

MONETARY POLICY & THE ECONOMY

Quarterly Review of Economic Policy

The OeNB's quarterly publication *Monetary Policy & the Economy* provides analyses of cyclical developments, macroeconomic forecasts, studies on central banking and economic policy topics as well as research findings from macroeconomic workshops and conferences organized by the OeNB.

Editorial board

Peter Mooslechner, Ernest Gnan, Georg Hubmer, Franz Nauschnigg, Doris Ritzberger-Grünwald, Martin Summer, Günther Thonabauer

Editors in chief

Peter Mooslechner, Ernest Gnan

Coordinator

Manfred Fluch

Manuscript editing and editorial processing

Karin Fischer, Susanne Pelz

Translations

Dagmar Dichtl, Ingrid Haussteiner, Alexandra Majer, Pauline Pitcher, Ingeborg Schuch

Technical production

*Peter Buchegger (design)
Walter Grosser, Franz Pertschi, Susanne Sapik (layout, typesetting)
OeNB Printing Office (printing and production)*

Paper

Printed on environmentally friendly paper

Inquiries

*Oesterreichische Nationalbank, Communications Division
Postal address: PO Box 61, 1011 Vienna, Austria
Phone: (+43-1) 40420-6666
Fax: (+43-1) 40420-6698
E-mail: oenb.info@oenb.at*

Orders/address management

*Oesterreichische Nationalbank, Documentation Management and Communications Services
Postal address: PO Box 61, 1011 Vienna, Austria
Phone: (+43-1) 40420-2345
Fax: (+43-1) 40420-2398
E-mail: oenb.publikationen@oenb.at*

Imprint

*Publisher and editor:
Oesterreichische Nationalbank
Otto-Wagner-Platz 3, 1090 Vienna, Austria
Günther Thonabauer, Communications Division
Internet: www.oenb.at
Printed by: Oesterreichische Nationalbank, 1090 Vienna, Austria
Oesterreichische Nationalbank, 2008
All rights reserved.*

May be reproduced for noncommercial and educational purposes with appropriate credit.

DVR 0031577

Vienna, 2008



Contents

Analyses

Global Economic Downturn Persists Crisis in Financial and Real Estate Markets Dampens Growth <i>Gerhard Fenz, Ingrid Haar-Stöhr, Maria Antoinette Silgoner</i>	6
Tax and Economic Growth in Austria <i>Konrad Pesendorfer</i>	21
Economic Country Risks Emanating from Austria's International Exposure <i>Matthias Fuchs</i>	41
Four Monetary Policy Strategies in Comparison: How to Deal with Financial Instability? <i>Jésus Crespo Cuaresma, Ernest Gnan</i>	65

Highlights

The Economics of Financial Stability: Research Workshop at the OeNB <i>Martin Summer</i>	104
Global Market Disruptions – Will Global Imbalances Unwind? <i>Peter Backé, Franz Nauschnigg</i>	113

Notes

Abbreviations	122
Legend	123
List of Studies Published in Monetary Policy & the Economy	124
Periodical Publications of the Oesterreichische Nationalbank	127
Addresses of the Oesterreichische Nationalbank	129

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

Analyses

Global Economic Downturn Persists

Crisis in Financial and Real Estate Markets Dampens Growth

Gerhard Fenz,
Ingrid Haar-Stöhr,
Maria Antoinette
Silgoner¹

The global economic downturn is persisting. In the U.S.A., tax rebates provided only a temporary stimulus to the economy. As the U.S. real estate crisis continues, it triggered the takeover of mortgage finance corporations Fannie Mae and Freddie Mac by their regulator in early September 2008. The crisis of the U.S. real estate and financial sectors, which has gathered momentum lately, sustained high commodity prices and the deterioration in the labor market are all badly damaging consumer confidence. As a reaction to the most recent aggravation of the financial crisis, the U.S. government announced its plan to establish a well-endowed stabilization fund.

As to the euro area, economic growth slowed unexpectedly sharply in the second quarter of 2008. Real GDP contracted by 0.2% quarter on quarter. Particularly, gross fixed capital formation made a negative contribution to growth, but also consumer restraint depressed economic performance. The ECB's current projections assume only a gradual improvement in the economy.

In August 2008, HICP inflation in the euro area was 3.8%, down from its probable peak of 4.0% in the summer months. This trend reversal is attributable to the latest fall in commodity prices – the main inflation driver in recent months. In addition, as the commodity price upsurge commenced in fall 2007, more favorable basis effects will now have an immediate impact. Accordingly, the ECB's inflation projections for 2009 range between 2.3% and 2.9%.

Austria's economy cannot decouple itself from the global economic slowdown as it heavily depends on exports. Furthermore, significant stimuli from private consumption, which is usually the key pillar of economic activity in the mature phase of the economic cycle, are currently not in evidence. A high saving propensity and steep inflation are both equally responsible for this development. According to the OeNB economic indicator's results, the OeNB projects the Austrian economy to nearly stagnate in the second half of 2008.

JEL classification: E2, E3, O1

Keywords: global outlook, euro area, central and (south-)eastern Europe, Austria

1 Global Economic Downturn Persists

1.1 U.S.A.: Tax Rebates Provide Only Temporary Stimulus to the Economy; U.S. Government's Bailout Package Worth up to USD 700 Billion

In the U.S.A., annualized real GDP growth accelerated by a vigorous 3.3% in the second quarter of 2008 after having risen by 0.9% in the first quarter of 2008 and shrunk by 0.2% in the fourth quarter of 2007. Growth in the second quarter of 2008 was led primarily by net exports and higher consumer spending, which is largely attributable

to the distribution of tax rebate checks. A rigorous rundown in inventories and flagging residential construction investment made a seriously negative contribution to growth.

The latest U.S. economic indicators signal a significant slowdown of economic activity in the second half of 2008 and in 2009, with downside risks having markedly risen recently. In July 2008, U.S. leading indicators (Conference Board) clearly deteriorated having fallen in eight of the past 12 months. In August 2008, industrial production was down sharply, and capacity utilization shrank to its lowest level since

Cutoff date for data:
September 17, 2008

¹ gerhard.fenz@oebn.at; ingrid.haar-stoehr@oebn.at; maria.silgoner@oebn.at.

October 2004. In July 2008, private construction expenditure fell to its lowest level since March 2001 – the official start of the previous recession. In August 2008, the labor market situation visibly deteriorated as the jobless rate rose to 6.1% and nonfarm payroll jobs were cut by 84,000. After major increases in May and minor growth in June, retail sales were down slightly both in July and August 2008. The reason for the favorable development in May and June 2008 was probably the payment of tax rebates. Since consumers have evidently already spent most of these tax rebate checks, their uncertainty stemming from deteriorated labor market conditions, still fairly high energy prices, real estate sector difficulties and the financial turmoil fallout will become more clearly apparent in the next few months.

