplished by the pooling of a large number of individual assets, which enhances diversification and makes the resulting security more desirable. The prototype of this kind of activity is the pooling of mortgages extended by U.S. depository institutions, a practice that dates back at least to the 1970s, but whose volume increased dramatically since the 1980s.

Since that time, various other bank assets have been securitized, including commercial mortgages, auto loans, student loans, home equity loans, credit card receivables, and manufactured housing. A quickly growing segment of these markets consists of collateralized debt obligations, for which the volume of new issuance increased from USD 1 billion in 1995 to USD 120 billion in 2000. Chart 2 illustrates the growth of mortgage securitization in the United States since 1980 by presenting the outstanding volume and issuance of mortgage-backed securities (MBSs) by three U.S. agencies: the Federal National Mortgage Association (Fannie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac), and the Government National Mortgage Association (Ginnie Mae). Chart 3 shows the growth of several types of asset-backed securities since 1995.

As in the case of deregulation, the influence of securitization on the transmission mechanism is likely to be felt the most in the interest rate and credit channels. The rise in securitization has provided banks and other issuers with alternative means of funding that were not previously available. Even though the central bank may still be able to affect short-term interest rates – or even long-term rates – as much as before, the impact on market liquidity is bound to be dampened by the availability of these alternative sources of funding.

The credit channel is likely to be affected significantly as well, since the flexibility provided to banks and other institutions by the ability to securitize assets makes it harder for the monetary authority to influence credit flows, which may be funded in various new ways. Mortgage loans, for example, may be much easier to fund for depository institutions. On the one hand, the ability to convert the loans into securities and sell them to investors makes it easier to channel funds from supply sources to demand needs. On the other hand, the ability to securitize can eliminate the positions altogether from bank balance sheets, giving these institutions a significant degree of added flexibility.

The economic literature has generally not focused on the connection between securitization and the monetary transmission mechanism. Kuttner

(2000) looks for evidence of a connection by comparing the relative growth of asset-backed securities and bank loans over the business cycle. He argues that if banks use securitization as a means to buffer the effects of monetary policy, the volume of asset-backed securities and bank loans should move in opposite directions in response to monetary policy actions. He shows that the behavior of home mortgages since 1980 tends to corroborate this hypothesis.

Estrella (2001) uses a structural model to determine whether the extent of securitization in the U.S. home mortgage markets has affected the ability of the Federal Reserve to influence output through the interest rate channel. He constructs a simple dynamic IS-curve framework in which real output is found to be less sensitive to changes in the real federal funds rate as the extent of mortgage securitization rises. This pattern is even more pronounced when an equation for housing investment, rather than for aggregate output, is estimated.

However, Estrella (2001) also finds that the effect of the federal funds rate on mortgage rates seems, if anything, to have increased with rising securitization. Thus, the reason for the lower efficacy of the interest rate channel seems not to stem from a loss in the ability to affect market interest rates, but from a lower sensitivity of investment and output to changes in the cost of capital. In order to illustrate the magnitude of this effect, we turn to estimates of an IS equation adapted from Estrella (2001). The model is an extension of an IS equation constructed by Rudebusch and Svensson (1999). This equation models the effect of a change in the real interest rate on the output gap as defined in section 3. The Rudebusch-Svensson (1999) IS equation is:

$$y_t = b_0 + b_1 y_{t-1} + b_2 y_{t-2} + b_3(\bar{i}_{t-1} - \bar{p}_{t-1}) + h_t, \qquad (2)$$

where y_t is the quarterly output gap, $\bar{i}_t$ is a four-quarter average of current and lagging federal funds rates, $\bar{p}_t$ is average inflation over the same four quarters, and h_t is a random disturbance term. Inflation is also defined as in section 3, though it enters equation (2) as a moving average. Note that since an increase in the interest rate is contractionary, we expect that $b_3 < 0$.

In order to test for the effects of mortgage securitization on the reaction to monetary policy, we allow the coefficient of the real rate, b_3, and the intercept term, b_0, to vary with the extent of securitization. Securitization is represented by the ratio S_t of the value of securitized home mortgages to the value of all home mortgages, both obtained from the Federal Reserve's Flow of Funds database.

The actual model estimated is of the form:

$$y_t = b_{00} + b_{01} S_t + b_1 y_{t-1} + b_2 y_{t-2} + b_{30} exp(b_{31} S_t)(\bar{i}_{t-1} - \bar{p}_{t-1}) + h_t. \quad (3)$$

The intercept is a linear function of the securitization ratio S_t, whereas the interest elasticity is a nonlinear function of S_t. The reason for the nonlinear form is that it is difficult to motivate the possibility of a positive interest elasticity. In the form specified, the sign of the interest elasticity is

determined by b_{30}, whereas dependence on securitization is determined by b_{31}. Thus, although the sign of the elasticity is not forced to be negative, it is constrained to be the same regardless of the level of securitization.

The first column of table 3 shows that the elasticity is negative, as expected, and that its absolute value decreases with securitization. The latter result is significant at the 10% level. In addition, the estimates from the first column imply that the interest elasticity has fluctuated from –0.21 with no securitization to –0.013 with the current securitization ratio of 0.46. Chart 4 shows the range of values of this elasticity since 1966, together with 95% confidence bands.[1]) The chart indicates that, even though the magnitude of the elasticity is currently fairly small, the estimate is statistically different from zero. The statistical significance of the negative sign of the elasticity is confirmed by the estimate of b_{30}, which determines the sign and has a p-value of 0.025.

Table 3

Estimates of IS Equation, Allowing Interest Elasticity to Vary Nonlinearly with Securization of Single-Family Home Mortgages

(1996 Q1 to 2000 Q2)

$$y_t = b_{00} + b_{01}S_t + b_1 y_{t-1} + b_2 y_{t-2} + b_{30} exp(b_{31}S_t)(\bar{i}_{t-1} - \bar{p}_{t-1}) + h_t$$

	Elasticity varying with securitization[1])	Varying elasticity and intercept term[1])
b_{00}	0.14 (0.135)	0.18 (0.208)
b_{01}	–	−0.18 (0.715)
b_1	1.16 (0.000)	1.16 (0.000)
b_2	−0.23 (0.007)	−0.23 (0.008)
b_{30}	−0.21 (0.025)	−0.23 (0.054)
b_{31}	−6.02 (0.096)	−6.62 (0.123)
R^2	0.915	0.915

[1]) *p-values in parentheses.*

The foregoing results suggest that securitization has affected the transmission mechanism in a fundamental way in the United States. The pattern is generally consistent with a simple trend in the elasticity, which could arise from any number of reasons, but Estrella (2001) presents evidence that the securitization model dominates a simple trend. Furthermore, the economic magnitude of the effect is striking, with the elasticity declining almost by a factor of 20, from a level of –0.2 to –0.01. Thus, although the evidence is indirect, it seems compelling.

1 *The confidence bands are asymmetrical, since they are computed with a nonlinear technique, rather than the standard delta method. The coefficients of the nonlinear elasticity function are assumed to be jointly normally distributed, and the extrema of the function over a 95% confidence ellipse are plotted.*

5 Derivative Instruments and Risk Management

In this section, we turn to the influence of the development of markets for derivative instruments on the transmission mechanism, particularly since the 1980s. As indicated earlier, we also consider the influence of modern risk management in this section, since the latter is intimately connected with the growth in derivative instruments.

Financial derivatives are instruments that, as the name implies, derive their value from some underlying asset. Financial futures and forwards allow the holder to lock in a price for a future transaction. Financial options give the holder the right, but not the obligation, to purchase or sell a financial asset in the future at a predetermined price. Most financial derivatives are combinations of these basic types.

Figure 5 shows the growth of exchange-traded financial derivatives in North America since the mid-1980s. The early data are as of yearend, whereas more recent data are quarterly. Although the numbers show some recent signs of leveling off, it is clear that the growth in these instruments since the early 1980s has been phenomenal. Growth in over-the-counter derivatives markets has been analogous. Thus, it makes sense to suspect that these markets may have had important influences on financial markets in general, and on the transmission mechanism in particular.

One of these influences is in the realm of risk management. Risk management existed before derivatives, and derivatives may be used for purposes other than risk management. In fact, futures and options allow market participants to accumulate positions whose implicit leverage, or sensitivity to changes in the underlying prices, are far in excess of those obtainable in direct holding of the underlying. However, one of the key features of derivatives is that they allow investors to hedge their positions in the underlying instruments, or in other closely related instruments.

Because of the ability to hedge with derivatives, in some cases even locking in prices with reasonable certainty, the growth in financial derivatives may have affected the transmission mechanism, particularly through the valuation channel. For instance, derivatives may be used to hedge holdings of corporate equity, with possible implications for both the wealth effect and the capital valuation effect. In addition, there are very extensive markets in foreign exchange derivatives, which could be used to change the characteristics of currency positions and in turn influence the size of the exchange rate effect.

There are two questions in this context. First, how extensive is the use of financial derivatives to hedge the positions that are most relevant for the valuation channel? In fact, it is possible to use derivatives to change risk in either direction. Second, even if the risk characteristics of investors' positions are in fact being modified by derivatives, to what extent do those practices change the size of the effects in the valuation channel? These are empirical questions and, unfortunately, detailed data to address them are not easily found at this time.

Derivative instruments and risk management may also affect the interest rate and credit channels. In the former, it is not clear how derivatives would change the cost of capital effect. It is clearer, however, that derivatives may

contribute to market liquidity and in that sense may lessen some of the direct effects of the interest rate channel.

The management of risk using derivatives may also have implications for the credit channel. In particular, to the extent that banks and other types of firms may shield their balance sheets from the effects of macroeconomic shocks, it may be more difficult for the actions of the monetary authority to take hold, particularly in the case of monetary tightening. For example, risk management could reduce the sensitivity of bank capital to macroeconomic fluctuations, and may lessen the severity of the bank lending effect, especially of the regulatory capital variant of this effect.

As noted, many of the key questions of this section are empirical, and we are regretfully short on empirical work in the area. An interesting study performed under the auspices of the Bank for International Settlements (Hannoun 1994) has a detailed and useful discussion of the potential effects of derivatives markets on the transmission mechanism, but does not offer empirical evidence.

Vrolijk (1997) uses data from the United Kingdom to investigate the effects of the development of derivatives markets on the transmission mechanism. He constructs a small structural VAR model of the UK economy, which includes real GDP, the price level, overnight interest rates and the size of the derivatives market (transactions volume of sterling futures contracts on the London Financial Futures Exchange since 1982). The model is structural in the sense that coefficient restrictions based on theoretical considerations are imposed.

From this analysis, Vrolijk concludes that he cannot identify any significant effect of derivatives markets on the equations of the model, and hence on the transmission mechanism. In particular, an attempt to model the interest elasticity of real output as a function of derivatives activity proved unsuccessful. Vrolijk does conclude that derivatives may have made markets more efficient in the sense that, with them, interest rates move more quickly to reach equilibrium levels. However, the evidence on that point seems mixed.

In contrast to the results with deregulation and securitization, there is little empirical evidence that the growth of financial derivatives has impacted the transmission mechanism in any meaningful way. It should be said, however, that this conclusion may result from a lack of relevant empirical evidence and not necessarily from a lack of real influence of these markets.

6 Conclusions

This paper argues that financial innovation, particularly since 1980, has brought with it the potential to affect nearly every aspect of the monetary transmission mechanism. Moreover, empirical evidence in the cases of deregulation and securitization suggests that the potential has in fact been realized, and that monetary policy in industrial economies is weaker as a result. The impact of derivatives markets and of risk management is not altogether clear, but the results may simply reflect a shortage of relevant data.

However, these conclusions should be taken as preliminary and not as definitive. The literature in this field is fairly scant, and there is a clear potential for much further progress, particularly on the empirical side. Moreover, as empirical evidence materializes, there may be a need to revisit the theoretical framework in light of any new results.

The policy conclusions from the analysis are at first sight not comforting, since it seems that monetary authorities in industrial economies have lost a lot of their punch in pursuing monetary policy. However, it is not clear that the implications are truly that negative. First, we may be witnessing a shift from the more visible elements of the transmission mechanism, such as the cost of capital effect, to more subtle mechanisms, such as those in the credit channel. Monetary policy may still be potent, but in a different way. Second, financial innovation has brought with it many positive elements, such as more efficient markets and better techniques for the management of risk, which must be weighed against any losses in monetary control. Finally, to the extent that markets are functioning more efficiently, they may be performing some of the tasks that were formerly required of the monetary authority. The consequences of financial innovation can hardly be considered negative if they are reflective of a market that is doing its job.

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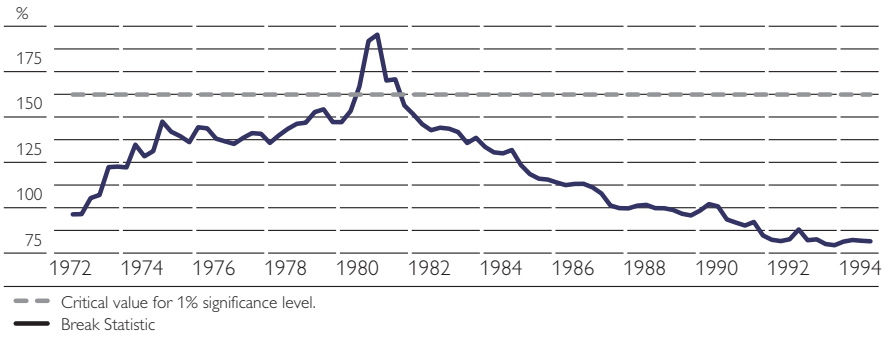
Chart 1

Break Static for VAR, Based on Likelihood Ratio Test[1])

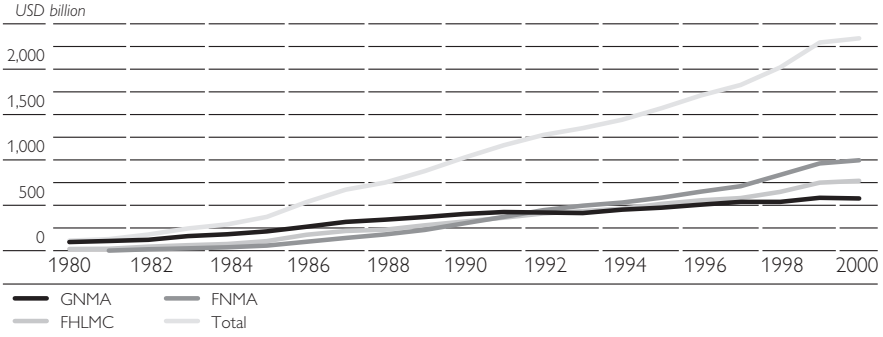


[1]) 16.541% of observations dropped.

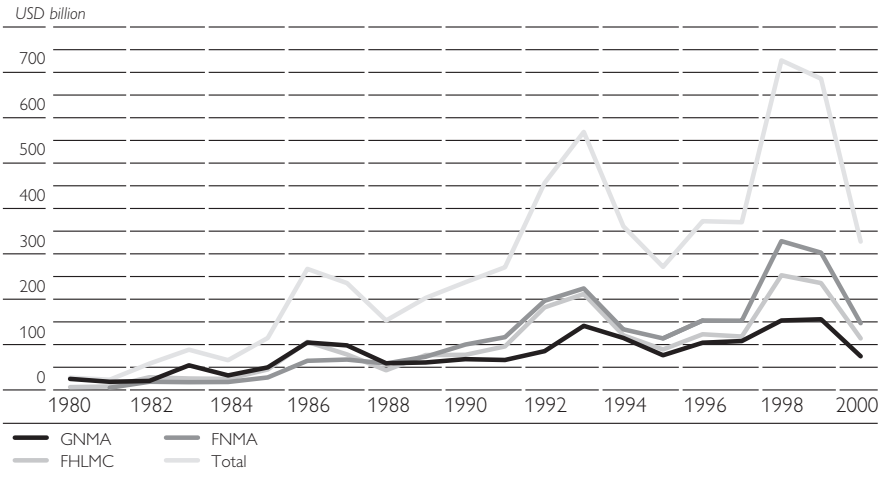
Chart 2

Growth of Mortgage-Backed Security Market

U.S. Outstanding Volume of Agency MBS 1980 to September 2000



U.S. Issuance of Agency MBS 1980 to September 2000



GNMA: Government National Mortgage Association (Ginnie Mae).
FNMA: Federal National Mortgage Association (Fannie Mae).
FHLMC: Federal Home Loan Mortgage Corporation (Freddie Mac).

Chart 3

U.S. Asset-Backed Securities Market

by Major Types of Credit 1995 to 2000

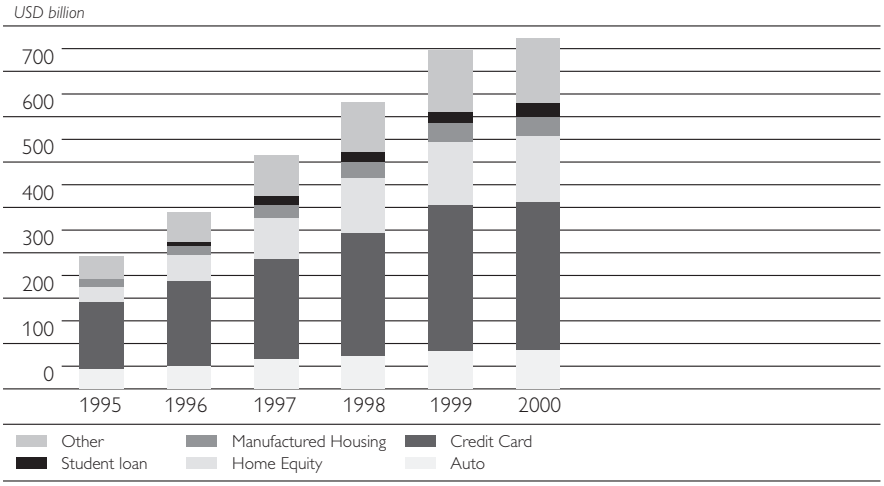


Chart 4

Interest Elasticity of Output in Nonlinear IS Equation

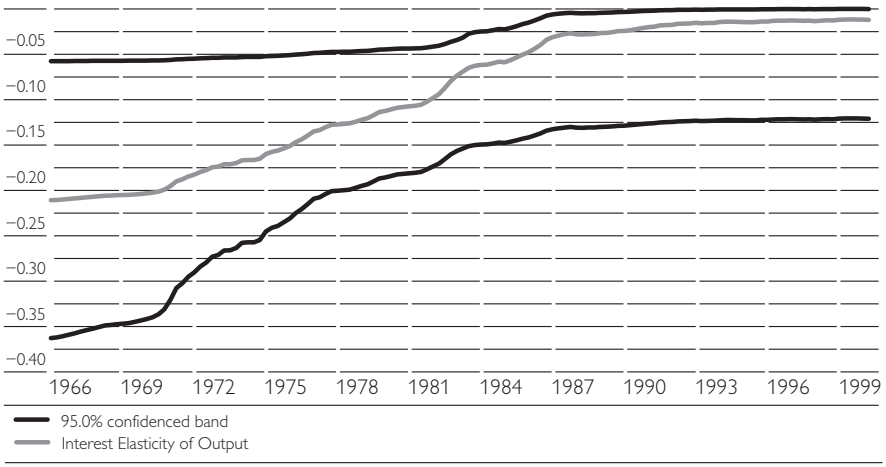
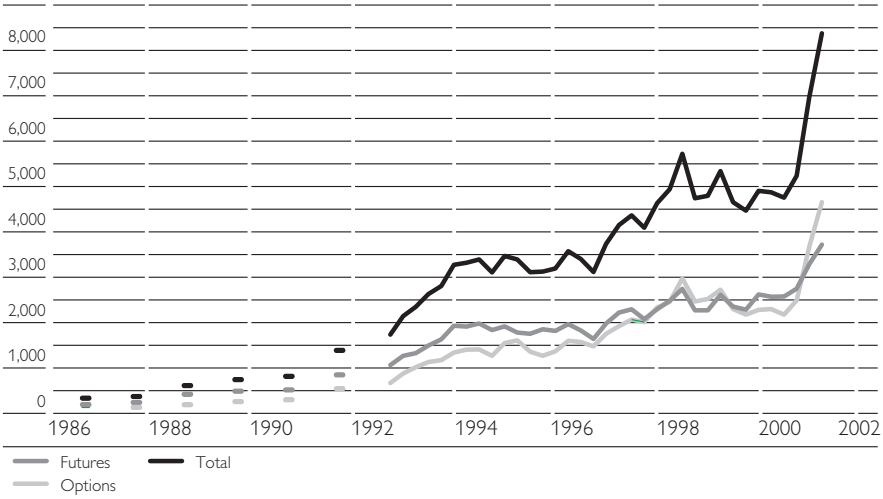


Chart 5

Open Interest in Exchange-Traded Derivatives Markets in North America

Notional amounts, USD billion



Source: Bank for International Settlements.

Transmission Mechanism and the Labor Market: A Cross-Country Analysis

Markus Knell, Fabio Rumler[1])

1 Introduction

In this paper we study the transmission of monetary policy on the labor market and investigate the role of various labor market institutions in the transmission process. The topic of monetary transmission is at the heart of monetary economics, and much has been written about this subject in recent years (see Journal of Economic Perspectives, Fall 1995; Bernanke, Gertler and Gilchrist, 1999). There exists, for instance, an extensive macroeconometric literature (see Christiano, Eichenbaum and Evans, 1999) on how monetary policy shocks affect an economy and notably on how this effect can be decomposed into quantity (GDP) and price (inflation) responses. A second strand of a more microeconomic-oriented literature attempts to analyze the precise channels of monetary transmission by focusing on the role of economic and, in particular, financial structures and institutions (see Bernanke and Gertler, 1995; Cecchetti, 1999). None of these studies, however, specifically look into the consequences for employment and the role of labor market institutions. In the macroeconometric studies the effects on employment are in general derived from the effects on GDP (via Okun's law) or on inflation (via a Phillips-curve relation), whereas in the microeconomic literature the focus is rather on legal and financial than on labor market structures.

Here, we take a different approach on both accounts, since we analyze directly the relation between monetary policy and unemployment and discuss the role of labor market institutions in this process. We think that this is a valid and valuable procedure for the following reasons. Various theories exist about the way monetary policy is transmitted into changes in real GDP and inflation. A number of labor market institutions have been said to play a crucial role in most of these transmission channels. The same labor market institutions will also influence the reaction of unemployment to changes in real GDP and in inflation. By looking directly at the link from monetary policy to unemployment we basically study the total effect of labor market institutions in this chain of reactions. We believe that this gives a more comprehensive picture of the role these institutions play in the cyclical behavior of economies.

According to the (traditional) interest rate channel, e.g. a rise in the real interest rate will affect aggregate demand via reductions in business investment, consumer spending and net exports. How these downward movements in aggregate demand are divided between output and price movements depends, however, on the shape and slope of the aggregate supply curve, which is itself influenced by a country's price- and wage-setting mechanisms. Since labor market institutions are important determinants of these price- and wage-setting mechanisms (see Layard, Nickell and Jackman, 1991) they should also play an important role in the

1 *The authors want to thank Jack Selody, Martin Schürz and Maria Teresa Valderrama for helpful comments and Ernst Glatzer for technical support.*

interest rate channel of monetary transmission.[1]) The degree of the coordination of wage bargaining, for instance, should make the aggregate supply curve steeper, as the bargaining parties will be able to take into account external effects of their wage decisions, thereby fostering real wage flexibility. Furthermore, labor market institutions could also affect the correlation between output and employment movements (via Okun's law or the Phillips-curve relation), as, for instance, employment protection legislation will arguably encourage labor hoarding in recessions. The setup of the empirical tests allows us to investigate the total effect of labor market institutions in the transmission of monetary policy.

Viewed from a somewhat different perspective, our paper is also related to a recent thread of literature where the interaction between macroeconomic shocks and labor market institutions is studied in order to explain the different unemployment histories in different OECD countries (see Ball, 1997; Blanchard and Wolfers, 2000; Bertola, Blau and Kahn, 2001). Our analysis differs from these predecessors in two important respects. First, we focus on the role of one specific type of demand shock – i.e. changes in monetary policy – whereas Ball (1997) analyzes the impact of disinflation and Blanchard and Wolfers (2000) look into the role of different measures of shocks. Second, and most importantly, we study how the interaction of labor market institutions and monetary policy affects cyclical unemployment rather than long-run unemployment, contrarily to the two papers mentioned above. Although it is rather difficult empirically to draw a clear distinction between cyclical and structural unemployment, such a conceptual distinction is nevertheless crucial, an issue we will discuss more extensively in a later section.

The methodological procedure of our paper is the following. First we identify periods of substantially increasing or decreasing real interest rates for a group of 19 OECD countries.[2]) In our benchmark selection this results in a sample of 44 periods that are characterized by different lengths and by different increases or decreases in real interest rates. We then calculate the changes in cyclical unemployment over the same periods, with cyclical unemployment defined as the difference between actual and structural unemployment (measured by the NAWRU). Finally, we investigate how the increase or decrease in cyclical unemployment over a monetary policy period can be explained by the interaction of the various labor market institutions and the change in the real interest rate over this period. Our results indicate that higher replacement rates, a higher tax wedge and a higher degree of union density significantly increase the impact of monetary policy on cyclical unemployment, whereas more active labor market policies and a higher degree of coordination in wage bargaining dampen the effect.

1 *"A fundamental determinant of the output profile is the flexibility in the goods and labor markets. If prices adjust quickly, then monetary policy is less effective and output responses will be smaller. […] In countries with rigid labor markets, one would expect to see more persistent deviations of output from its potential level." (Mihov, 2000, p. 24).*

2 *The exact definition and the technicalities of our procedure are explained in the following sections of the paper.*

The paper is organized as follows. In section 2 we describe the empirical setup of our estimation, while the results and various robustness tests are reported in section 3. Finally, section 4 concludes.

2 Empirical Setup

As has been said in the previous chapter, the aim of this paper is to analyze the role of labor market institutions in the transmission of monetary policy. The first step of our analysis is therefore to define the empirical setup in which we want to study this question. This involves not only the choice of adequate measures for monetary policy and labor market performance but also the formulation of an appropriate empirical strategy which allows a clear identification of the transmission process of monetary policy. In this respect we follow Ball (1994) in defining monetary policy periods for each country in which the real-economy variables (i.e. unemployment in our case) are observed – including a certain lag, though. This means that not the whole sample of the time series involved is considered but only prespecified monetary policy periods, which can be different for each country. In selecting monetary policy periods we define two types of periods, one reflecting a restrictive and the other reflecting an expansionary monetary policy. In the following we will further discuss our empirical setup.

2.1 Monetary Policy Measure

As our preferred measure of monetary policy we consider the change in the real short-term interest rate. Our measure should reflect intentional monetary policy actions which are used by the central bank to systematically influence output and inflation. The short-term interest rate being the most important policy instrument of most central banks, is the most natural candidate.

Furthermore, according to standard theory it is the real rather than the nominal rate of interest which reflects the user cost of capital and determines people's savings and investment decisions. The real interest rate is defined as the nominal rate less inflation expectations. We calculate an ex-ante real interest rate using expectations of inflation derived from univariate time series models. Inflation is forecast one step ahead for each period with the help of an autoregressive process, which is re-estimated for each period on the basis of past inflation. This amounts to assuming that individuals expect inflation in the next period to be a weighted average of past inflation.[1]) Considering the real instead of the nominal short-term interest rate makes a considerable difference, especially during high inflation periods.

The final step in defining our monetary policy measure is the decision to focus on changes in the short-term interest rate rather than on its level.[2]) A positive change is associated with restrictive monetary policies while a

1 *It turns out that inflation is characterized by a unit root implying a unit coefficient on the first lag and small and rather insignificant coefficients on the other lags. An inflation forecast based on this model is equivalent to static expectations where inflation is expected to be the same as in the previous period. This is confirmed by the fact that the real interest rate based on expectations derived from an AR-model and the real interest rate based on lagged inflation turned out to be virtually identical in our dataset.*

2 *This is also the approach followed by Ball (1999) and Romer and Romer (1994).*

negative change is associated with expansionary monetary policies. In our view, changes in the interest rate capture a central bank's monetary policy actions more adequately than the interest rate level, since any significant change in the short-term (in our case 3-month) interest rate is driven by central bank actions. Incidentally, even significant changes in the real interest rate reflect central bank actions in the sense that leaving the interest rate unchanged in a situation of rising or declining inflation represents a reaction of the central bank that is intended to be either expansionary or restrictive.

Furthermore, the change in the interest rate is the appropriate measure because it in a way isolates the monetary policy actions from the pre-shock level of the real interest rate, which may be influenced by other factors than monetary policy, like the fiscal stance, varying risk premia, deregulation of capital markets, etc. More generally, differencing has the useful property of factoring out previous shocks if they are sufficiently persistent over the observed time span. Thus, it implicitly corrects for other influences than monetary policy.

2.2 Monetary Policy Periods

Once the monetary policy measure has been established, we can use it to find periods of restrictive and expansionary monetary policy. This step is crucial since we are going to evaluate labor market developments only in these prespecified periods and the results are, of course, sensitive to their selection. Given the belief that systematic monetary policy can influence real economy variables, restrictive monetary policy – as measured by a rise in the real interest rate – is associated with a rise in unemployment and expansionary monetary policy – a fall in the real interest rate – with a decrease in unemployment. Since interest rate movements are rather erratic and short-lived from time to time, a thorough selection of monetary policy periods across countries should be based on objective criteria.

The selection of periods should reflect intentional and systematic monetary policy actions which, in addition, display a certain persistence. In order to dampen erratic interest rate movements, the first step was to construct a moving average[1]) of monthly real interest rates and proceed with that time series. Furthermore, a monetary policy period reflecting a significant interest rate change should last at least one year, thus excluding transitory movements in the interest rate. The most straightforward procedure of selecting periods is to examine a time series plot of the smoothed real interest rates by visual inspection. Of course, visual inspection entails a great deal of judgment, but based on the above criteria it yields reasonable periods of restrictive and expansionary monetary policies (see table 2).

As an alternative we also followed a more objective period selection procedure based on automatic selection according to various prespecified criteria. The time series were screened automatically to find periods in

1 *Our standard specification was a centered 9-period (months) moving average but the selection of periods is in general not very sensitive to the moving average parameter.*

which the first differences of the real interest rate are of equal consecutive sign, i.e. growing or decreasing monotonically. In addition, the period was required to have a minimum length, and some small exceptions of adverse sign were allowed. Interestingly, both selection procedures led to similar results concerning the role of labor market institutions in the monetary policy transmission even though in the first stage the two methods delivered somewhat different monetary policy periods (see section 3.3). Therefore, we proceed with the selection based on visual inspection as our standard case and present the results based on automatic selection as a test for robustness.

2.3 Unemployment Measure

In order to analyze the effect of monetary policy in conjunction with labor market institutions on labor market performance a corresponding measure has to be defined for labor market performance, which must necessarily be a variable measuring unemployment. In accordance with most of the theory (neoclassical as well as New Keynesian) but in contrast to Ball (1997; 1999) we assume that monetary policy primarily affects cyclical unemployment rather than long-run unemployment. Therefore, we define the deviation of the actual unemployment rate from trend or long-run unemployment, as measured by the NAWRU[1]), to be our unemployment measure.