Yet, there are also some positive signs. In August 2008, consumer confidence (Conference Board) improved for the second month in a row, primarily owing to the sharp fall in fuel prices. Over the long term, however, this value is still very low. In the second quarter of 2008, employee productivity grew by a robust 4.3% (annualized) after having advanced by only 2.6% in the first quarter of the year. Productivity growth has therefore been much stronger than in previous periods of economic downturn.

In early September 2008, the OECD revised its U.S. growth forecast for 2008 up to 1.8%, while the equivalent IMF projection is 1.3%, and the Federal Reserve's ranges from 1.0% to 1.6%. For 2009, the IMF and the OECD predict real GDP growth to slow to 0.7% and 1.1% respectively. This would be the lowest growth rate since 2001. As these forecasts do not yet reflect the latest developments, further downward revisions are likely.

In August 2008, U.S. consumer prices rose by 5.4% year on year, which was somewhat less steep than in July (+5.6%). In August 2008, the CPI dropped by 0.1% month on month for the first time since October 2006, which was mainly attributable to the fall in energy prices. Core inflation climbed by a relatively modest 2.5%. The Federal Reserve predicts core inflation to range from 2.2% to 2.4% in 2008.

The U.S. real estate crisis continues to rage. House prices, which have fallen nationwide by an average of 16% in the previous 12 months, are still sliding. This trend is likely to persist until the high and still expanding inventory of unsold houses is run down, which is unlikely to occur before the end of 2009. The growing number of foreclosures also contributes to this trend. In early September 2008, the Federal Housing Finance Agency (FHFA) – regulator of Fannie Mae and Freddie Mac, the two most important U.S. real estate finance corporations – noted that, in view of their inadequate capital resources, the latter could no longer fulfill their statutory mandate of providing liquidity to the mortgage market. Fannie Mae and Freddie Mac's problems derive from their growing number of loan losses, amounting to a total of just under USD 15 billion in the previous 12 months. To prevent the financial crisis from further escalating, the FHFA placed both corporations under conservatorship, which means that the regulator will assume control for an unlimited period of time. Their management was replaced, and the U.S. Treasury injected capital (ceiling: USD 100 billion) in the form of senior preferred stocks into the corporations. Furthermore, the U.S. Treasury will repurchase mortgage-backed securities (MBS) in the market in a bid to bolster

their price. The prime objective of state intervention for Fannie Mae and Freddie Mac is to restore confidence in these two corporations, which together hold almost 50% of all U.S. mortgages. This measure is also designed to improve the image of the U.S. market in the eyes of foreign investors, as the latter – particularly from China, Japan, Luxembourg and Belgium – own a significant share of Fannie Mae and Freddie Mac bonds. State intervention is also meant to limit a further increase in private insolvencies and to prevent a potential collapse of private consumption, which is key to the U.S. economy. Although the costs of this “rescue package” to be picked up by the taxpayer are as yet unforeseeable, they will depend on the future economic performance of these two institutions.

In September 2008, another blue chip joined the list of private investment banks hit by the financial crisis. In the second week of September, Lehman Brothers, the fourth-largest U.S. investment bank, reported an unexpectedly high quarterly loss of USD 3.9 billion. On September 15, 2008, the bank was forced to file for bankruptcy, as negotiations between senior Wall Street bankers and the U.S. government to rescue the bank had broken down. To prevent a chain reaction and a further destabilization of the financial system, the Federal Reserve, the ECB and other central banks injected liquidity into the financial markets. Since leading financial houses are very closely interlinked, a default by a single major bank also increases the risk of a spillover to other banks. Likewise, the risk of a further economic downturn in the U.S.A. is also increased. So as to prevent the threatening negative synergy effects generated by financial turmoil and economic downturn, the U.S. government

has drafted an emergency plan to combat the financial crisis. According to this plan, the U.S. government is to purchase bad mortgages and illiquid securities up to a value of USD 700 billion from banks (including foreign banks operating in the U.S.A.). Yet this plan still needs to pass the U.S. Congress.

In the wake of the financial crisis, the Federal Reserve, between September 2007 and April 2008, cut its key interest rate seven times by a total of 325 basis points to 2% (April 30, 2008). The federal funds target rate has since remained unchanged. In its statement following the latest Federal Open Market Committee (FOMC) meeting held on September 16, 2008, the Federal Reserve expressed its unease about a more severe economic slowdown somewhat more strongly than it voiced its concern about high inflation. The next FOMC meeting will take place on October 28–29, 2008.

1.2 Japan: Growth Slumps in the Second Quarter of 2008, Further Slowdown Expected

After a relatively strong first quarter in 2008, Japan’s real GDP growth contracted by 0.7% against the previous period in the second quarter of 2008 – the largest slump in seven years. Growth was depressed by weak external demand, in particular. Above all, automotive and steel exports to the U.S.A. and Europe fell dramatically. In addition, private consumption declined for the first time in two years. Rising living costs and a weak labor market depressed consumer sentiment. Still, Japan’s economy is now likely to be better prepared for a downturn than it was in 2001. Corporate profits have so far dropped less sharply. As a countervailing measure, the Japanese government, for the first time in six years, is preparing an economic stimulus package worth EUR 70 billion.

Owing to more sluggish global demand, the economy is expected to slow in 2008. The IMF and the OECD downgraded their growth forecasts to 1.0% and 1.2% respectively. The Bank of Japan (BoJ) cut its forecast to 1.2% for the financial year 2008 (April 2008 to March 2009). Despite a favorable profit situation, the BoJ's quarterly survey revealed a significant deterioration in Japanese corporate sentiment. The diffusion index, which reflects the business climate, worsened in all categories although large manufacturers were the worst hit.

After a fairly long-lasting period of deflation, rising wages and higher import prices for commodities started to push up consumer prices from October 2007 onward. In July 2008, the rise in the CPI and core inflation came to 2.3% and 0.2% year on year respectively. As a result, the CPI breached the upper limit of the BoJ's definition of price stability for the very first time. However, recently falling commodity prices should dampen future inflation. The BoJ expects the CPI to advance by 1.8% in the current fiscal year.

Key interest rates were last raised by 25 basis points to 0.5% in February 2007. Although the interest rate gap between Japan and the world's leading currency areas has since narrowed to some extent, it still remains wide. The BoJ announced it would not further raise interest rates in the near future.