To be consistent with the monetary policy measure, we take the change of the cyclical unemployment rate as our unemployment measure rather than its level. The reason for this is that monetary policy should affect cyclical unemployment regardless of its level at the start of the policy action, which may be influenced by factors other than monetary policy. The same arguments apply as were mentioned above for the monetary policy measure. Accordingly, we hold that the impact of monetary policy on the labor market is most accurately captured by the change in the cyclical unemployment rate. In addition, to account for the long lags of the real effects of monetary policy, the change in the cyclical unemployment rate is observed in a period corresponding to the monetary policy period but lagged by one year.[2])

Our analysis implicitly assumes that monetary policy is one of the most important sources of movements in short-run unemployment during the monetary policy periods under consideration. Without doubt, there are a lot of other factors influencing cyclical unemployment – also in the periods observed – like various supply shocks and nonmonetary demand shocks. However, we agree with Ball (1994) that intentional demand contractions are an essential source of postwar recessions in industrialized countries and therefore we believe that monetary policy (together with fiscal policy) is indeed a major factor influencing labor market performance. Apart from

1 *The NAWRU (non-accelerating wage rate of unemployment) is an equilibrium concept specifying the rate of unemployment that is consistent with stable wages. We estimate the NAWRU for each country according to the method proposed by Elmeskov (1993) and modified by Elmeskov et al. (1998).*

2 *Of course, one year is an arbitrary assumption on the length of the lag concerning the effects of monetary policy. It turns out, however, that the results are not very sensitive to the choice of the lag length. Robustness tests will be presented later for different lags (see section 3.3).*

that, we try to account for the various nonmonetary shocks in our regressions aimed at explaining cyclical unemployment by including real GDP growth as a broad measure for these shocks (see section 3.2). A further argument is that the time span considered in our econometric analysis starts at 1980 and, therefore, does not include the 1970s, a time when large supply shocks played an important role in most industrialized economies.

2.4 Labor Market Institutions

The variables for the labor market institutions used in the estimations are the standard labor market variables available, most of which are based on various OECD sources. They are taken from Layard and Nickell (1999), where most of these variables are collected and discussed.[1]) Table 1 includes all labor market variables used in our regressions along with their definitions. If not explicitly stated otherwise in the table (in parentheses), all Layard and Nickell variables consist of two observations – one referring to the period of 1983 to 1988 and one to the years 1989 to 1994. In constructing the labor market variables corresponding to the monetary policy measure for the regressions we used the first observation if the monetary policy period (including the lag) was in the 1980s and the second if it was in the 1990s. For periods that extend from one decade into the other a weighted average has been calculated with the weights based on the proportions of the overlap.

Table 1

Variables for Labor Market Institutions

Variable	Variable name	Definition
Total Tax Wedge	TaxWedge	Sum of payroll tax, income tax and consumption tax rates
Labor Standards (1985 to 1993)	LStandards	Including: working hours, fixed-term contract, employment protection, minimum wages, employees' representation rights; each varies from 0–2 (no to strict legislation), aggregate index is constructed by summing the subindices
Union Density	UnDens	Percentage of the employees being a member of a trade union
Union Coverage	UnCov	Percentage of employees covered by collective agreements: 3 means >70%, 2 means 25-70%, 1 means <25%.
Union Coordination[1])	UnCoord	3 = high, 2 = middle, 1 = low
Replacement Ratio	RRate	The share of income replaced by unemployment benefits
Benefit Duration	BenDur	In years; 4 years means indefinite duration
Active Labor Market Policies (1991)	Active	Active labor market spending per unemployed in percent of GDP[2]): expenditures on labor market training, assistance with job search, employment subsidies
Employer Coordination[1])	EmpCoord	3 = high, 2 = middle, 1 = low
Total Coordination	Coord	= UnCoord + EmpCoord

[1]) These have not been used directly in the regressions but only to construct the variable "total coordination".
[2]) Due to endogeneity problems with the original variable Layard and Nickell (1999) have created an instrumental variable by normalizing active labor market spending by unemployment in a reference period (1977 to 1979) instead of current unemployment.

1 *Although these variables have been criticized for a number of reasons, we have used these data due to the lack of other comprehensive data sources and for reasons of comparability to related studies.*

3 Results

3.1 Specification

In order to test our hypothesis that labor market institutions have an impact on the transmission mechanism we first have to choose an appropriate specification for the econometric model. There exist (at least) two reasonable specifications:

$$\frac{UnrM_i}{MPolM_i} = \alpha + \beta' X_i + \gamma' Y_i + \varepsilon_i \quad (1)$$

$$UnrM_i = \alpha + \beta \cdot MPolM_i + \gamma' X_i + \delta' \cdot MPolM_i \cdot X_i + \phi' Y_i + \varepsilon_i, \quad (2)$$

where $MPolM_i$ is the monetary policy measure (i.e. the change in the real interest rate) over period i, $UnrM_i$ is the unemployment measure (i. e. the change in cyclical unemployment) over the same period (including the transmission lag), X_i is a vector of variables that are related to labor market institutions and Y_i is a vector of other (macroeconomic, etc.) variables.

In specification (1) the dependent variable can be interpreted as a "sacrifice ratio": How does the unemployment rate in a certain period react to a change in monetary policy or – more precisely – by how many percentage points does the cyclical position of unemployment change when the real interest rate is changed by one percentage point?[1]) The hypothesis is that these sacrifice ratios are influenced by the institutional variables in a systematic and – according to this specification – linear way.

The second specification is less restrictive than the first one as it allows for possible nonlinear relationships and different interactions between the monetary policy measure and the various institutional variables (see Greene, 2000, chapter 10). Theory and intuition suggest that not every labor market institution is equally important in the transmission of monetary policy and that, for instance, certain institutional features only have a significant impact on the transmission channel if they exceed some threshold value. The interaction terms $MPolM_i \cdot X_i$ are thus included to capture these various nonlinearities and interdependencies. Although we do not believe that the institutional variables per se have a systematic influence on the unemployment situation in a certain monetary policy period we still include them in specification (2) for econometric reasons. Since all of these direct effects will in fact turn out to be insignificant (as one would expect) we will consider a third specification that does not include these variables:

$$UnrM_i = \alpha + \beta \cdot MPolM_i + \delta' \cdot MPolM_i \cdot X_i + \phi' Y_i + \varepsilon_i. \quad (3)$$

In table 3 we present the results for specifications (1) to (3), where we use our benchmark selection of monetary policy periods (including 44 observations from 19 countries) that were selected by visual inspection

1 *This is in fact fairly close to the "usual" definition of sacrifice ratios, i.e.: The number of percentage points increase in cyclical unemployment that is required to reduce inflation by one percentage point (see Mankiw 1997, p. 352). See also Ball (1994), Jordan (1997) and Andersen and Wascher (1999).*

(see table 2). The variables $MPolM$ and $UnrM$ are measured as explained in section 2. The measures for the labor market institutions are taken from Layard and Nickell (1999) and are also discussed in section 2. In addition the regression includes variables for the length of a monetary policy period (*Length,* measured in months), the "direction" of a period (*Dir,* which is a dummy variable that takes the value "1" for restrictive and "–1" for expansionary periods) and output growth *(GDP_Growth).*

As can be seen from table 3 we get different results depending on whether we use specification (1) or (2). The differences are mainly reflected in the magnitudes and the levels of significance and not in reversals of sign. Furthermore, the institutional variables that significantly affect the sacrifice ratios of model (1) are a subset of the significant (interacted) institutional variables of model (2). This lends support to the hypothesis that the remaining differences (and the lower $\bar{R}^2$ of model (1)) are due to nonlinear relationships between monetary policy and labor market institutions that are not accurately captured in the first specification. In the following we will thus concentrate our discussion on estimated models that are based on the interaction approach.

For model (2) we observe that none of the institutional variables is significant in its "pure" (i.e. non-interacted) form, while a number of these variables have a significant impact on the unemployment measure when interacted with the monetary policy measure. Dropping the non-interacted institutional variables from the regression (see model (3)) changes the p-values only slightly, while leaving the estimated coefficients of the interacted terms basically unchanged in magnitude. For this reason we will leave out the non-interacted institutional variables in our following estimations, and model (3) is used as the benchmark specification on which also the robustness tests will be based.

3.2 Interpretation

In this section we will turn to an interpretation of the results of model (3) and relate them to the predictions of various theoretical models.

Inspecting the results of model (3) more closely we can observe the following characteristics: Higher replacement rates, a longer duration of unemployment benefits, a high degree of labor standards and a higher union density tend to increase the impact of monetary policy on cyclical unemployment, whereas more active labor market policy, a higher union contract coverage and a higher degree of coordination dampen the effect. Most of these coefficients have the signs that would have been predicted by various theoretical models (we will say more about this below). The size of the effect of institutions on the monetary transmission[1]) is largest for union density, coordination, the tax wedge, active labor market policy and the replacement rate and lowest for labor standards, union coverage and benefit duration, where the coefficients of the latter variables are not statistically significant at the 10% level.

1 *This size was calculated as the effect of a one standard deviation change in the various institutional variables.*

We have included output growth *(GDP_Growth)* in our specification in order to (at least partially) control for effects on unemployment that are not directly related to monetary policy (and its interaction with labor market institutions) such as supply or demand shocks. Cyclical unemployment should tend to increase during periods of lower growth and decrease with high growth. The (significantly) negative sign of the coefficient is thus the expected result. We have entered the output growth variable into our benchmark specification without an interaction term, because it is itself a macroeconomic variable, defined over the same time span (including the transmission lag) as the dependent variable. One can thus expect output growth to have an impact on the unemployment position (e.g. via Okun's law) that is independent of the monetary policy measure (which is not the case for the institutional measures).

The positive sign of the variable measuring the length of the monetary policy period *(Length)* indicates that a sharp and short increase in real interest rates ("cold turkey strategy") seems to be preferable to a gradualist approach. The coefficient, however, is not highly statistically significant (p-value: 13.6%).

The direction of monetary policy (i.e. whether real interest rates were increased or decreased over a period) was included in our specification as a dummy variable *(Dir)*. We did this to control for possible asymmetries, i.e. for the possibility that the transmission of monetary policy in restrictive periods is different from the one in expansionary periods. The positive sign of the coefficient implies that restrictive (expansionary) monetary policy periods are on average associated with increases (decreases) in cyclical unemployment, which is the expected result. The coefficient is, however, not statistically significant, and we leave the more in-depth analysis of the issue of asymmetry for future research.

Another point is to investigate the impact of changes in the interest rates themselves. One could be tempted to interpret the negative sign of the non-interacted monetary policy variable *(MPolM)* as suggesting that a period of increasing real interest rates is correlated with decreases in cyclical unemployment. This, however, would be erroneous, since *MPolM* exerts its influence in our specification not only directly but also – and primarily – *indirectly* via the interaction with the various labor market institutions. In order to assess the complete impact of changes in the real interest rates on cyclical unemployment one would thus have to consider all interaction terms. Since we are mostly interested in the role of labor market institutions and their interaction with monetary policy we will not follow this topic any further here.

Now we want to relate the results of our estimation to economic theory and investigate whether they are in line with the predictions of various economic models. The first labor market institution that comes to mind are active labor market policies. If governments are engaged in active anticyclical employment policies then this should weaken – almost automatically – the impact of all kinds of shocks. The expected negative sign on *Active* also shows up in our estimation.

A second institutional feature of labor markets that was shown (in dynamic labor market models) to have clear-cut theoretical implications for (un)employment fluctuations are labor regulation and job security provisions, e.g. hiring and firing legislation (see Bertola, 1999). *"Theory suggests that employers should refrain from shedding labor in downturns when firing is costly, and also refrain from hiring in upturns. Hence, more stringent employment protection legislation should be associated with smoother dynamic employment patterns"* (see Bertola, Blau and Kahn, 2001, p. 25). We would thus expect a negative sign of a job-security variable. Our regression, however, only includes the variable *LStandard,* which is composed of several indices that measure certain features of a country's labor standards, only one of which is employment protection. Perhaps this multidimensionality is the reason why the coefficient of *LStandard* is not significantly different from zero in the estimation. In later estimations, however, the coefficient turns out to be significantly positive, thus seemingly contradicting the predictions of the theoretical models. This result, however, can be explained by the above-mentioned data problems and by the fact that the theoretical models make direct statements only about employment fluctuations which may or may not correspond to unemployment fluctuations (which are the focus of our paper).

The structure of wage bargaining, captured in our estimations by the variables *UnDens, UnCov* and *Coord,* can also be related to economic theories in order to make predictions about their impact on unemployment fluctuations. According to the theory of staggered wage contracts (see Taylor, 1979; Calvo, 1983; Walsh, 1998, chapter 5) long wage contract periods and a high degree of staggering will lead to a larger impact of demand fluctuations on real variables. Due to the lack of availability our estimation does not include a measure for contract length but the variables *UnCov* and *Coord* are related to this topic. A higher degree of contract coverage and a higher degree of coordination in wage bargaining will lower the degree and soften the impact of staggering, which should dampen the fluctuations of unemployment. The estimated coefficients of both variables have in fact the expected negative sign, although the one of *UnCov* is not statistically significant. Conversely, it is often argued that strong (i.e. highly organized) but uncoordinated unions have less tendency to wage moderation, thus causing a larger impact on employment if shocks occur. This channel is less clear-cut theoretically, but the coefficient of the respective variable *(UnDens)* comes out with a positive sign and is highly significant, thus implying that a high degree of union density will lead to a stronger impact of monetary policy on cyclical unemployment.

Theoretical models are rather mute about the impact of taxes (or the tax wedge) on fluctuations in unemployment, since most of them (e.g. Daveri and Tabellini, 2000) study the impact of taxes on *structural* unemployment. The statistically significant positive coefficient of the variable *TaxWedge* in our estimation suggests that high taxes are associated with a stronger impact of monetary policy on cyclical unemployment.

The unemployment benefit system – besides influencing the reservation wage and thus the long-run level of real wages – is generally seen as creating

disincentives for active and immediate job search after getting unemployed. This alone would mean that both a high level of unemployment benefits *(RRate)* and a long duration of these benefits *(BenDur)* will lead to a lower rate (and a slower process) of reemployment of unemployed workers, to less wage pressure of high unemployment rates, and thus to larger fluctuations of unemployment. The coefficient of *RRate* is in fact positive and significant while the coefficient of *BenDur* is positive but insignificant. On the whole, the unemployment insurance system appears to have the effects that are predicted by economic theory.

3.3 Robustness Tests

The results of our benchmark specification (see table 3, column 3) are based on various assumptions concerning the definitions of monetary policy and the unemployment measure, the choice of the monetary policy periods, the lag of monetary policy on the real economy and the exact specification of the estimated model. We have conducted a variety of robustness tests in order to analyze the sensitivity of our results to changes in these assumptions. A small subsample of these tests is shown in table 4, where we only report the levels of significance of the variables.

In columns (2) to (6) we report various tests of robustness with respect to modifications in the specification and with respect to the inclusion of additional variables that could have explanatory power for our dependent variable. These include inflation, a measure for the output-gap instead of the growth rates of GDP and country and regional dummies.

A crucial element of our analysis is the determination of the monetary policy periods and it would be interesting to know if and how the results change if a different sample of periods is used. In the columns (7) to (9) of table 4 we have employed alternative samples of monetary policy periods – a large sample (N=61) and a small one (N=38) – that are still based on visual inspection, together with one sample of periods (Automatic) that was selected by an automatic procedure based on a number of different (predetermined) selection criteria.

In the benchmark specification we have assumed that the effect of monetary policy on the real economy starts with a lag of one year and also lasts for one more year after the monetary policy period has ended. This 12/12 (months) transmission lag structure is not indisputable, and in table 4 columns (10) to (12) we have reestimated our benchmark specification with different assumptions about the lags (0/0, 12/24, 24/24). For instance, "12/24" stands for the assumption that the effect of monetary policy on the real economy starts after 12 months and lasts until 24 months after the end of the monetary policy period.

The general impression from the robustness tests is that the results of our benchmark specification are surprisingly consistent across different specifications in many respects. There seems to be an important and significant role of active labor market policies, the replacement rate, the tax wedge, union density and the degree of coordination of employers and employees in the transmission of monetary policy on the labor market. In contrast, benefit duration, labor standards and union coverage do not

appear to be of particular importance for the monetary transmission mechanism on the labor market.

3.4 Comparison to Related Literature

Blanchard and Wolfers (2000) is probably the most related paper to the research question of our study.[1]) They investigate the effect of three different shocks and their interaction with labor market institutions on European unemployment. In contrast to our setup, Blanchard and Wolfers aim at explaining different developments in long-run unemployment – as measured by 5-year averages of unemployment rates covering the period from 1960 to 2000 – by the interaction of institutions and shocks. The latter are measured either as common unobservable shocks or as country-specific observable shocks (given by the sum of variations in TFP growth, shifts in labor demand and real interest rate changes). The labor market institutions are the same as in our study since they are taken from the same source, i.e. Layard and Nickell (1999). Although their motivation and dependent variable are different from ours, their specification for country-specific observable shocks (equation (2), p. C25) is directly comparable to our benchmark specification. To build the bridge between the two approaches we can interpret our sample as a panel of "quasi-countries" with the monetary policy periods as time-variant observations for each "real country." Bearing in mind that the dependent variables in the two approaches are different, the results indicate quite a few similarities. All institutions except active labor market policy and union coverage came out significant in their estimation (employment protection was additionally included while the variable for labor standards was left out). The difference, however, is that we could not find a significant effect of benefit duration whereas active labor market policy turned out to be highly significant in our model. The signs of the coefficients in the two specifications concerning the labor market institutions are all equal.

There are two ways to explain why the same labor market institutions seem to influence both structural and cyclical unemployment in a similar fashion. The first explanation refers to likely measurement errors. Blanchard and Wolfers' measure of structural unemployment (5-year averages) might not eliminate all short-run dynamics while – by the same token – our measure of cyclical unemployment might be overly influenced by the development of the long-run component (NAWRU). Although these issues of measurement are certainly important a second explanation is reasonable even under the assumption that all crucial concepts are accurately measured. If the development of long-run unemployment is characterized by highly persistent (or even "hysteretic") short-run unemployment, one could expect the same variables to exert influence on both concepts. Restrictive monetary policy leads to increases in short-run unemployment, the size of these increases being affected by the prevailing labor market institutions. Due to elements of persistence on the

1 *Other papers that are related to our study include Ball (1997), Scarpetta (1996) and Elmeskov et al. (1998), but – due to space constraints – we will not discuss similarities and differences here.*

labor market these increases in cyclical unemployment will be transformed into increases in structural unemployment, and this transformation is again influenced by the same (and other) institutional features. This interpretation of the results is further supported by the fact that benefit duration is significant in Blanchard and Wolfers (2000) but not in our specification. It was often argued that the duration of benefits is the single most important institution that propagates the persistence of shocks, while it might have less impact on the labor market in the short run.

4 Conclusions

In this paper we have studied the role of labor market institutions for the transmission of monetary policy on the labor market. We get the result that higher replacement rates, a higher tax wedge and higher union density increase the impact of monetary policy on cyclical unemployment, whereas more active labor market policy and a higher degree of coordination between employers and employees dampen the effect. On the other hand, no significant effect on the transmission of monetary policy on the labor market could be found for the duration of unemployment benefits, the degree of labor standards and union contract coverage.

The implication of these results can again be viewed from the angle of the transmission mechanism literature or the one about the interaction between shocks and institutions. As far as the transmission aspect is concerned, our results suggest that labor market institutions are in fact important for the impact of monetary policy on the real economy. Our results are particularly relevant for the question of whether the transmission mechanism is different for the twelve EMU member countries and whether the ECB policy could have asymmetric effects in different countries (see Dornbusch, Favero and Giavazzi, 1998, Cecchetti, 1999 and Mihov, 2000). In contrast to Mihov (2000) our results suggest that varying constellations of labor market institutions could in fact be a source of asymmetry in the transmission mechanism within EMU. Relating our results to the literature on the interaction between shocks and institutions, they give further support to the currently dominant view that labor market institutions are affecting long-run unemployment primarily via persistent effects of short-run unemployment and not so much by direct effects on structural unemployment itself.

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Table 2

Benchmark Selection of Periods[1])

Country	Begin of period	End of period	Monetary policy measure (MPolM)	Unemployment measure (UnrM)
Australia	1983:08	1985:04	9.15	– 1.13
Australia	1989:08	1993:11	– 6.97	1.41
Austria	1981:07	1984:06	– 4.14	– 0.08
Austria	1988:01	1990:02	3.54	0.00
Austria	1991:09	1994:05	– 4.16	– 0.03
Belgium	1983:02	1986:07	3.77	– 0.41
Belgium	1992:05	1996:10	– 6.05	– 0.84
Canada	1982:12	1984:10	5.91	– 1.54
Canada	1987:02	1990:06	4.91	1.75
Canada	1994:10	1997:03	– 5.28	0.14
Switzerland	1988:02	1989:07	3.76	– 0.47
Germany	1981:06	1983:02	– 3.01	0.64
Germany	1988:03	1991:06	4.93	– 0.50
Germany	1991:06	1993:10	– 5.78	1.11
Denmark	1988:09	1992:12	7.35	1.82
Denmark	1993:03	1996:11	– 9.74	– 2.95
Spain	1986:09	1987:11	9.07	– 1.53
Spain	1992:12	1999:08	– 7.32	– 4.08
Finland	1988:10	1992:06	6.19	7.35
Finland	1992:06	1997:12	– 9.47	– 6.10
France	1980:09	1986:10	7.24	0.27
France	1992:11	1996:08	– 7.35	– 0.10
United Kingdom	1980:06	1983:05	8.77	– 0.13
United Kingdom	1991:12	1994:05	– 3.22	– 1.41
Ireland	1980:12	1985:02	13.12	2.41
Italy	1980:06	1982:03	8.76	0.24
Italy	1994:12	1999:08	– 5.00	– 1.32
Japan	1981:01	1983:11	2.87	0.17
Japan	1990:09	1997:09	– 6.69	0.97
Japan	1997:09	2000:03	2.50	0.27
Netherlands	1988:06	1990:01	2.79	– 0.89
Netherlands	1992:10	1996:09	– 5.36	0.01
Norway	1981:02	1986:04	9.08	– 1.98
Norway	1992:09	1997:05	– 9.01	– 1.27
Norway	1997:05	1998:12	4.29	0.50
New Zealand	1980:07	1984:05	13.28	– 1.88
New Zealand	1985:06	1987:08	– 6.48	0.62
Sweden	1980:06	1982:07	7.20	0.88
Sweden	1991:06	1992:08	9.57	1.92
Sweden	1995:08	1997:11	– 3.34	– 1.63
United States	1980:06	1981:06	7.42	2.01
United States	1984:06	1987:09	– 3.78	– 0.96
United States	1989:01	1991:02	– 2.97	1.90
United States	1993:01	1995:04	2.91	– 0.64
No. periods	Startlag	Endlag	Correlation	"Right direction"
44	12	12	0.32	0.55

[1]) *The selection of the periods followed the procedure explained in section 2, in which also the monetary policy and the unemployment measure are defined. "Startlag" ("Endlag") (measured in months) refers to the lag when the impact of monetary policy on unemployment is assumed to start (end). "Correlation" denotes the correlation between MPolM and UnrM, "Right Direction" gives the fraction of periods in which both go in the same direction.*

Table 3

Different Model Specifications[1])

	Model specification		
	1	2	3
C	−0.710**	2.931	1.027**
	(−2.108)	(1.390)	(2.352)
MPolM		−0.932***	−0.880***
		(−2.972)	(−3.360)
Active	−0.004	−0.025	
	(−0.709)	(−0.656)	
BenDur	−0.011	0.012	
	(−0.290)	(0.052)	
RRate	0.003	0.000	
	(0.870)	(0.003)	
LStandards	−0.004	0.095	
	(−0.107)	(0.329)	
TaxWedge	0.012*	−0.012	
	(1.890)	(−0.316)	
UnCov	−0.029	−0.834	
	(−0.194)	(−0.856)	
UnDens	0.009**	0.010	
	(2.414)	(0.480)	
Coord	−0.078	0.091	
	(−1.623)	(0.307)	
Active x MPolM		−0.009	−0.010**
		(−1.599)	(−2.568)
BenDur x MPolM		0.019	0.019
		(0.549)	(0.618)
RRate x MpolM		0.005*	0.005**
		(1.980)	(2.561)
LStandards x MPolM		0.015	0.024
		(0.418)	(0.935)
TaxWedge x MPolM		0.014**	0.013***
		(2.542)	(2.839)
UnCov x MPolM		−0.042	−0.081
		(−0.362)	(−0.887)
UnDens x MPolM		0.010**	0.010***
		(2.784)	(3.463)
Coord x MPolM		−0.120**	−0.114***
		(−2.636)	(−2.971)
GDP_Growth	−0.027	−0.498**	−0.478***
	(−0.992)	(−2.531)	(−2.981)
Dir	0.005	0.752	0.807
	(0.104)	(0.900)	(1.277)
Length	0.005*		
	(1.938)		
Length x MPolM		0.003	0.003
		(1.188)	(1.554)
Adjusted R-squared	0.228	0.487	0.563

[1]) In parentheses we report the standard errors of the coefficient estimates.
**** (**) [*] indicates significance at the 1% (5%) [10%] level.*

Table 4

Collected Robustness Tests

	Bench-mark	Modifications of the benchmark specification					Alternative periods			Alternative lag structure		
		growth inter-acted	with inflation	with output-gap	with country dummies	with region dummies	large (N=61)	small (N=38)	auto-matic (N=77)	0/0	12/24	24/24
	1	2	3	4	5	6	7	8	9	10	11	12
C	**	**	**				**		***	*	**	***
MPolM	***	***	***	***	**	***	***	***	***	**	***	***
Active x MPolM	**	**	**	**	**	**	***	*	***		**	**
BenDur x MPolM												
RRate x MPolM	**	**	**	**	*	**	***	**	*	*		
LStandards x MpolM							**					
TaxWedge x MPolM	***	***	***	***	**	**	**	**	***	**	**	*
UnCov x MPolM												
UnDens x MPolM	***	***	***	***	**	***	***	***	***	***	***	**
Coord x MpolM	***	***	***	***		**	***	***	**	***	**	**
GDP_Growth	***	**	***		**	***	***	**	***	*	***	***
GDP_Growth x MpolM												
Output gap[1])												
Inflation												
Dir						*	***	*				***
Length x MPolM				**			**		*	**	*	**
Country dummies	no	no	no	no	yes	no	no	no	no	no	no	no
Region dummies[2])	no	no	no	no	no	yes	no	no	no	no	no	no
Adjusted R-squared	0.563	0.550	0.552	0.485	0.547	0.559	0.570	0.543	0.485	0.474	0.505	0.573

[1]) The variable denotes the change in the output gap (measured by the deviation of actual output from its trend which has been decomposed by HP-filtering) during the respective monetary policy period including the lag.

[2]) Regions are: Scandinavia: Denmark, Finland, Sweden, Norway; Anglosaxon countries: U.K., Ireland, Canada, U.S.A.; Oceania: Australia, New Zealand; Continental Europe: Austria, Belgium, Switzerland, Germany, Spain, France, Italy, the Netherlands (Japan was left out for econometric reasons).

**** (**) [*] indicates significance at the 1% (5%) [10%] level. The benchmark specification corresponds to model (3) in table 3. GDP_Growth x MpolM [Output gap] was used instead of GDP_Growth in estimation (2) [4], inflation was added to the benchmark model in estimation (3), country [regional] dummies in estimation (5) [6].*

Monetary Transmission and Fiscal Policy – A Few Provisional Reflections

Heinz Glück

1 Introduction

Monetary transmission processes in the 12 euro area countries are proving not only to be diverse in both nature and scope, they are also undergoing rapid transformation, and not necessarily in the same form.[1]) Changes in the economic and, in particular, financial structures of individual countries as well as in the behavior patterns of economic players are also altering the extent and speed of response to monetary shocks (Taylor, 1995a).

The previous decade has, above all, also seen profound changes in the institutional framework within which the macroeconomic management of the European Union (EU) has to be performed. The Single Market program lifted a large number of restrictions on goods and capital markets, thus furthering economic integration. The introduction of the euro and the creation of a new institution, the European Central Bank (ECB), with a clear mandate for ensuring price stability set clear guidelines for monetary policy. Preparation for monetary union led many governments to implement wide-ranging fiscal consolidation measures in order to guarantee stable budgetary conditions in the medium term as well. All these developments resulted in a clear change of emphasis in economic policy.

In the emerging Economic and Monetary Union (EMU) the growing acceptance and definitive establishment of central bank independence as a permanent institutional arrangement at first appeared to support the view that, in these conditions, monetary and fiscal policy need to interact with each other only to such an extent as national fiscal policies (in addition to performing their infrastructural and macroeconomic stabilization duties) even out any asymmetrical effects that may result from monetary policy designed for the euro area as a whole. However, first, the national fiscal policy options were partly limited by the Stability and Growth Pact and, second, the above-mentioned view quickly proved to be untenable, and the realization that coordination between monetary and fiscal policy is indispensable generally became accepted.

The implementation of the Stability and Growth Pact can be seen as a regime shift. Will its introduction have any consequences for the current understanding of the efficiency, mode of action and operative channels of monetary policy? Will the transmission process change in the "new" system? What kind of impact could there be on the ECB's monetary strategy as a result?

Empirical studies on the monetary transmission mechanism (e.g. BIS 1995) did not usually take account of the potential consequences of monetary shocks for fiscal policy and the latter's impact on both the real effects of monetary policy and the control of inflation, or would explicitly neglect them. A current ECB project with an objective similar to the study[2]) carried out at that time by the Bank for International Settlements (BIS) also follows this approach. The importance of this project is not to be

1 *Recent studies cannot identify any convergence of transmission processes in the euro area. See Toolsema, Sturm and de Haan (2001).*

2 *For further details see also section 3.*

doubted as regards the study of the transmission process in the narrower sense of the word and the comparison between participating countries. For policy recommendations that may be derived from this, the neglect of potential fiscal responses to monetary measures seems however to be a shortcoming, which should be remedied at a subsequent stage of the project.

There have been attempts to integrate the fiscal policy aspect: in addition to the well-known monetary transmission channels, some more recent econometric studies (e.g. Sgherri, 2000) also include a fiscal channel, which results from the fact that fiscal policy, for its part, has to respond should the attainment of specific fiscal policy objectives and targets (e.g. under the Stability and Growth Pact) appear to be jeopardized by monetary measures. The specific form of such a fiscal response will determine whether the scope of the transmission effects will be increased or reduced as a result, i.e. whether procyclical, anticyclical or neutral effects will appear.

The following will attempt to arrive at an initial picture of the potential effect and the size of a fiscal channel for Austria. Section 2 gives a brief outline of the literature on fiscal discipline, and section 3 discusses the need to take account of fiscal responses in the monetary transmission process. Section 4 describes an initial attempt to assess the amended impact of a monetary shock when including simple fiscal rules. Finally, a few conclusions will be presented in section 5.

2 On the Need to Include a Fiscal Channel in the Transmission Process

As previously mentioned, the changes to the economic policy regime described above have restructured the relationship between monetary and fiscal policy. The literature on optimum currency areas shows that fiscal policy in monetary union should have greater scope as regards cyclical stabilization so as to offset the loss of monetary autonomy in this way – and, according to this theory, particularly if asymmetrical shocks arise. In this sense, the European Commission defined fiscal flexibility as a cornerstone of economic policy in the EMU to be set up (European Commission, 1990). Initially, monetary and fiscal policy were apparently seen as requiring little interaction. And only on this premise could the coexistence of centralized monetary policy and decentralized fiscal policy, as first evidently envisaged for EMU, be conceived as unproblematic.

However, fiscal policy requirements were and are stringent. Cyclical developments are to be stabilized and the long-term growth potential of national economies are to be maintained, and, for the maintenance of fiscal discipline, both national and EU-wide requirements, as well as the quality of the resulting policy mix, are to be observed (Brunila and Martinez-Mongay, 2001). To do justice to the latter aspects, above all, relevant institutional agreements were reached under the Maastricht Treaty (1992) and the Stability and Growth Pact (1997), and the scope for national fiscal policy was restricted by specifying upper limits for deficit and debt ratios as well as by setting a medium-term target for the budgetary position ("close to balance or in surplus").