1.3 Asia's Economy Still Robust despite Downturn; Rising Consumer Prices

Despite sluggish global demand, Asia's emerging economies continued to expand at a high level in the first half of 2008. Buoyant demand within the region and from other emerging economies contributed to robust export

growth. The IMF, however, anticipates a modest slowdown to 7.7% in 2008 (2007: 9.3%), with China and India remaining the driving forces of growth.

In China, real GDP growth amounted to 10.4% year on year in the first half of 2008. Whereas export momentum slowed somewhat on the back of more sluggish global demand and a modest appreciation of the Chinese yuan against the U.S. dollar (until mid-July 2008 whereafter it has since remained stable), both investment and consumption have continued to soar. The price freeze in respect of administered prices and declining food prices dampened the rise in consumer prices (August 2008: 4.9% year on year). In India too, economic momentum continued at a somewhat slower pace, although consumer prices reached a 16-year high in August 2008.

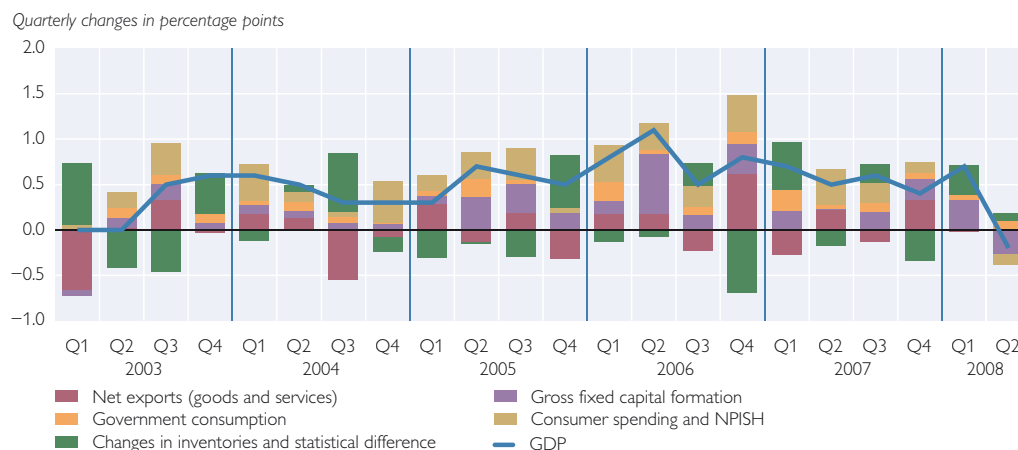
In several Asian emerging economies, tighter financing conditions as a result of the financial crisis, monetary policy tightening and deteriorating consumer and corporate confidence are dampening domestic demand. In addition, weak GDP growth in their traditional U.S. and Western European export markets is darkening future growth prospects. Many countries are currently trying to curb the effects of higher inflation by subsidizing energy prices and intervening in foreign exchange markets to strengthen their national currency.

2 Euro Area: Short-Term Outlook Darkens

2.1 Economic Downturn More Severe than Expected

In the euro area, real GDP in the second quarter of 2008 shrank by 0.2% quarter on quarter. After the dynamic growth generated by special factors in the first quarter of 2008 (+0.7%), a growth correction was to be expected. For in-

Contribution to Real GDP Growth in the Euro Area



Source: Eurostat.

stance, the mild winter had stimulated construction activity, thereby boosting gross fixed capital formation. However, the extent of the moderation has come as a surprise and the economic downturn seems to be deeper and more prolonged than previously anticipated. Compared with the second quarter of 2007, real GDP increased by 1.4% in the euro area.

The correction in the second quarter of 2008 was particularly pronounced when it came to gross fixed capital formation, which contributed negatively to growth for the first time in more than five years. Weak investment activity is also partly explained by the shrinking utilization of existing production facilities. According to a European Commission survey, industrial capacity utilization peaked in the second quarter of 2007 whereafter it has been in decline. In the third quarter of 2008, it is expected to decrease by almost 1 percentage point to 82.9%, making dynamic investment activity less likely. Yet, capacity utilization still remains high in historical terms.

Dynamic commodity price growth in recent quarters led to a loss of house-

holds' purchasing power and in turn to heightened consumer restraint. As a result, private consumption made a negative contribution to growth in the second quarter of 2008. Of GDP components, only government consumption stimulated the economy.

A breakdown by economic sector shows that only business-related and financial services, as well as other services, made positive contributions to growth. No other sector provided any positive impetus in the second quarter of 2008. In Germany, France and Italy, the economic contraction was more pronounced than in the euro area average while Spain still registered positive GDP growth.

2.2 Leading Indicators Dip below Long-Term Average

There are hardly any signs of a rapid improvement in the economic climate. Instead, most leading indicators of economic growth signal stagnation. Indicators reflecting the current situation and expectations about the near future have both deteriorated.

The European Commission's Economic Sentiment Indicator (ESI) regis-

tered a further drop in August 2008. The ESI's retail and industrial confidence components accounted for this deterioration while its services and construction components staged a modest recovery. Since July 2008, the ESI has trended below its historical average. Key national indicators such as the Ifo Business Climate Index have recently also continued to slide. In August 2008, the Industrial Purchasing Managers' Index signaled continued sluggish growth in both industry and services. Like the second quarter of 2008, the third quarter is therefore also likely to be lackluster.

The European Commission's survey of consumer confidence – a component of the ESI – has steadily worsened since mid-2007. Household expectations about both the general performance of the economy and their own financial situation suffered severely. Merely in August 2008, consumer confidence staged a modest recovery. This somber appraisal of the situation has translated into marked consumer restraint. Households answered the question about their current propensity to consume and about their willingness to make major purchases in the near future as cautiously as never before since the creation of this indicator.

The pessimism underlying consumer sentiment is backed by an unfavorable development in real income, which is related to two factors. First, nominal income has declined more rapidly. Second, the labor market outlook has darkened, thus dampening income expectations. In April 2008, seasonally adjusted unemployment rose by 0.1 percentage points to 7.3% for the first time in three years and has since remained at this level. Large regional differences lie at the root of this phenomenon. In Spain, the jobless rate climbed by almost 3 percentage

points within a single year. In Italy too, more people registered as unemployed, whereas in Germany and France the unemployment rate is still falling. The European Commission's survey on employment expectations indicates a further deterioration of the labor market situation across all economic sectors. Households' fear of unemployment has mounted significantly. Consumer demand cannot therefore be expected to provide much impetus for GDP growth in the third quarter of 2008.