By no means did this approach meet with unanimous approval. Many authors, such as Eichengreen and Bayoumi (1994) as well as Eichengreen and von Hagen (1996), think it a mistake also to abandon fiscal instruments (by binding them to strict guidelines), having already given up the exchange rate instrument as it is in the third stage of EMU. *"Vigorously applying the excessive deficit procedures of the treaty to the national budgets of member states would leave post-Maastricht Europe with significantly less automatic stabilization than the U.S. economic and monetary union."* Similar arguments were put forward by de Grauwe (1996): *"When asymmetric shocks occur, the requirement to keep budgetary policies in line with the other members will rob countries of the last instrument to absorb these shocks."*

Eichengreen and Wyplosz (1998) renewed this line of criticism. Although, on the one hand, they do not expect the Stability Pact, and the sanctions threatened in violation thereof, to be implemented with total consistency, they do see, on the other hand, *"a real danger that preoccupation with fiscal consolidation is hindering labor market reform, and hindering more general reforms to enhance economic flexibility and boost productivity growth."*

A further point of criticism is directed at the fact that the Stability and Growth Pact explicitly introduces fiscal discipline into a system where monetary discipline already prevails. Some studies (among others, Fatás and Mihov, 2001, Benhabib, Schmitt-Grohé and Uribe, 1998) question the compatibility of these two disciplines, pointing to the potential emergence of instability and multiple equilibria under these conditions. For a given monetary regime, these studies show that the addition of a fiscal rule (specifically a balanced budget rule) can have significant and potentially unwelcome repercussions on nominal stability.

However the literature also offers a number of reasons for the need for fiscal discipline. At a European level fiscal policy has a contribution to make both in terms of attaining the targets set by the ECB and as regards its credibility which, in addition to the ECB's independence, is also determined not least by a coordinated and sensible policy mix. An extensive literature seeks to establish this need for coordination at a theoretical level.

A large number of studies on *economic policy coordination* between monetary and fiscal policy refer to the possibility of improving the attainment of objectives through coordination and to the suboptimality of a mix of policies shaped by national competition for market shares. In its less complex models this literature argues that governments intent on reelection will pursue a more expansive fiscal policy than would be desirable, or sensible, in accordance with a variety of criteria, thus placing monetary policy under too much strain in future. The potential carelessness of fiscal policy is further reinforced in a monetary union based on the EMU construction model because the monetary problem can be passed up to the supranational level of the ECB. Such developments can be prevented by the imposition of restrictions on national fiscal policies.

In other papers (Chari and Kehoe, 1998, Cooper and Kempf, 2000) these results are stated in greater detail to the effect that the need for restrictions on national fiscal policy depends on the ability of the central bank to commit itself to specific targets. Only if it is unable to do this (i.e. if

fiscal policy is not subordinated to monetary objectives), is the provision of restrictions appropriate. In the event of a strong and credible commitment by the central bank, fiscal restrictions will, however, only lead to avoidable costs.

Game theory approaches (e.g. Dixit and Lambertini, 2000) also draw the conclusion that fiscal discretion can undermine monetary commitment and that for this reason alone fiscal rules seem sensible. If there is no coordination between monetary and fiscal policy, the Nash equilibrium generates suboptimal values for output and inflation. Leadership by one of the two policy sectors is recommended to ensure more favorable results.

In the last few years the *fiscal theory of the price level* has received some attention. Based on Sargent and Wallace (1981), this theory seeks to show that monetary policy will fail to control inflation if fiscal policy is pursued in an undisciplined fashion and budget deficits and/or debt levels have reached considerable proportions. Sims (1999) makes the critical point that the European treaties, by contrast, seem to reflect the belief that monetary stability may be ensured by preventing all relations between central bank and fiscal authorities. The individual member states have to pursue passive fiscal policies, i.e. need to achieve higher primary surpluses if rising national debts require higher interest payments. Given passive fiscal policies, paired with an active monetary policy that stabilizes monetary aggregates or sufficiently increases interest rates in the event of a rise in inflation, unstable equilibrium conditions together with accelerating inflation cannot be ruled out. Such a scenario cannot be prevented by even the most credible central bank. For Sims, EMU, for the time being, still lacks institutional requirements to avoid such developments.

Finally, at *model theory level,* the need to include a fiscal rule arises from the requirement to complete the model and satisfy the budget constraint of the member state (Sims, 1995).

3 Extension of the Transmission Process

Our empirical knowledge about the transmission process is small. As late as 1995 Bernanke and Gertler observed: *"To a great extent, empirical analysis of the effects of monetary policy has treated the monetary transmission mechanism itself as a black box."* In the same year, however, the Bank for International Settlements (BIS) published the results of a project that is, to our knowledge, the first comprehensive attempt to present the transmission processes of monetary policy in a group of highly-developed countries, namely 14 industrialized countries.[1]) Specifically, the BIS compared the effects of monetary transmission with which the macroeconometric models of the participating central banks were able to come up. To this end, all participants subjected their models to a temporary interest rate shock of 100 basispoints (for 2 years) and calculated the impact on the real economy, prices, exchange rates and the current account balance etc. For further details of this study's wide-ranging material, please refer to the original

1 *Australia, Austria, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom and the United States.*

publication (Bank for International Settlements, 1995). To summarize, the transmission process was found to differ significantly across countries for a variety of reasons; among other things, given the focus of the study at the time, largely because of differences in financial structures.

A key innovation in this project was, however, the attempt to break down the global effects of an interest rate shock into contributions made by individual transmission channels in order to study the size and relative importance of the channels. Five such channels were distinguished:

– The exchange rate channel quantifies the effects that are produced as a result of higher interest rates on the nominal exchange rate and, furthermore, on prices and wages as well as on aggregate demand.
– The substitution channel or cost-of-capital channel is intended to assess the direct impact of the increase in interest rates on investment activity, as well as the effects of the change in relative factor prices.
– Changes in interest rates bring about changes in income for both households and companies, which influence future consumer and business investment decisions. This is indicated by the income channel.
– The wealth channel measures the indirect effects of interest rate changes on the value of financial assets as well as likewise ensuing consumer and investment decisions.
– The direct effect of interest rates on consumer activity records the response to higher lending rates.

Without going into the technical problems encountered when isolating individual channels, the result at the time for Austria[1]) was as follows. In quantitative terms the cost-of-capital channel and the exchange rate channel are the key channels of interest rate policy. However, they clearly differ in timing – how long they take to come into effect following the setting of an interest rate measure – and in the permanence of their influence. Whereas the exchange rate effect starts to take effect immediately and also proves to be more durable, the cost-of-capital channel takes effect only after a time lag but then rapidly gains in importance and in the third and fourth year following the shock overtakes the exchange rate effect in quantitative terms.[2]) The remaining three channels, by contrast, prove to be less influential.

1 *The model applied basically had a Keynesian structure. In the event of an interest rate shock, the trend line progresses from the policy-controlled interest rate to the domestic interest rate pattern, which (also) determines the exchange rate relative to foreign interest rates. This in turn influences import prices, domestic price levels and wage rates. Interest rates, exchange rates and the wage/price structure now determine the demand components of GDP and (real) income generated in this way. Labor demand, monetary demand, asset size, tax etc. can then be calculated immediately. See also Glück (1995).*

2 *The term "quantitatively important" must be seen in relation to the fact that the overall effect of an interest rate shock on GDP was relatively small in the study carried out at that time, i.e. the effect was in the fractions of a percentage point. However, fresh calculations made in the meantime point to a significant increase in the effect of a comparable interest rate shock in general and also as regards the influence of individual channels.*

4 Attempt at a Provisional Assessment

To answer the question about the kind of influence the new economic policy regime could have on the transmission process, yet more extensive discussion and research are needed than have been carried out here. To obtain an initial impression of the parameters that may be involved, we can however ask in the context of a simple experiment to what extent, for instance, the addition of a fiscal channel would have modified the results of the BIS project in 1995. To answer this question we repeated the simulation experiment of the BIS project. To ensure comparability we retained the structures[1]) developed for Austria at that time and inserted a fiscal response function into the model then in use. But the first step was to establish what such a rule could look like.

The European treaties define the budget deficit and national debt as key fiscal parameters. It seems reasonable to formulate a fiscal rule derived from the benchmarks thus defined such that deviations from these benchmarks will trigger a response by fiscal policy, e.g. in the form of a change in tax rates. If we define the average rate of tax as t, the budget deficit (in terms of a percentage of GDP) in an adequate definition as b and the benchmark as b^*, a simple fiscal rule in respect of the deficit could then look as follows:

$$\Delta t = a(b - b^*), a > 0 \qquad (1)$$

If we define the level of debt as a percentage of GDP as d and the relevant benchmark (specifically 60%) as $d*$, for scenarios in which this parameter is the focus of attention, an alternative fiscal rule can be formulated as

$$\Delta t = c(d - d^*), c > 0 \qquad (2)$$

As regards the choice of specific values for parameters a and c there are neither any indications to be found in the literature, nor does the empirical method generate stable results when attempting to obtain values from past trends. Based on a number of own estimations, we finally calibrated a value of 0.4 for a and 0.1 for c.

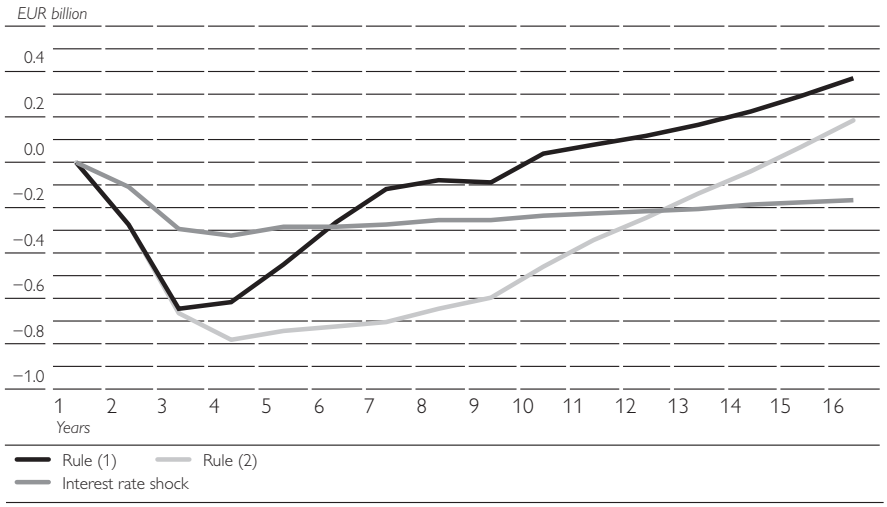
We then alternately introduced these two fiscal rules into the macroeconometric model and compared the results thus derived with the results of the original interest rate shock simulation that had neglected fiscal reactions.

The results for GDP and inflation are shown in charts 1 and 2. Rule (1) describes the results generated by the application of equation (1). Similarly, rule (2) describes those generated in accordance with equation (2).

1 *Since 1994/1995 there has naturally been progress in constructing macroeconometric models as well as changes in several aspects of the Austrian economy. Only under this proviso can results be applied to current conditions. However this does not so much involve (apparent) precision and topicality as it does a basic analysis of the influence of the fiscal channel.*

Chart 1

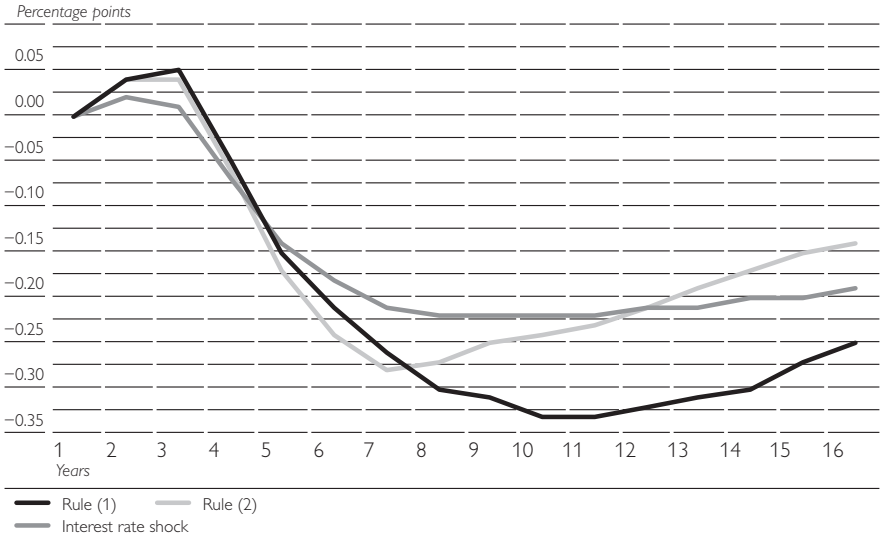
Temporary Interest Rate Shock – Impact on GDP



These simple simulations confirm, above all, the reasonable assumption that the effect of an increase in interest rates on the real economy is more restrictive due to fiscal rules – ultimately this corresponds to the fundamental Keynesian insight that balanced budget rules increase the amplitude of cyclical fluctuations due to the need for a hike in tax rates or a cut in government spending. Both rules initially indicate a slowdown that is larger relative to the pure interest rate shock but eventually also signal a more rapid recovery, even if over a relatively long period, because adjustment to the desired capital stocks in the business investment and consumer durables sectors, following the stronger initial slowdown, is eventually more pronounced than in the baseline solution.

Chart 2

Temporary Interest Rate Shock –
Impact on GDP Deflator



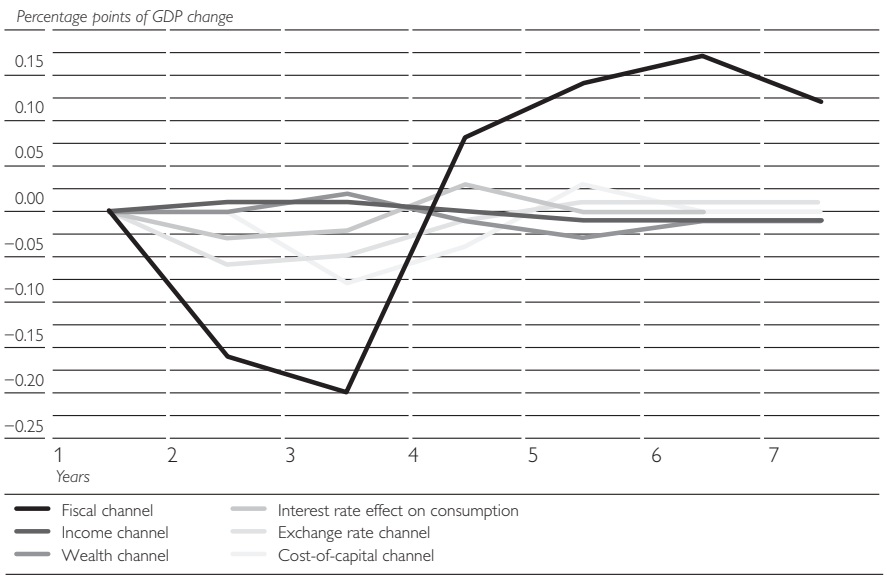
The impact of fiscal rules on nominal stability has been explored – at least empirically – to a far lesser extent than the real effects. Our results in this respect prove to be small and are basically due to the slowdown in the economy. To map potential effects as postulated by the fiscal theory of the price level, a more complex model structure would no doubt be necessary. Initial marginal price rises are due to the fact that employment reacts to an economic slowdown with a time lag, leading to a temporary loss in productivity with corresponding price effects.

It should be pointed out again that the chosen parameters for a and c in equations (1) and (2) represent approximate values (which ought to be even better supported empirically) and that all the results naturally depend on the model. Even with this qualification and on careful analysis, clear responses by the system as a whole and an intensification of the transmission process can however be identified overall.