2.3 Inflation Peaks in the Summer

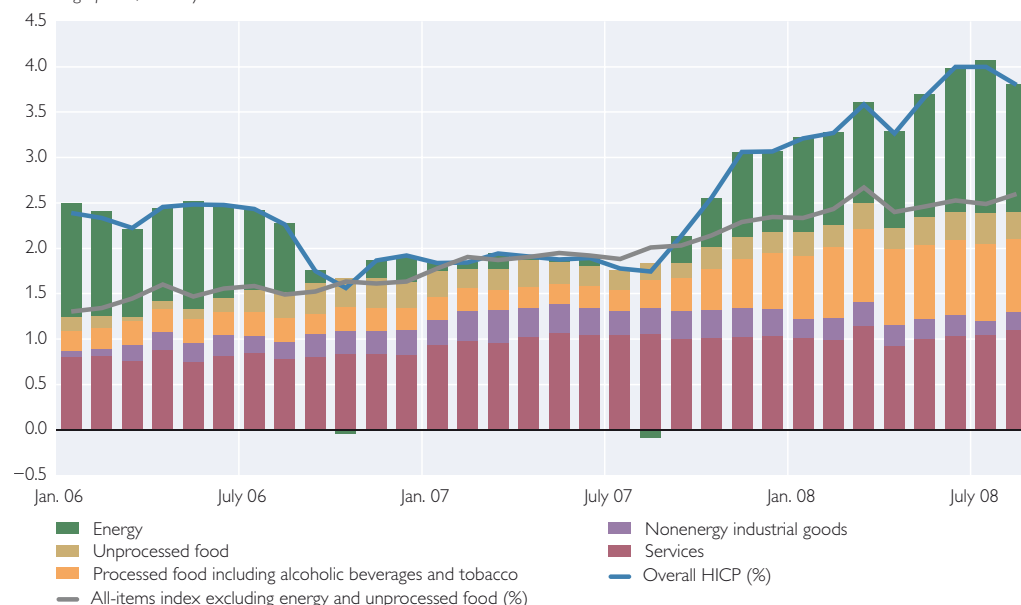
HICP inflation peaked in the summer. In August 2008, it declined by 0.2 percentage points to 3.8%, against the previous two months (June and July 2008: 4.0%).

The turnaround in inflation is attributable primarily to the development of commodity prices and, in particular, crude oil prices. Since its record high of USD 145 per barrel, the price of a barrel Brent crude has fallen by 40% from mid-July to mid-September 2008. Even for food, beverages and tobacco the time of rocketing prices is over for the time being. As for cereal and oil seed prices, they have been falling since spring and summer 2008 respectively. For these volatile price components, however, even a price stabilization would see their contribution to inflation increasingly diminish over the coming months, as their dynamic upsurge had commenced in fall 2007, which means that more favorable basis effects will now unfold.

Even so, a large share of euro area inflation is still explained by energy and food prices. In August 2008, these two components accounted for two-thirds of inflation. Furthermore, lag effects can be expected in both cases. For instance, the prices of other energy

HICP Components

Percentage points, monthly data



Source: Eurostat.

sources (especially gas) track crude oil prices only with a time lag and, even in the case of food, increased cost pressures are only gradually passed onto consumers.

In August 2008, core inflation, which explicitly excludes the most volatile components of inflation namely energy and unprocessed food, stood at 2.6%. Prices for processed food and services prices are responsible for this unusually high level of core inflation, which indirectly also reflects the developments of the volatile price components of energy and food. For instance, prices for transport services and travel as well as café and restaurant prices rose particularly rapidly. Thanks to the appreciation of the euro and to international competition, however, high cost pressures along the value chain have so far not fed through to price increases for nonenergy industrial goods. The prices of these goods rose by a mere 0.5% year on year.

The euro exchange rate depreciated against the U.S. dollar by more than 10% between its record high of 1.599 USD/EUR on July 15, 2008, and mid-September 2008. Key factors behind this exchange rate movement are likely to be concerns about growth prospects in the euro area and a related narrowing of the interest rate gap between the euro area and the U.S.A., as well as the easing in the commodity markets. In June and July 2008 when Japan's economic outlook deteriorated, the euro initially appreciated against the Japanese yen. When, in early August 2008, the euro area economy also began to sputter and a reversal of carry trades commenced, the euro softened markedly relative to the Japanese yen. The euro depreciated in effective terms by 5% between mid-July and mid-September 2008.

2.4 Sharp Downward Correction of GDP Forecasts, Further Downward Revisions Expected

The ECB's projections of early September 2008 assume a slow improvement in the economy. Lower oil prices will have a positive impact on disposable income and thus gradually bring consumer restraint to an end. Emerging markets' sustained dynamic demand will also stimulate the economy. The ECB expects annual average real GDP growth to range between 1.1% and 1.7% in 2008, and to stabilize between 0.6% and 1.8% in 2009. Compared with the projections of June 2008, the outlook for both 2008 and 2009 has deteriorated. Uncertainty remains particularly high regarding these projections, as further energy and food price shocks as well as financial turmoil cannot be ruled out.

In its interim forecast of early September 2008, the European Commission sharply downgraded its GDP growth expectations for 2008 by 0.4 percentage points to 1.3%, as all the downside risks cited in its spring forecast – worsening financial and real estate turmoil as well as commodity price upsurge – have occurred and have been depressing both corporate and consumer confidence.

As the latest aggravation of the financial crisis has occurred after the production of the current projections and forecasts, neither as yet reflect the possibly ensuing further dampening effects on the overall economic growth. Consequently, the next projections and forecasts are likely to show further downward revisions.

Even if commodity prices may have peaked for the time being and more favorable basis effects will have an impact from fall 2008, inflation will ease only gradually. According to the ECB, HICP inflation will range

between 3.4% and 3.6% in 2008, and between 2.3% and 2.9% in 2009. For both 2008 and 2009, this signifies a marked upward revision. Upside risks will arise not only from further price shocks but also from stronger second-round effects from previous shocks.

3 CESEE Countries Still Growing Faster than Euro Area

3.1 Robust GDP Growth in the First Half of 2008

In the first quarter of 2008, the EU Member States of Central, Eastern and Southeastern Europe (CESEE) – Bulgaria, Poland, Romania, Slovakia, Slovenia, the Czech Republic and Hungary – registered average real GDP growth of 5.9% year on year, thus growing much faster than the euro area as a whole (+2.1%). Initial figures released show that economic momentum seems to have held up in the second quarter of 2008 as well, although growth appears to be slowing down in Slovakia (albeit from an extremely high level) and the Czech Republic. By contrast, the economic performance of Romania, Bulgaria and Hungary picked up in the first half of 2008. In Poland – the region's largest economy – GDP growth remained at around 6% year on year, thus making a substantial contribution to growth in the region as a whole.

In the first quarter of 2008, key growth stimuli came from domestic demand. In early 2008, consumer spending further increased almost across the entire region. Somewhat more sluggish growth visible in the Czech Republic is probably attributable to higher inflation as well as to fiscal measures adopted in early 2008. In Romania, already dynamic private consumption growth continued to accelerate, amounting to more than 15% year on year in the first quarter of 2008

Table 1

Economic Growth in CESEE EU Member States

	2006	2007	Q3 07	Q4 07	Q1 08	Q2 08 ¹
	Real GDP growth rate (annual change in %)					
Bulgaria	6.5	5.9	4.9	6.9	7.0	..
Poland	6.2	6.5	6.4	6.1	6.3	6.0
Romania	7.9	6.0	5.7	6.6	8.2	9.3
Slovakia	8.5	10.4	9.4	14.3	8.7	7.6
Slovenia	5.7	6.1	6.4	4.7	5.4	5.5
Czech Republic	6.8	6.6	6.4	6.6	5.2	4.5
Hungary	3.9	1.3	0.9	0.8	1.7	2.2

Source: Eurostat.

¹ Initial figures released.

(2007: +11%). Besides, it is not expected to slacken in the second quarter of 2008. In Romania, as in other countries of the region, private consumption was fueled by both expansive lending growth and rising real wages. For instance, Bulgaria and Romania registered real household lending growth of more than 30% and nearly 70% year on year respectively. With real growth rates of more than 10%, wages in the two newest EU Member States also rose dynamically. A similar trend could also be observed in most of the other countries under review.

In the first quarter of 2008, gross fixed capital formation grew in Bulgaria, Poland and Slovenia by 15% and in Romania by as much as 33% (year on year respectively). However, its momentum was not as high as in 2007 and in Slovenia it remained almost constant. In the Czech Republic, Slovakia and Hungary, by contrast, gross fixed capital formation grew at a considerably slower pace in the first three months of 2008 than in 2007 (+2.0%, +2.4% and -5.4%, year on year respectively).

In the first quarter of 2008, dampened demand in the euro area, the region's main trading partner, did not yet translate into a generally deteriorated export growth. Compared with

full year 2007, export growth in the first quarter of 2008 increased or remained almost unchanged in most countries of the region. Only Slovakia and Slovenia registered a significant decline in export growth, which was in both cases also reflected in a negative contribution to growth by net exports.

Overall, the risks for the CESEE region as a whole have considerably increased in the wake of global financial turmoil. The key risk factors include the slowdown in euro area growth, tighter financing conditions owing to higher risk aversion, and a generally worse investment climate. In the Baltic countries, particularly Estonia and Latvia, real GDP growth slowed significantly in early 2008. This deceleration had been widely expected owing to accumulated internal and external imbalances (high current account deficit, inflationary pressures, overheated real estate markets, rapid wage growth, lending boom).

3.2 Sustained Price Pressure and Exchange Rate Fluctuation Determine Monetary Policy

Despite a slightly easing inflation in most countries of the region in August 2008, global inflationary pressures are still clearly apparent. They are mainly

Table 2

Price Developments in Selected CESEE EU Member States

	2006	2007	Apr. 08	May 08	June 08	July 08	Aug. 08
Annual rate of change in the HICP (%)							
Bulgaria	7.4	7.6	13.4	14.0	14.7	14.4	11.8
Poland	1.3	2.6	4.3	4.3	4.3	4.5	4.4
Romania	6.6	4.9	8.7	8.5	8.7	9.1	8.1
Slovakia	4.3	1.9	3.7	4.0	4.3	4.4	4.4
Slovenia	2.5	3.8	6.2	6.2	6.8	6.9	6.0
Czech Republic	2.1	3.0	6.7	6.8	6.6	6.8	6.2
Hungary	4.0	7.9	6.8	6.9	6.6	7.0	6.4

Source: Eurostat.

the result of rising food and energy prices, which explained on average some two-thirds of the measured inflation. In addition to these global factors, changes in both indirect taxes and administered prices, as well as increasingly tight labor markets and rising unit labor costs also induced these pricing pressures.

The generally visible appreciation of most of these countries' currencies was attributable primarily to sustained robust GDP growth with strong export

activity (especially in the Czech Republic) and to expected interest rate increases owing to accelerated inflation. As to Hungary, a gradual improvement in macroeconomic fundamentals was another factor.

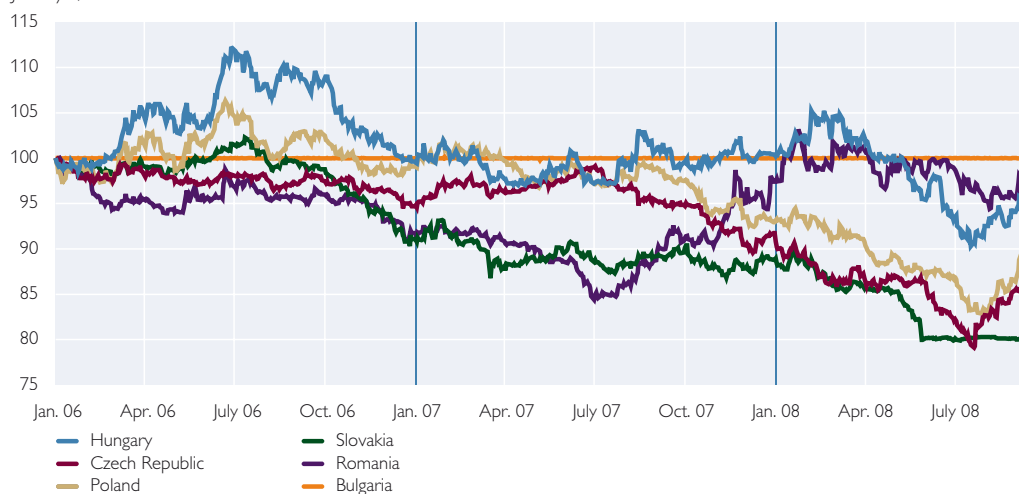
In view of the monetary climate outlined, many central banks in the region reacted with key interest rate changes. Poland, Hungary and Romania continued with tightening their monetary policy. For instance, Poland raised its key interest rate in two moves from

Chart 3

Exchange Rate Development: Local Currency Against the Euro

(Upward trend signifies nominal depreciation)

January 1, 2006 = 100



Source: Thomson Financial.