Chart 3 shows the breakdown of transmission channels in the simulation in accordance with rule (1), i.e. the fiscal rule in respect of the budget. The results for the channels described above are in line with those of the BIS study. However, there is also the pronounced fiscal channel[1]), which dominates the other channels in terms of size and also explains the increase in cyclical fluctuation (shown in chart 1) following a monetary measure[2]).

Chart 3

Breakdown of Transmissions Channels



1 *Sgherri (2000) arrives at a similar result.*

2 *Pérez and Hiebert (2001) develop a method for deriving a fiscal rule, which at least evens out these destabilizing effects.*

5 Conclusions and Outlook

The following conclusions, arguments and proposals for further research are suggested:

The inclusion of a fiscal channel clearly represents a meaningful addition to studies on the transmission process, transforming the same significantly. The redesigning of the economic policy regime in EMU therefore appears to have an influence on the impact of monetary policy. The amplitude of real fluctuations triggered by the interest rate shock is clearly higher. Although the increase in restrictive effects due to balanced budget rules by no means represents a new finding, it seems to be frequently overlooked in the current debate on economic policy.

Assumptions expressed occasionally to the effect that the transmission of monetary shocks (e.g. under the influence of increasing financial market efficiency) could have become weaker, are clearly not justified under these circumstances. On the contrary, the impact of a monetary measure will be enhanced by taking account of fiscal reactions.

However, it can be assumed that fiscal reactions to the ECB's monetary measures will differ between EMU Member States. If this is correct, this can be a further argument why an increasingly harmonized response (assumed or asserted) by individual member states to centralized monetary policy seems less plausible.

The appearance of instabilities in price trends could not be seen in the simple experiment performed here. Such effects could probably only appear in the case of more complex simulations. Moreover, further studies need to be carried out. As mentioned earlier, several studies (Benhabib, Schmitt-Grohé and Uribe, 1998; Sims, 1999) theoretically prove this potential for price instability under specific conditions where monetary and fiscal rules are present in an unfavorable parameter scenario. The new economic policy regime is therefore clearly not without risks. The cautious procedure adopted by the ECB when implementing interest rate changes therefore seems to make sense provided increasing and cumulative effects are avoided.

Taylor (2000) examined 18 models of the U.S. economy in an attempt to find out the kind of impact various opinions (expressed in these models) on the transmission process would have on an optimal monetary rule that could be derived by means of a stochastic simulation. The upshot was that these differing views ultimately lead to very similar and straightforward rules, which also ensure "good policy." There are, largely speaking, no such studies for Europe. For EMU such an optimal monetary rule in accordance with the reflections above could clearly only be determined against the background of the provisions of the Stability and Growth Pact and the fiscal rules derived therefrom. This should be the focus of further research.

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Principles for Building Models of the Monetary Policy Transmission Mechanism

Jack Selody[1])

Introduction

Models of the monetary policy transmission mechanism show how a change in the stance of monetary policy causes output and inflation to change. They focus on the economic behaviors linking monetary policy actions to the real and financial decisions that determine spending and pricing in the economy. Models of the transmission mechanism can be complex because the economic and financial behaviors that underlie spending and pricing decisions are numerous, multifaceted, interlinked and subject to change. Most troublesome for the policy modeler is the economic profession's lack of understanding of how the transmission mechanism works. Nonetheless, economists that give policy advice must maintain a complete view of how the transmission mechanism works, because without such a view there would be no economic content to their advice. Building a mathematical model of the transmission mechanism is a way of formalizing this view.

Mathematical models of the transmission mechanism are helpful to monetary policymakers, advisers and analysts because of the rigor they bring to the policy debate and the ease with which they can be used to produce quantifiable policy advice. Rigor helps identify and quantify the elements of the transmission mechanism that contribute to a policy recommendation, helping policymakers better understand the advice they are receiving. Rigor also enhances the time consistency of policy advice by helping policy advisers isolate and articulate the reasons why their advice has changed over time. Rigor can expose inconsistencies in policy advice, thereby helping policymakers determine where the economic logic behind the advice is weak and where it is strong. Rigor helps modelers validate their view of the transmission mechanism so that policymakers have a better understanding of when a model is likely to produce advice that works and when it might produce advice that does not work so well. Rigor helps policymakers communicate their policy decisions by delineating the factors that led to a policy recommendation, which clarifies the economic reasons for a policy change. And rigor enhances the discussion of monetary policy because it allows policymakers and the public to identify the precise reasons why competing views of the transmission mechanism produce conflicting policy advice, which helps move the policy debate forward. In short, the rigor provided by mathematical models helps policymakers, advisers and modelers understand what lies behind the policy advice, which helps in the formulation and communication of monetary policy decisions.

Thus, policymakers and advisers are interested in models of the transmission mechanism because of the potential for these models to improve the monetary policy advice-giving process. To be effective at improving this process, models of the transmission mechanism must be refined beyond their raw ability to explain the data. They must be reliable, easy to use, easy to interpret, coincide as much as possible with the intuition of policymakers, and provide simple explanations for the policy advice that

1 *Jack Selody – Chief, Monetary and Financial Analysis Department, Bank of Canada.* *I would like to thank, without implicating, Kevin Moran, Chuck Freedman, and David Longworth. The views in this paper do not necessarily reflect those of the Bank of Canada.*

they generate. These attributes are obtained by developing a model beyond an abstract set of mathematical equations through the addition of features helpful to policymakers and advisers. Policymakers and advisers are reluctant to rely on models without these features because they may misinterpret the advice coming from such models. As models of the transmission mechanism have to fulfill a unique purpose, policy modelers are compelled to integrate special features into their models.

In this paper I identify the features that models of the transmission mechanism should have in order to maximize their ability to give useful monetary policy advice. I do this by setting out ten principles of model building that, if followed, will render the resulting models more effective as tools for giving advice. In proposing these principles I try not to constrain the type of economic theory or behavior that model builders might include in their models because it is important to encourage policy modelers to use a variety of different theories when building their models. Policy advice is better when the transmission mechanism is viewed from multiple perspectives.[1]) Yet, regardless of the paradigm, policymakers and advisers must be able to understand the policy advice coming from a model, and to achieve this, the models they use must be built to a certain standard.

Principle 1:
Include the Ability to Generate a Permanent Inflation

Monetary policymakers use models of the transmission mechanism to help determine the monetary policy actions necessary to attain the inflation objective.[2]) Consequently, for the policymaker the most important aspect of a model of the transmission mechanism is its theory of inflation – that is, the description of what causes inflation to reach and maintain a steady rate. Theories of what causes inflation and output to fluctuate around this steady state in response to the shocks hitting the economy are also important to policymakers, but the elimination of these cycles is secondary to the objective of putting inflation on the desired track.

There are many different models of the transmission mechanism, each of which focuses on a different aspect of the channels by which monetary policy actions are transmitted to output and inflation, or on a different way of identifying the dynamics of output and inflation fluctuations. However, most models of the transmission mechanism use one of two core theories to motivate the conditions that must be established to stabilize the rate of inflation.

One theory posits that trend inflation is determined by the central bank's control of the output gap and inflation expectations. In this theory, monetary policy works by affecting the spending patterns of economic agents, which affects the output gap, resulting in a change in inflation and then inflation expectations. For example, a monetary policy tightening

1 *See Engert and Selody (1998), Selody (2000) and Longworth and Freedman (2000) for a more complete discussion of why multiple models lead to better monetary policy advice.*

2 *See Duguay and Longworth (1998) for a discussion of how macroeconomic models have been used at the Bank of Canada.*

raises the cost of borrowing and reduces liquidity, causing households and firms to spend less. The result is an excess supply of goods and services that cause a *temporary* drop in the rate of inflation as firms discount prices to stimulate the demand for their goods and services. The temporary drop in inflation, if persistent, causes inflation expectations to drop, which then causes inflation to stay at the lower rate even after real economic activity recovers sufficiently to put an end to price discounting. In this theory, inflation cannot change permanently without the central bank causing a change in the output gap and inflation expectations.[1])

The other theory posits that trend inflation is determined by the rate of money expansion in the economy, which is under the indirect control of the central bank. A monetary policy tightening raises the cost of borrowing and reduces liquidity, as in the previous theory. In this theory, however, the tightening of policy causes banks to restrict the supply of loans and hence money to firms and households. The reduction in loans causes firms and households to spend less on goods and services, and this causes them to have a lower demand for money. The simultaneous reduction in supply and demand for money puts money on a lower growth track, and, with less money coming in, firms reduce prices below what they otherwise would have been. The reduction in prices is *permanent* because the reduction is what is required to restore the real purchasing power of the money balances held by households and firms to its new equilibrium value. When the reduction in the supply and demand for money is not perfectly matched, it causes temporary real effects in the economy. A deficiency of money supply relative to demand dampens spending as firms and households cut back their purchases in order to accumulate money to satisfy their demand. In a steady state, though, the supply and demand for money will be balanced at a lower growth rate, so inflation will be lower.[2])

Surprisingly, not all models that purport to describe the transmission mechanism can pass the simple test of generating a different steady-state rate of inflation in response to a series of monetary policy actions. For example, many empirical models, such as VARs (vector autoregression models) and VECMs (vector error correction models), use stationary data to obtain parameter estimates. These models tend to have the property that the steady-state inflation rate is an exogenous constant in the model, estimated as the average inflation rate over history. What this means in practice is that these models are highly stable, with inflation always returning to its historical average after a series of monetary policy actions.[3]) To be useful to policymakers, these models must be augmented with a

1 *See Black et al. (1994) and Coletti et al. (1996) for a description of a policy model that uses this theory of inflation.*

2 *See Rose and Selody (1985) for an example of a policy model that uses this theory, and Laidler (1999) for a further elaboration of this theory.*

3 *An alternative interpretation of this property is that these models are only capable of simulating monetary policy actions that have a temporary effect on inflation. When interpreted in this way, however, these models are of limited interest to policymakers looking for advice on how to move inflation to a new target rate, or to policymakers who want an indicator that tells them when inflation might break free of its anchor and what policy actions they need to take to prevent that from happening.*

theory of what causes steady-state inflation to change. Unfortunately, few VARs and VECMs are extended in this way, restricting the ability of these models to give complete and convincing monetary policy advice.

In effect, complete models of the transmission mechanism must contain a way for the central bank to permanently change the rate of inflation. Monetary policy that is persistently too loose or too tight should cause inflation to rise or fall permanently. The ability of a model to simulate different steady-state inflation rates is at the core of the monetary policy transmission mechanism and should be a property of all models used for monetary policy advice, because advice from models that do not have this property might mistakenly predict that inflation will go away on its own when in reality a monetary policy response is required.

Principle 2:
Be Explicit about Microeconomic Behavior

The key to building models of the transmission mechanism that policymakers and advisers can understand is to be explicit about the microeconomic behavior of the economic agents that set prices in the model.[1]) These are private agents for the most part, usually firms, but may include foreigners, households, and market makers (auctioneers, for example). Unfortunately, many model builders are vague about how these agents set prices, positing instead that inflation is somehow determined by an aggregate output or money "gap." Policymakers and advisers have a difficult time understanding the economics of these models. In particular, they cannot judge whether the behavior of these agents conforms to that of their priors.

Associated with the two theories of inflation that underlie most models of the transmission mechanism are two distinct ways of looking at the microeconomics that motivates price setting. One perspective emphasizes the real variables that go into the decisions of price setters, whereas the other emphasizes the financial variables. Of course, in the real world, price setters look at both real and financial variables, and a real decision often implies a corresponding financial decision and vice versa. Nevertheless, for simplicity, most models of the transmission mechanism focus on either the real or the financial aspects of a decision, and this distinction provides a useful way of grouping models of the transmission mechanism.

Models that emphasize the *real* aspects of price-setting behavior often assume that the firms that produce goods and services set prices by looking at their sales relative to production capacity. When sales are relatively high, these firms raise prices more than normal, and vice versa when sales are low. Normal price rises are determined by inflation expectations or by the rising cost of factor inputs, which in turn depend on the demand for factors

1 *The drive to anchor macroeconomic models with microfoundations was heavily influenced by Lucas (1980, 1987). More recent discussions of the use of microfoundations in models of the transmission mechanism can be found in Williamson (1996) and Danthine (1997). Examples of recent models with microfoundations built at the Bank of Canada are Hendry and Zhang (1998), Amano, Hendry and Zhang (2000) and Yuan and Zimmermann (2000).*

relative to supply and the inflation expectations of the agents who demand and supply the factors. The aggregate behavior of these agents has the appearance of an expectations-augmented Phillips curve.

Models that emphasize the *financial* aspects of price-setting behavior often assume that individual agents look at cash balances relative to desired levels when setting prices. When these agents are short of cash they tend to lower prices to stimulate sales to restore their cash inflow. These agents raise prices when cash is plentiful because they are always looking to increase profits and are better able to weather the resulting decline in sales that will result if they raise prices too much by mistake. In this view, normal price rises are determined by the normal or expected growth rate of their cash balances (i. e., trend money growth). The aggregate behavior of these agents also has the appearance of a Phillips curve, but one that includes a money gap and trend money growth as explanatory variables.

To understand the microeconomics of price-setting behavior it is necessary to understand what determines spending in the economy and the cash flows associated with that spending. These are the channels of the transmission mechanism – that is, the different routes that liquidity takes to affect pricing decisions. No model of the transmission mechanism is complete without a well-articulated description of the channels of monetary policy.

More explicitly, a channel is the mechanism whereby some aspect of equilibrium is first disrupted and then restored, with the consequence that resources may be temporarily misallocated while the economy is in disequilibrium. The essential feature of a channel is the economic reason why equilibrium is slow to reestablish, usually because a price is slow to adjust to its new equilibrium value after a shock ("a nominal rigidity"). The microeconomic theory underlying a channel explains why equilibrium is slow to reestablish, providing an explanation for why monetary policy has real effects on the economy.

The most popular explanations of nominal rigidities are (i) binding contracts in which the previously-agreed-to price cannot be changed for the length of the contract, (ii) search whereby it takes time for agents to seek out other agents that are willing to transact at the new equilibrium price, (iii) imperfect information because of which it takes time and perhaps many transactions to discover the new equilibrium price, (iv) menu costs whereby price adjustment is delayed because it is costly to change prices, and (v) habit persistence where it takes a large or cumulated change in incentives to change behavior.[1]) Almost all channels of the transmission mechanism rely on these rigidities to some extent. The main channels used in models of the transmission mechanism are described in Mishkin (1998).

1 *Recent examples of models that contain explicit real and nominal rigidities and have been used to study various issues related to monetary policy are Parkin (1998), Goodfriend and King (1997), Rotemberg and Woodford (1997), King (2000) and Clarida, Gali, and Gertler (1999).*

Principle 3:
Keep the Model Simple

The numerous channels of the transmission mechanism discussed by Mishkin are all theoretically valid and undoubtedly present to some degree in every developed economy. Nevertheless, model builders would be unwise to include all channels in a single model. The resulting model is likely to be too complex to be understood by the model builder, policy advisers and policymakers, as the economic behaviors associated with the different channels would interact in ways that could defy interpretation. Moreover, each channel can vary in intensity over time and according to the state of the economy, making a single channel difficult to model, let alone all channels simultaneously. In addition, including all channels in a single model would require the model builder to include a multiplicity of agents in the model, each with its own microeconomic behavior, and each of whom would interact with the other agents in the model in complex ways. Keeping track of all the possible interactions could render the model intractable. Assigning all behaviors to one representative agent is not an option because the incompatibilities between channels are likely to produce a model that is internally inconsistent.

Monetary policymakers tend to prefer simple models to complex models.[1]) The reason is that simple models are easier to understand and therefore easier to reconcile with the advice they receive from other sources. If there are too many behaviors in a single model, even though each is well articulated, the advice from that model can be incomprehensible and impossible to put into the broader context. In particular, the weights applied to the advice from different sources are not constant but vary in response to many difficult-to-quantify factors. Models used to generate policy advice are best kept simple, so that each provides advice from a single easily weighted perspective. Policymakers and advisers can then rely on multiple models to obtain a complete cluster of advice. In general, the combination of policy advice from different sources is more art than science.