5.5% to 6.0%. This decision was based on the fact that Poland had missed its inflation target of 2.5% \pm 1 percentage point (measured against the CPI) by a wide margin. In Hungary, interest rates were raised by 100 basis points to 8.5% in three stages. The reason for this decision was the high risk of a sustained breach of Hungary's inflation target of 3% (measured against the CPI). The National Bank of Romania cited quite similar reasons for its four interest rate hikes from 9% to 10.25%. Here too, the country's current inflation trend makes it look unlikely that the inflation target of 3.8% \pm 1 percentage point (measured against the CPI) will be reached in December 2008.

By shaving 25 basis points off its key interest rate to 3.5% on August 7, 2008 (after having raised it by 25 basis points in March 2008), the Czech National Bank acted contrary to the regional trend. The reason for this move was primarily the Czech koruna's strong appreciation, which might dampen economic growth. In the Czech Republic inflation is currently also well above the inflation target of 3% (measured against the CPI). The Czech National Bank, however, considers high inflation to be only a temporary phenomenon, for which it holds responsible first and foremost the increase in indirect taxes and administered prices arising from the fiscal consolidation package adopted in early 2008.

3.3 Slovakia to Become the 16th Member of the Euro Area

In its convergence report of May 7, 2008, the European Commission proposed the adoption of the euro in Slovakia on January 1, 2009, as the country now fulfills all required convergence criteria. At the Ecofin Council meeting held on July 8, 2008, the convergence rate of the Slovak koruna for accession

to the euro area was fixed at SKK 30.1260 per euro. This value corresponds to the central parity of the Slovak koruna in the exchange rate mechanism II after the latter was increased by 17.6% on May 28, 2008 following strong appreciation pressure. In the course of this realignment, the Slovak government issued a comprehensive economic policy statement, which comprises, above all, structural fiscal adjustment measures.

3.4 Growing Wage Pressures Resulting from Dynamic Labor Market Developments

In recent quarters, the region under review stood out in terms of its particularly dynamic labor market developments. In many countries, sharply falling unemployment rates and robust employment growth resulted in tight labor markets. This development is essentially attributable to the healthy economic performance of CESEE countries and the migration of their labor to western EU countries. Unemployment in Bulgaria, Poland and the Czech Republic fell particularly sharply. Above all, the lack of skilled labor worsened. Among other factors, this situation led to accelerated wage growth with unweighted average wage growth amounting to more than 13% year on year in the first quarter of 2008 (2007: +10.9%). This dynamic wage growth was only partly offset by higher productivity, which translated into some steep increases in unit labor costs.

Table 3

Selected Labor Market Indicators for CESEE EU Member States

		2006	2007	Q1 08	Q2 08
Bulgaria	Unemployment rate (%)	9.0	6.9	6.1	5.6
	Employment rate (%)	58.7	61.7	62.6	..
	Wage development	6.2	16.2	19.3	..
	Unit labor costs	4.1	14.4	16.8	..
Poland	Unemployment rate (%)	13.9	9.6	7.7	7.5
	Employment rate (%)	54.5	57.0	58.0	..
	Wage growth	1.7	8.1	13.9	..
	Unit labor costs	-0.8	6.2	12.1	..
Romania	Unemployment rate (%)	7.3	6.4	6.0	..
	Employment rate (%)	58.8	58.8	57.7	..
	Wage growth	19.3	22.1	23.7	..
	Unit labor costs	13.0	15.2	15.4	..
Slovakia	Unemployment rate (%)	13.4	11.2	10.4	10.4
	Employment rate (%)	59.4	60.7	61.3	..
	Wage growth	6.2	8.1	11.6	..
	Unit labor costs	1.8	0.3	5.5	..
Slovenia	Unemployment rate (%)	7.5	7.4	7.6	7.6
	Employment rate (%)	57.3	57.3	56.1	..
	Wage growth	6.9	6.5	8.5	..
	Unit labor costs	2.4	2.6	6.2	..
Czech Republic	Unemployment rate (%)	7.2	5.3	4.5	4.4
	Employment rate (%)	65.3	66.1	66.1	..
	Wage growth	6.8	7.1	9.3	..
	Unit labor costs	1.2	2.3	5.9	..
Hungary	Unemployment rate (%)	7.5	7.4	7.6	7.6
	Employment rate (%)	57.3	57.3	56.1	..
	Wage growth	8.6	8.4	7.4	..
	Unit labor costs	5.2	6.7	3.8	..

Source: Eurostat.

Note: Wage growth and unit labor costs both relate to the aggregate economy year on year.

4 Austria: Global Economic Gloom Increasingly Over-shadows Austrian Economy

4.1 Period of Austrian Economic Expansion Comes to an End in the Second Quarter of 2008

According to the latest national accounts data, the Austrian economy in the second quarter of 2008 grew by 0.4% (in real terms, seasonally and working day-adjusted, on a quarterly basis), thereby corresponding to the growth outlook of the OeNB economic indicator. A similarly low growth rate was last seen just less than five years ago in the fourth quarter of 2003. In addition, real GDP growth for the first quarter of 2008 was revised down by

0.1 percentage points to +0.6%. Thus, the boom period of the Austrian economy, lasting from 2005 to 2007, has now come to an end.

The composition of growth has changed compared with the last few years and reflects the different external macroeconomic conditions. Owing to the visible cooling of the economies of Austria's key trading partners, Austrian exports (+0.5%) are no longer a driving force of growth. Although investment growth is also slowing down, it still looks fairly robust in comparative terms. In the next few months, however, Austrian enterprises are likely to scale down their investment activity significantly. Although private con-

Cutoff date for data:
September 30, 2008

sumption growth remained very subdued at 0.3%, it is not expected to further deteriorate over the next few months. The negative effect of the gloomier economic outlook will be offset by the expected drop in inflation from the fourth quarter of 2008. Government consumption, by contrast, grew very vigorously thanks to a consignment of Eurofighters. Yet, this has not had an impact on GDP growth as imports rose simultaneously. The sluggish or low momentum of all demand components points to weak growth in the second half of 2008.

In addition to the national accounts, other “hard” indicators also support Austria’s economic slowdown. For instance, industrial production (harmonized trend) in July 2008 shrank for the fourth time in a row (–0.1% seasonally and working-day adjusted, on a monthly basis). Retail sales growth slowed on the back of unexpectedly high inflation and the related weak rise in real household income. In the first half of 2008 as a whole, real retail sales were only 0.9% higher than in the previous year. In external trade, the cooling of the global economy was

clearly apparent. Statistics Austria’s goods balance showed a surplus of EUR 0.4 billion for the first seven months of 2008, i.e. EUR 0.5 billion less than in the same period a year ago. Whereas the deficit in trade with the EU was reduced slightly, the surplus in trade with non-EU countries was markedly smaller – not least because of high energy import costs. By contrast, tourism registered gratifying growth. In the first eight months of 2008, the number of overnight stays rose by 4.4%. Both winter and summer tourism witnessed growth, with the number of foreign visitors rising at a faster than average pace (+5.1%).

4.2 Sharp Deterioration in Confidence Indicators

A sharp deterioration in sentiment indicators signals a further slowdown in economic momentum. In September 2008, the European Commission’s Economic Sentiment Indicator for Austria worsened slightly on the previous month – at 94.6 points it is significantly below its long-term average of 100. Similarly poor sentiment values were last measured in 2003. The Bank

Table 4

Austria’s National Accounts Results (Real)

	2003	2004	2005	2006	2007	Q1 07	Q2 07	Q3 07	Q4 07	Q1 08	Q2 08
	Annual change (%) ¹					Quarterly change (%) ¹					
GDP	0.8	2.5	3.3	3.3	3.0	0.8	0.6	0.6	0.7	0.6	0.4
Private consumption	1.2	2.0	2.6	2.5	0.9	0.1	–0.1	0.3	0.4	0.2	0.3
Government consumption	1.0	1.1	1.5	2.2	1.9	0.0	–0.1	1.6	1.1	–1.8	2.5
Gross fixed capital formation	2.2	2.0	2.5	2.8	3.9	1.0	0.9	0.9	0.7	0.6	0.7
Exports	4.8	8.0	6.4	7.3	8.4	2.3	2.0	1.6	1.2	0.8	0.5
of which: goods	2.8	10.6	7.2	7.0	8.6	2.4	1.6	1.2	1.2	1.0	0.4
services	3.2	5.0	7.7	6.3	6.8	1.8	1.9	1.8	1.6	1.2	1.0
Imports	4.0	9.5	6.9	5.4	7.0	1.9	1.5	1.7	1.0	–0.2	1.4
of which: goods	4.3	10.6	6.8	5.5	7.8	2.2	1.7	1.7	0.8	–0.2	1.7
services	2.7	6.1	7.0	4.6	4.4	1.0	1.2	1.2	0.9	0.6	0.5

Source: Eurostat.

¹ Seasonally and working-day adjusted.

Box 1

Results of the OeNB Economic Indicator of October 2008¹

As a result of the financial turmoil, the global economic outlook has recently continued to darken considerably. Austria's economy cannot decouple itself from this development as it heavily depends on exports. Furthermore, significant stimuli from private consumption, which is usually the key pillar of economic activity in the mature phase of the economic cycle, are currently not in evidence. A high saving propensity and steep inflation are both equally responsible for this development. The Austrian economy will therefore nearly stagnate in the second half of 2008. According to the OeNB economic indicator's results, the OeNB projects real GDP growth of 0.2% (seasonally and working day-adjusted, on a quarterly basis) in the third quarter of 2008. The fourth quarter of 2008 will most unlikely see the Austrian economy grow (+0.0%). For 2008 as a whole, Austria will nonetheless still register real GDP growth of close to 2% due to buoyant activity seen at the start of the year.

However, this outlook is exposed to extraordinarily high uncertainty. By international standards, the Austrian financial system is only to a small degree directly affected by the financial crisis – still, neither its extent nor its impact on the global economy and on Austria's key trading partners can be definitively estimated from a current perspective. In the current climate, it should be particularly highlighted that only developments occurring to end-September 2008 were included in the data used for calculating the OeNB indicator. The events of recent weeks are therefore still not reflected in these data. While this should hardly affect developments in the third quarter, the growth rate projected for the fourth quarter of 2008 should be interpreted rather as an upper limit in the event of no further aggravation of the financial crisis.

Table 5

Short-Term Outlook for Austria's Real GDP in the Third and Fourth Quarters of 2008 (Seasonally and Working Day-Adjusted)

2006				2007				2008			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Year-on-year quarterly change (%)											
3.5	3.3	3.2	3.3	3.3	3.2	2.9	2.7	2.5	2.2	1.8	1.1
Quarterly change (%)											
0.8	0.8	0.8	0.9	0.8	0.6	0.6	0.7	0.6	0.4	0.2	0.0
Annual change (%)											
3.3				3.0				1.9			

Source: Results of the OeNB economic indicator of October 2008, Eurostat.

¹ The OeNB economic indicator has been published four times a year since the first quarter of 2003. It forecasts real GDP growth for the current and the next quarters (in each case, on a quarterly basis, using seasonally-adjusted data). The forecast's values are based on the results of two economic models, an unobserved components model and a dynamic factor model. Further details on the models used can be found at www.oenb.at in the Monetary Policy and Economy/Outlooks section. The next publication is due in January 2009.

Austria Purchasing Managers' Index fell sharply in August 2008. At 46.0 points – its lowest value since 2001 – the index signals a deepening of the recession in Austrian industry. The Ifo Business Climate Index for Germany,

which is also known to be a good leading indicator for Austria, further deteriorated in September and now stands at only 92.9 points. Austrian enterprises continued to scale down their investment plans for 2008. Owing

to the flat investment trend during recent years' economic boom, a sharp deceleration in investment growth similar to the period between 2001 and 2002 is, however, not to be expected from a current perspective.

4.3 Upcoming Trend Reversal in the Labor Market

In recent months, developments in the labor market have represented a ray of hope for the Austrian economy. In September 2008, the number of registered unemployed fell for the 31st month in succession. At 183,327 registered unemployed, jobless numbers were lower by 1,820 persons or by 1.5% compared with the preceding year. However, they did not fall to the same extent as in previous months. Furthermore, employment momentum has markedly slowed recently. Up by some 70,591 persons (+2.1% year on year), the number of payroll employees came to 3,467,791 persons at end-September 2008. As a result, the unemployment

rate (Eurostat definition) was 3.3%. However, the labor market is also witnessing growing signs of a trend reversal. In September 2008, reported vacancies fell by 7.7% – a clear signal that the boom period of the last three years is now over.

4.4 Slight Drop in Inflation

In June 2008, inflation peaked at +4.0% (HICP). It has since dropped slightly, standing at 3.6% in August 2008. At 0.8 percentage points, fuel prices contributed most to inflation. In August 2008, food and nonalcoholic beverages accounted for a fifth of inflation. Communication expenditure, however, had a price-dampening effect. In the fourth quarter of 2008, basis effects arising from the rise in inflation since October 2007 will – for the first time – have a dampening effect on inflation. Inflation should therefore continue to fall over the next few months.