There are a number of strategies that model builders can employ to keep their models simple yet relevant for policymakers. The most obvious strategy is to include only those elements necessary to understand the causes of inflation. For example, if wages are not thought to cause inflation but instead are caused by inflation, then the model builder would be wise to leave the labor market out of the model. Nonessential elements in a model may make it more interesting and realistic, but they add to the cost of maintaining and interpreting the model without adding to the quality of the policy advice coming from the model.

Another strategy for keeping models of the transmission mechanism simple is to choose either model depth or breadth. A deep but narrow model would focus on one channel of the transmission mechanism in detail, fully describing all aspects of the microeconomic behaviors that are important to the channel. A shallow but wide model would include many

1 *See Duguay and Longworth (1998) for further discussion of this point.*

channels of the transmission mechanism but would model the behaviors behind each channel in a superficial, incomplete, or imprecise way – relying on *ad hoc* dynamics, for example. Models that are both deep and wide are usually more difficult to maintain than they are worth.

A third strategy is to specialize in both mainstream and experimental models separately. Mainstream models are those that have been validated and accepted by the policymakers and advisers in the central bank. The advantage of mainstream models is that they have stood the test of time. Experimental models are those that represent the ideas of a single or small group of model builders without having been validated or accepted by the policymakers and advisers in the central bank. These models are unlikely to earn the trust of policymakers until they have proven their worth (at which time they would become mainstream models). To maintain the integrity of mainstream models, it is wise to keep experimental elements out of the model until such elements have been validated.

Principle 4:
Choose an Appropriate Final Target Variable

The monetary policy target variable is used in models of the transmission mechanism to monitor how the economy is performing with respect to the goal of monetary policy. It is the variable that takes center stage in the objective function of the monetary policymakers. The stated objective of most monetary policymakers is price stability, which makes inflation a logical choice for the monetary policy target variable. Inflation is also the variable at the end of the transmission mechanism.

To make their models tractable, policy modelers need a precise value for the central bank target – for example, a 2% increase in the year-over-year change in the consumer price index two years into the future. Policy modelers use a precise objective because they want to minimize ambiguity in their models and so focus on what they consider to be the essence of the monetary policy target. This added precision does not diminish the value of the policy advice coming from the model, since under normal circumstances most policymakers act as if they aimed to hit a precise inflation objective.

This is not to say that monetary policymakers cannot have objectives in addition to hitting an inflation target, such as minimizing the variance of output or smoothing interest rates. But, to maintain model consistency, these other objectives must be incorporated into the model in a way that is compatible with the inflation target. Compatibility can be satisfied in one of two ways.

One, the additional objectives can be used to choose between alternative ways of reaching the monetary policy target by ensuring that additional variables in the reaction function vanish in the long run – for example the change in interest rates or the output gap.

Two, the additional objectives can be cast as multiple targets, provided that all targets are consistent with one another. An example of a consistent set of multiple targets would be a 2% inflation target and a 5% money growth target in an economy with 3% potential output growth and unit

income elasticity of long-run money demand. An incompatible target would be one that could be achieved only at the expense of missing another target in the long run. It can be argued that the advantage of consistent multiple targets is that they provide a better characterization of complex monetary policy objectives.

An essential property of a good monetary policy target variable is that monetary policy actions have a strong and persistent influence on the target variable. This implies that only nominal variables should be thought of as potential candidates for the monetary policy target variable. Monetary policy has little ability to influence real variables in the long run because few economic agents or institutions suffer from chronic money illusion.

Principle 5: Choose an Appropriate Monetary Policy Instrument

When a monetary policymaker asks for a change in the monetary policy instrument, he or she initiates the monetary policy transmission mechanism. Conceptually, the monetary policy instrument is the variable that the central bank controls or regulates in order to achieve its policy objective. In a model of the transmission mechanism, the variable is more often than not presumed. Such rules are usually designed to ensure that inflation returns to its target with a minimum of output volatility and small changes to the policy variable itself. The policy rule is often calibrated to capture the "typical" policy response of the central bank over history. Alternatively, it is sometimes calculated to produce what the model builder believes would be the optimal policy response of a hypothetical central bank to an average shock to the economy.

When the policy adviser presents the advice from the model to the policymaker, he or she uses the monetary policy instrument to quantify the policy recommendation from the model. In effect, the policy instrument becomes the operational target for monetary policy. A good operational target is one that is closely and intuitively related to the financial variables observed by the policymaker and that is also closely and intuitively related to the actual instruments used by the central bank to implement monetary policy. Every model used to generate monetary policy advice needs a good monetary policy instrument so that the policymaker can understand the advice coming from the model.

First and foremost, a good monetary policy instrument must be under the direct or close control of the central bank. This property is important because policy implementers need to figure out how to hit the operational target. Monetary policy instruments with this property are usually set directly by the central bank or are closely connected to variables that are set directly by the central bank. Examples of variables that meet these criteria are central bank money, the interest rate on deposits or loans at the central bank, the cumulative change in the value of open market operations, or a short-term policy interest rate (i. e., the one-day interest rate). Examples of variables that are sometimes used as monetary policy instruments but do not meet these criteria are broader measures of money, longer-term market-determined interest rates, innovations from a VAR model. These

variables make bad operational targets because the central bank cannot control them with the necessary degree of precision. As a result, attempts to keep these market-determined variables on target will produce, under some conditions, highly volatile or unattainable settings for the policy instrument as the central bank tries to neutralize unwanted movements or trends in these variables.

The second desirable property of a monetary policy instrument is that its movements reflect the decisions of the central bank exclusively. This property allows the policy rule to be modeled and interpreted as central bank behavior. Other agents in the model have objectives different from those of the central bank, so their behaviors should not be combined with, or confused with, that of the central bank. This feature is also necessary if policymakers are to have a clear idea of what it is that they alone need to do to obtain their policy goal. Longer-term market-determined interest rates do not have this property, since they are influenced by the behavior of market participants other than the central bank. Nor do monetary aggregates have this property, since they are heavily influenced by changes in households' and firms' demand for money.

The third desirable property of the monetary policy instrument is that it has a strong, albeit indirect, influence on the behavior of the economic agents in the model. The monetary policy instrument cannot influence price setting in the economy if it does not affect private-sector behavior in a significant way. In particular, the monetary policy instrument should influence the behavior of those agents that transact with the central bank, such as bankers and financial market participants, or those agents who base their expectations on central bank behavior.

Unfortunately, it is difficult to observe economic variables that have all the properties of a good monetary policy instrument. This makes finding a good monetary policy instrument a challenge for model builders. For this reason, economic modelers often construct and use a measure of policy stance to capture the effect of monetary policy on observed financial variables. These measures, such as yield spreads, monetary conditions indices, or money gaps, are then used to capture the link between monetary policy actions and economic behavior. Unfortunately, it is difficult to separate liquidity effects from other influences on financial variables, making stance measures difficult to interpret.

Thus, the perfect monetary policy instrument or measure of monetary policy stance has yet to be found. Of course, this is not reason enough to abandon attempts to construct a variable that captures the cumulative actions of the monetary authorities, although it does make the job of modelers more difficult. It does mean, however, that policy modelers must spend significant effort identifying an appropriate monetary policy instrument or constructing a measure of the monetary policy stance to make sense of the advice coming from their models.

Principle 6:
Validate the Model

Model builders must demonstrate that their models of the transmission mechanism are capable of capturing real world behaviors and explaining real world phenomena before policymakers and advisers will trust the advice coming from the model.[1]) Empirical validation is important because the policy recommendations from the models are likely to be used in real-world situations. To provide credible policy advice, model builders must validate their models in a convincing fashion.

To validate their models, model builders often look at the sum of squared forecast errors. This is not always the best criterion for evaluating models used for policy advice, however. The reason why the sum of squared errors can be a deficient metric is that it assumes that all equal-sized errors are equally disadvantageous to the policymaker when, in practice, not all errors are equally important. In particular, transitory changes in inflation are less of a concern to policymakers than are persistent changes in inflation. Transitory changes need not evoke a response from monetary policy, as they will go away on their own. Indeed, a monetary policy reaction to transitory changes in inflation may make matters worse if its effect comes too late to offset the change in inflation, owing to the long and variable lags with which monetary policy works. On the other hand, persistent changes in inflation should elicit an immediate and determined monetary policy response to the extent that they can be identified, since these changes will not vanish on their own but instead may intensify and cause inflation to break free from its anchor. Monetary policymakers are therefore very much in need of models that can predict persistent changes in inflation consistently and accurately.

It is important to note that not all models that are shown to be empirically valid are capable of providing good policy advice. Some models are built with much artificial data – output gaps, money gaps, inflation expectations, for example. These variables often improve the fit of a model, making the model appear valid, without necessarily improving the model's ability to give accurate policy advice because of the uncertainty surrounding the measurement of these indicators. Other models use a large number of free parameters to maximize the empirical properties of the model. These free parameters are likely to be sample specific, which again reduces the ability of the model to give consistently good policy advice. For these reasons, it is important to limit the number of free parameters and unobservable variables in models of the transmission mechanism.

1 *Until recently, models with well-specified microfoundations were submitted to very little systematic confrontation with the data. Numerical values for critical structural parameters were calibrated, and the evaluation of the models consisted of simple comparisons between some data moments predicted by the model and their empirical counterparts. Recent research has, however, succeeded in couching the structure of those models in forms amenable to estimation using standard methods like Maximum Likelihood. See, for example, Ireland (1997, 1999, 2000), Rotemberg and Woodford (1997, 1998), Kim (2000), and Christiano, Eichenbaum and Evans (2001).*

Principle 7:
Build a Robust Model

Monetary policymakers prefer monetary policy advice from models that are robust to small changes in model specification and revisions to the data. This is because most channels of the monetary transmission mechanism have the property that a small shock to the economy requires a small monetary policy response. In other words, it should take a big shock to the economy to cause a significant change in the policy advice generated by a model of the transmission mechanism. Monetary policymakers and advisers are therefore suspicious of models in which large changes in policy advice result from small changes to the model or data. What this means for a model builder is that the policy advice from their models should be robust to small changes in their model or data.

Often, however, models of the transmission mechanism are not robust in this sense. Usually it is because the parameters of the model are not known with precision owing to small sample sizes and the large numbers of free parameters that must be estimated. This is especially, but not exclusively, true of VAR models or VECMs that rely heavily on data for model identification.[1]) Often, these models have the property that small revisions to the data produce significantly different model dynamics that require a significantly different policy response. This is especially true when the models are used to forecast and target inflation two years ahead, the time horizon of most interest to policymakers and advisers. Builders of models used to giving policy advice tend to rely on three methods to improve the robustness of their models.

The first method is to put theoretically-based long-run restrictions on the model to reduce the number of free parameters in the model and "tie down" the long-run values of key variables.[2]) Many long-run restrictions come from microfoundations plus an assumption about the long-run stability of key relationships. In effect, these restrictions add end-point anchors to the forecasts from the model, which renders the forecasts less sensitive to changes in starting conditions. This approach works well for models of the transmission mechanism because monetary policy works with long lags that require the models to predict far into the future.

Many of the long-run restrictions used in this approach come from cointegrating vectors such as a long-run demand-for-money function. Restrictions can also come from credibility effects where inflation expectations are "tied down" by the inflation target in the long run. It is often difficult to verify the validity of the long-run restrictions imposed on a model, so modelers should use only restrictions that are considered reasonable by policymakers and advisers, or that are generally accepted by the economics profession.

1 *See Christiano, Eichenbaum and Evans (1998) for a discussion of the importance of finding reliable estimates of the effects of monetary policy shocks using VARs.*

2 *See Adam and Hendry (1999) and Trecrogi and Vega (2000) for examples of using long-run restrictions in models of the transmission mechanism.*

The second method for adding robustness to models of the transmission mechanism is to reduce the number of free parameters in the model by reducing the number of endogenous links in the model to those that are most important. This is equivalent to making the behavior of each agent in the model less dependent on the actions of others, and so reduces the number of variables that can affect inflation. With fewer variables able to affect inflation, it is more likely that the effect of each variable will be estimated with greater precision, rendering it less sensitive to changes in the data. In effect, the limited data set available to model builders forces them to make a tradeoff between a limited model with precise parameter estimates and a comprehensive model with less precise parameter estimates. Not surprisingly, policymakers and advisers tend to prefer comprehensive models with precise parameter estimates that are impossible to obtain.

The third method for adding robustness to models of the transmission mechanism is to restrict the dynamics of the model. The dynamics of models of the transmission mechanism are often heavily parameterized. There are two basic approaches to restricting dynamics in models: the empirical approach and the theoretical approach. The empirical approach uses truncated lag lengths, zero restrictions on statistically insignificant coefficients, and smoothing functions on parameters to reduce the number of free parameters. This approach emphasizes efficient parameter estimation at the expense of economic theory. The theoretical approach relies on microeconomic theory to articulate the precise nature of the nominal frictions in the transmission mechanism. Only a few such frictions are admitted into the model, rendering the dynamics of the model highly restricted. This approach emphasizes internal model consistency at the expense of realism.

As a matter of course, model builders should test the robustness of their models of the transmission mechanism to determine if small changes in specifications and data produce large changes in the policy advice coming from the model. If their model is not robust, they should consider using one of the above techniques to improve the robustness of their model. Policymakers and advisers are willing to place greater trust in models that produce robust policy advice.

Principle 8:
Build a Flexible Model

Monetary policymakers know that the transmission mechanism changes from time to time and that no model builder is yet capable of building a model that anticipates how it will change and therefore no model builder can ensure that the advice from a model will be relevant in all circumstances. Because of this, policymakers expect their advisers to add judgment to their models in order to change those characteristics of the model that do not fit the current economic situation. For example, judgment may be used to change a link in the model that the model builder assumed would remain constant but is now changing, or, the economy may be responding to shock of a type that the model builder did not foresee. A good model builder will anticipate that model users will want to add

judgment to the model and so will build a model that is flexible enough to incorporate judgment in a way that preserves the essence of the model.

The greatest danger in adding judgment to a model of the transmission mechanism is that it will break the consistency of the model with respect to either theory or data, thereby rendering the advice from the model less effective. To protect the effectiveness of the advice from the model, judgment should be added in ways that preserve model consistency. The places where it is legitimate to add judgment should be clearly identified by the model builder who should also indicate what would constitute reasonable judgment – whether abnormal price discounting can continue indefinitely, for example.

One place where judgment is commonly added to models of the transmission mechanism is to the coefficients that determine the stickiness of price and quantity adjustment. Economic theory puts few constraints on the dynamics of the transmission mechanism, and the data available to estimate these dynamics are limited. A second place where model users often add judgment to models of the transmission mechanism is in the modification of the artificial variables in the model – variables such as the output or money gap. Model builders are usually unsure about how to construct such variables and in particular are unlikely to have a good idea of when these variables were in equilibrium. A third place to add judgment to models of the transmission mechanism is in the modification of the behavioral parameters of the model.

Principle 9:
Explain the Important Stylized Facts

Policymakers tend to trust models that can explain the stylized facts as they know them. Policymakers usually have extensive experience with the transmission mechanism, having watched it at work many times in the past. Through first-hand observation they have developed an understanding of how monetary policy works. In order to gain credibility for a model of the transmission mechanism, model builders should demonstrate how their model explains past monetary policy episodes to the satisfaction of the policymakers and advisers who will use the advice from the model. In other words, the model should explain the stylized facts as interpreted by the policymaker.

This model-building principle is different from the ability of the model to reproduce the historical data. Rather, it focuses on those episodes that are most important to policymakers and the reasonableness of the explanations the model provides for what happened in those episodes. Policymakers tend to be most concerned about episodes that may have been characterized as policy mistakes or successes in the past and episodes in which monetary policy did not work as intended. In most developed economies, these tend to be the major inflations and recessions in the post-war data. Every model of the transmission mechanism should be able to provide a convincing explanation for these episodes. Knowing that the model would have performed sensibly in such episodes gives comfort to policymakers and makes it more likely that they will use the advice coming from the model.

Principle 10:
Be Willing to Compromise the Above Principles

The transmission mechanism is a very complex process involving many agents and many types of microeconomic behavior. No single model can capture all aspects of the transmission mechanism and remain tractable. This means that there will be a compromise between simplicity and comprehensiveness in all models of the transmission mechanism. In other words, not every model of the transmission mechanism can be expected to respect all the above principles.

Some principles are so fundamental, however, that they should not be part of any compromise. Principles 1, 4, 5, and 6, for example, should be respected by all models of the transmission mechanism used for monetary policy advice. Some of the other principles may be compromised for expediency, although greater adherence to these principles outlined above will make models of the transmission mechanism more useful to policymakers. In effect, policymakers need to understand the nature of the policy advice they are given, and applying the above principles when building models of the transmission mechanism will help them achieve the required understanding.

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Abbreviations

AMS	Arbeitsmarktservice Österreich (Austrian Public Employment Office)
ARTIS	Austrian Real Time Interbank Settlement
BWA	Bundes-Wertpapieraufsicht (Federal Securities Supervisory Authority)
BWG	Bankwesengesetz (amendments to the Banking Act)
CAD	Capital Adequacy Directive
CEECs	Central and Eastern European Countries
COICOP	Classification of Individual Consumption by Purpose
CPI	Consumer Price Index
EC	European Community
ECB	European Central Bank
EEA	European Economic Area
EEC	European Economic Community
EGVG	Einführungsgesetz der Verwaltungsverfahrensgesetze (Introductory Act to the Administrative Procedure Acts)
EMU	Economic and Monetary Union
EQOS	Electronic Quote and Order Driven System
ERM	Exchange Rate Mechanism
ERP	European Recovery Program
ESCB	European System of Central Banks
ESNA	European System of National Accounts
EU	European Union
Eurostat	Statistical Office of the European Communities
GDP	Gross Domestic Product
HICP	Harmonized Index of Consumer Prices
IHS	Institut für Höhere Studien (Institute for Advanced Studies)
IIP	International Investment Position
IMF	International Monetary Fund
NACE	Nomenclature générale des Activités économiques dans les Communautés Européennes (Statistical Classification of Economic Activities)
ÖCPA	Austrian Version of the Classification of Products by Activities
OECD	Organisation for Economic Co-operation and Development
OeKB	Oesterreichische Kontrollbank
OeNB	Oesterreichische Nationalbank
ÖNACE	Austrian Version of the Statistical Classification of Economic Activities
RTGS	Real Time Gross Settlement System
SDR	Special Drawing Right
SNA	System of National Accounts
TARGET	Trans European Automated Real Time Gross Settlement Express Transfer System
TEU	Treaty on European Union
WIFO	Österreichisches Institut für Wirtschaftsforschung (Austrian Institute of Economic Research)
WWU	Wirtschafts- und Währungsunion

Legend

– = The numerical value is zero
. . = Data not available at the reporting date
× = For technical reasons no data can be indicated
0 = A quantity which is smaller than half of the unit indicated
∅ = Mean value
_ = New series

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

Official Announcements of the Oesterreichische Nationalbank

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

		Authentic German text published in the Official Gazette (Amtsblatt zur Wiener Zeitung)	Translation published in "Reports and Summaries" and "Focus on Austria" issue no
Official Announcements Regarding the Foreign Exchange Law			
DL 1/91	Promulgation of the new Official Announcements regarding the Foreign Exchange Law; general provisions 1. Issuance of new Official Announcements 2. Definitions 3. Fees	Sept. 24, 1991	4/1991
DL 2/91	Granting of general licenses 1. General license 2. Waiver of obligation to declare; release 3. Nonbanks 4. Banks not engaged in foreign business 5. Foreign exchange dealers 6. Exchange bureaus 7. Special banks and financial institutions 8. Provisions applying to both banks and financial institutions	Sept. 24, 1991	4/1991
DL 3/91	Reporting requirements 1. General provisions 2. Exemptions from the reporting obligation 3. General reports 4. Reports by banks 5. Reports by nonbanks and financial institutions 6. Special reports	Sept. 24, 1991	4/1991
DL 4/91	Assets of nonresidents with residence (domicile) in Iraq	Oct. 29, 1991	4/1991
DL 2/93	Modification of the Official Announcement DL 3/91	May 5, 1993	2/1993
DL 1/95	Repeal of the Official Announcement DL 1/93; SC Resolution 1022 (1995) Concerning the suspension of the sanctions of the United Nations against the Federal Republic of Yugoslavia	Dec. 21, 1995	4/1995
DL 1/96	Modification of Official Announcement DL 3/91	Sept. 3, 1996	3/1996
DL 1/99	Modification of Official Announcements DL 2/91 and DL 3/91 to the Foreign Exchange Act	Dec. 21, 1998	4/1998
DL 2/99	Abrogation of Official Announcement DL 3/93 Sanctions of the United Nations against Libya	April 30, 1999	1/1999
DL 3/99	Modification of Official Announcement DL 3/91 with respect to the Foreign Exchange Act	Dec. 16, 1999	3/1999
DL 1/01	Modification of Official Announcement DL 3/91 with respect to the Foreign Exchange Act	June 19, 2001	2/2001

Council Regulations of the European Communities

		Published in the Official Journal of the European Communities
Minimum Reserve Regulations		
No 2531/98	Council Regulation (EC) concerning the application of minimum reserves by the European Central Bank	Nov. 23, 1998
No 2532/98	Council Regulation (EC) concerning the powers of the European Central Bank to impose sanctions	Nov. 23, 1998
No 2818/98	Regulation (EC) of the European Central Bank on the application of minimum reserves	Dec. 1, 1998

List of Reports, Summaries and Studies[1])

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

	Published in "Focus on Austria"
Oesterreichische Nationalbank and Selected Monetary Aggregates	
Official Announcements Regarding the Foreign Exchange Law and Minimum Reserve Requirements – see preceding page	
Calendar of Monetary Highlights	1/1999
Calendar of Monetary Highlights	2/1999
Calendar of Monetary and Economic Highlights	3/1999
The Possibilities and Limitations of Monetary Policy – Results of the OeNB's 27th Economics Conference	3/1999
Calendar of Monetary and Economic Highlights	4/1999
Calendar of Monetary and Economic Highlights	1/2000
Calendar of Monetary and Economic Highlights	2/2000
Calendar of Monetary and Economic Highlights	3/2000
The New Millennium – Time for a New Economic Paradigm? – Results of the OeNB's 28th Economics Conference	3/2000
Calendar of Monetary and Economic Highlights	4/2000
Calendar of Monetary and Economic Highlights	1/2001
Calendar of Monetary and Economic Highlights	2/2001
The Single Financial Market: Two Years into EMU – Results of the OeNB's 29th Economics Conference	2/2001
Calendar of Monetary and Economic Highlights	3–4/2001
Austrian Financial Institutions	
Money and Credit in 1998	1/1999
Money and Credit in the First Quarter of 1999	2/1999
Austria's Major Loans Register in 1998	2/1999
Money and Credit in the First Half of 1999	3/1999
Banking Holidays in Austria	4/1999
Money and Credit in the First Three Quarters of 1999	4/1999
Money and Credit in 1999	1/2000
The Austrian Supervisory Risk Assessment System	1/2000
Money and Credit in the First Quarter of 2000	2/2000
Risk Analysis of a Representative Portfolio of International Assets	2/2000
Calculating the Thresholds for the Notification of Mergers of Banks – The New Legal Situation	2/2000
Money and Credit in the First Half of 2000	3/2000
Banking Holidays in Austria	4/2000
Money and Credit in the First Three Quarters of 2000	4/2000
Money and Credit in the Year 2000	1/2001
Money and Credit in the First Quarter of 2001	2/2001
Money and Credit in the First Half of 2001	3–4/2001
Banking Holidays in Austria in the Year 2002	3–4/2001
Interest Rates	
An International Comparison of Term Structures – Estimations Using the OeNB Model	1/1999

1 For a comprehensive list of reports, summaries and studies hitherto published please refer to issue no. 4/2000 of "Focus on Austria."

List of Studies on Focus on Austria Main Topics

Focus on Austria 2/2000:

The Monetary Policy of the Eurosystem
Monetary Policy and Monetary Policy Strategy in EMU:
New Framework – New Challenges
The Credibility of the Eurosystem
Monetary Growth during the Changeover to Economic
and Monetary Union
Indicators for Assessing Price Changes
Estimate and Interpretation of the Taylor Rule for the Euro Area
Modification to the Monetary Policy Framework
and Structural Changes in the Austrian Money Market
in Stage Three of EMU

Focus on Austria 3/2000:

On a New Capital Adequacy Framework as Proposed by Basel and Brussels
Regulatory Capital Requirements for Austrian Banks –
A Supervisory Tool Subject to Change
Supervisory Review
Credit Risk
Critical Evaluation of the Basel Committee's
and the European Commission's Proposals on the
Treatment of Other Risks in the New Capital Adequacy Framework
Interest Rate Risk in the Banking Book

Focus on Austria 2/2001:

The New Framework for Fiscal Policy
Fiskal Policy Design in the EU
Measures and Strategies for Budget Consolidation
in EU Member States
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An Analysis from an Employee Perspective
Problems Relating to the Taxation of Cross-Border Capital Income
Austria's Sovereign Debt Management Against the Background
of Euro Area Financial Markets
Cyclically Adjusted Budgetary Balances for Austria

Focus on Austria 3–4/2001:

Aspects of the Transmission of Monetary Policy

The Transmission Mechanism
and the Role of Asset Prices in Monetary Policy
Asymmetric Transmission of Monetary Policy
throught Bank Lending –
Evidence from Austrian Bank Balance Sheet Data
Balance Sheet and Bank Lending Channels:
Some Evidence from Austrian Firms
Financial Innovation and the Monetary Transmission Mechanism
Transmission Mechanism and the Labor Market:
A Cross-Country Analysis
Monetary Transmission and Fiscal Policy
Principles for Building Models of the
Monetary Policy Transmission Mechanism

Publications of the Oesterreichische Nationalbank

Periodical Publications	Published
Statistisches Monatsheft	monthly
Focus on Statistics (English translation of "Statistisches Monatsheft")	http://www.oenb.at
Leistungsbilanz Österreichs, revidierte Jahresdaten gegliedert nach Regionen und Währungen	annually
Berichte und Studien	quarterly
Focus on Austria (selected chapters from „Berichte und Studien")	quarterly
Focus on Transition	semiannually
Finanzmarktstabilitätsbericht	semiannually
Financial Stability Report (English translation of "Finanzmarktstabilitätsbericht")	semiannually
Geschäftsbericht	annually
Annual Report (English translation of "Geschäftsbericht")	annually
Volkswirtschaftliche Tagung (for a list of the topics discussed at the conferences, see below)	annually
The Austrian Financial Markets – A Survey of Austria's Capital Markets – Facts and Figures	annually

Other Publications	
New Developments in Banking and Finance in East and West (Kranichberg 1989)	1990
Erfahrungen Österreichs beim Übergang von administrativer Regulierung zur Marktwirtschaft (Moscow 1990)	1990
Challenges for European Bank Managers in the 1990s (Badgastein 1990)	1991
From Control to Market - Austria's Experiences in the Post-War Period (Warsaw 1990)	1991
The Economic Opening of Eastern Europe (Bergsten Conference Vienna 1991)	1991
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Neuorientierung – Internationale Vermögensposition und Außenwirtschaftliche Investitionsbilanz Österreichs	1993
Bankwesengesetz 1993	1994

Other Publications (cont.)	Published
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International Investment Position for 1992 – Austria's Cross-Border Assets and Liabilities	1994
Western Europe in Transition: The Impact of the Opening-up of Eastern Europe and the Former Soviet Union	1995
Die Oesterreichische Nationalbank als Unternehmen	1996
Monetary Policy in Central and Eastern Europe: Challenges of EU Integration	1996
Monetary Policy in Transition in East and West	1997
Die Auswirkungen des Euro auf den Finanzmarkt Österreich	1997
Die Bank der Banken	1997
Die Zukunft des Geldes: Auf dem Weg zum Euro Grundlagen – Strukturen – Termine	1997
Geld & Währung	1997
Kompendium von Texten zur Wirtschafts- und Währungsunion	1997
Nationalbankgesetz 1984 (as of January 1999)	1999
Information literature on banknote security	recurrently
Working Papers (for a list of the topics discussed in the papers, see below)	recurrently

Videos	
Wie Mozart entsteht (banknote security)	1990
The Evolution of W. A. Mozart (English version of "Wie Mozart entsteht")	1995
Bank der Banken (tasks and functions of the OeNB)	1991
The Banks' Bank (English version of "Bank der Banken")	1991

List of the Topics Discussed at the Economics Conferences (Volkswirtschaftliche Tagungen)

1975	Die ökonomischen, politischen und sozialen Konsequenzen der Wachstumsverlangsamung
1976	Störungsanfällige Bereiche in unserem ökonomischen und sozialen System
1977	Fiskalismus kontra Monetarismus
1978	Wirtschaftsprognose und Wirtschaftspolitik
1979	Technik-, Wirtschaftswachstums-, Wissenschaftsverdrossenheit: Die neue Romantik – Analyse einer Zeitströmung
1980	Probleme der Leistungsbilanz in den achtziger Jahren
1981	Systemkrisen in Ost und West
1982	Forschung und Wirtschaftswachstum
1983	Ausweg aus der Krise – Wege der Wirtschaftstheorie und Wirtschaftspolitik
1984	Der Weg zur Welthandelsnation
1985	Weltanschauung und Wirtschaft
1986	Vollbeschäftigung, ein erreichbares Ziel?
1987	Vollendung des Binnenmarktes in der Europäischen Gemeinschaft – Folgen und Folgerungen für Österreich
1988	Sand im Getriebe – Ursachen und Auswirkungen der Wachstumsverlangsamung in Österreich
1989	Banken und Finanzmärkte – Herausforderung der neunziger Jahre
1990	Wettbewerb und Kooperation im Finanzbereich
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1992	Zukunft regionaler Finanzmärkte in einem integrierten Europa
1993	Europäische Währungspolitik und internationaler Konjunkturverlauf
1994	Neue internationale Arbeitsteilung – Die Rolle der Währungspolitik
1995	Die Zukunft des Geldes – das Geld der Zukunft
1996	Auf dem Weg zur Wirtschafts- und Währungsunion – Bedingungen für Stabilität und Systemsicherheit
1997	Die Bedeutung der Unabhängigkeit der Notenbank für die Glaubwürdigkeit der europäischen Geldpolitik
1998	Wirtschaftspolitik 2000 – Die Rolle der Wirtschaftspolitik und nationaler Notenbanken in der WWU
1999	Möglichkeiten und Grenzen der Geldpolitik
2000	Das neue Millennium – Zeit für ein neues ökonomisches Paradigma?
2001	Der einheitliche Finanzmarkt – Eine Zwischenbilanz nach zwei Jahren WWU

List of the Topics Discussed in the Working Papers

		Published
No. 5	Die Auswirkungen der Finanzmarkt- und Kapitalverkehrs-liberalisierung auf die Wirtschaftsentwicklung und Wirtschaftspolitik in Norwegen, Schweden, Finnland und Großbritannien – mögliche Konsequenzen für Österreich[1])	1991
No. 6	Zwei Jahre G-24-Prozeß: Bestandsaufnahme und Perspektiven unter besonderer Berücksichtigung makroökonomischer Unterstützungsleistungen[1])	1991
No. 7	Die Finanzoperationen der öffentlichen Haushalte der Reformländer ČSFR, Polen und Ungarn: Eine erste quantitative Analyse	1991
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No. 9	Alternative Strategies For Overcoming the Current Output Decline of Economies in Transition	1992
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