Tax and Economic Growth in Austria

Konrad
Pesendorfer¹

Taxation influences the behavior of economic agents and, as a consequence, a country's economic activity and growth. The nature and size of this impact depends on the object or activity taxed as well as on the tax rate and the design of the tax. In a recent survey of 21 countries, the OECD sets up a ranking of tax categories based on their effects on wealth and GDP growth. This study investigates to what extent this ranking reflects the taxation-growth relationship in Austria. To this end, we compare the Austrian tax structure against the tax structure in the countries posting the highest GDP per capita levels and growth rates. Moreover, we assess the individual tax categories' impact on the key explanatory variables of economic growth. The investigation is based on the central assumption that tax revenues are kept constant and that reducing the revenues from one tax category requires increasing those from another tax source.

The analysis shows that the high level of labor taxes, including social security contributions, negatively affects the growth potential in Austria. The relative share of revenues from property taxes, which, according to the OECD survey, hamper economic growth least, is lower in Austria than in almost all other OECD countries. Although the share of revenues from consumption taxes in Austria is comparable to that in the countries posting the best GDP per capita figures, tax rates are necessarily higher because the Austrian VAT system grants numerous exemptions and has a set of reduced rates.

The substantial reduction of the tax burden on businesses brought about by the 2004/2005 tax reform improved the conditions for economic growth. The low degree of progressivity of taxes on labor income fosters productivity and economic efficiency rather than the redistribution of income.

JEL classification: H20, E62, O43

Keywords: taxation, economic growth, Austria

In economic growth models, the factors capital, education level (human capital) and labor as well as technological level determine an economy's output level and its long-term growth. The relation between taxes and economic growth can therefore be described along all the channels through which taxes affect these input factors: capital taxes influence individuals' decisions to save as well as businesses' decisions to invest and promote innovation. Thus, taxes affect the extent to which enterprises build up their productive capital stock and their level of innovation. Taxes on labor income affect labor demand and supply as well as an individual's decision

to invest in education, thereby building human capital.

A recent OECD study on taxation and economic growth² indicates that rather than the level of taxation it is the tax mix, i.e. the way tax instruments and categories are designed and combined, which primarily determines the growth potential of economies. Analyzing the data of 21 countries, the OECD sets up a ranking of tax categories which adversely affect economic growth (in descending order). Not unexpectedly, the tax categories directly related to income from capital and labor have the largest negative impact on growth, followed by consumption and

Refereed by:
Margit
Schratzentaller,
Austrian Institute of
Economic Research
(WIFO), Vienna

¹ konrad.pesendorfer@oebn.at. The author would like to thank Anton Rainer, Peter Mooslechner and Natacha Valla for valuable suggestions and discussions.

² OECD (2008), *Tax and Economic Growth*.

property, which have a smaller adverse impact.

These results are consistent with recent economic literature. Lee and Gordon (2005) show that higher corporate tax rates have a significantly negative impact on economic growth. Cutting corporate taxes by 10 percentage points would increase growth rates by 1 to 2 percentage points. This relation is less obvious for high income taxes. Djankov et al. (2008) investigate the economic effects of effective corporate tax rates in 84 countries and find negative correlations between this tax category and investment and growth. Feldstein (2008) highlights the adverse effects of income taxes on broadly defined labor supply: changes in labor participation, the number of hours worked, the choice of job, employees' commitment, etc. Altig et al. (2001) calculate the welfare and growth effects of five proposals to reform the U.S. tax system. All five proposals envisage the following measures to strengthen growth: broadening the tax base to finance low taxes on capital and income, taxing existing property and consumption and exempting investment from taxation.

The main objective of this study is to find out to what extent the results of the OECD reflect the relation between the tax structure and economic growth in Austria. To this end we compare the Austrian tax mix with the tax structures seen in the countries showing the highest and the lowest levels and growth rates of GDP per capita. In addition, the study looks at the factors within the individual tax categories which, according to theoretical tax literature

and the OECD survey, may impact on the levels and growth rates of GDP per capita.

Since the focus of this paper is on the relation between taxation and growth in Austria, key issues like tax incidence or the overall objective of the tax system (tax incentives, income redistribution, the optimum tax rate) are touched on only briefly or not covered at all.

1 Tax Mix and Economic Growth in the OECD

In the OECD study "Tax and Economic Growth" the authors estimate the effects of individual tax categories on the level of GDP per capita and its short- and long-term growth rates by integrating tax variables in a Solow-Swan growth model.³ The empirical results of this survey of 21 OECD countries (with data series available for the period from 1971 to 2004)⁴ allow a ranking of tax categories by their degree of impact on the level and growth of GDP per capita as follows:

- Property taxes have the least adverse effect on the long-term growth of GDP per capita, followed by
- consumption taxes and
- personal income taxes,
- whereas corporate taxes are the taxes which hamper the level and growth of GDP per capita most severely in the long term.

Box 1 provides a detailed overview of the relation between level and growth of GDP per capita and the individual tax categories as described in the OECD study "Tax and Economic Growth."

³ For details on the model and econometric results, see Annex.

⁴ Except Western Germany, for which the data series was available only to 1990.

OECD Working Paper “Tax and Economic Growth”

Property taxes

Property taxation, the category found to be least harmful to growth in the OECD study, takes the following forms: recurrent taxes on land and buildings, taxes on financial and capital transactions, taxes on net wealth and taxes on gifts and inheritances. These taxes – except financial transaction taxes – do not directly affect economic agents’ decisions to supply labor, to invest in or to build up human capital and generally share the aim of taxing the relatively wealthy, hence reducing inequality.

Recurrent taxes on land and buildings are not only non-distortionary as regards economic efficiency, but have other advantages as well: their tax base is relatively stable (generating predictable revenues), and they are difficult to evade. Moreover, property taxes can increase the progressivity of the tax system if low-value properties are exempt and the valuation of land and buildings is regularly updated. Due to higher opportunity costs there would be incentives for developing land, which in turn would contribute to an improved allocation of resources. The OECD argues against the favorable tax treatment of owner-occupied housing, as it may distort capital allocation and lead to excessive investment in housing. Also, it may reduce labor mobility, since people have more incentive to keep their homes for a longer period of time. Housing should be taxed in the same way as other investment by taxing the imputed rent and allowing interest deductibility. In most OECD countries, property taxes are levied at lower government levels, which makes it difficult to implement harmonized taxation at the federal level.

According to the OECD, taxes on financial and capital transactions are generally more distortionary than direct taxes on income and services provided by assets. Transaction taxes discourage transactions, which may result in hoarding behavior and the inefficient allocation of resources. Nevertheless, transaction taxes are widely used in financial markets, since they are easier to collect than taxes on capital gains.

Net wealth taxes with an appropriate exemption level (e.g. to foster saving for retirement) can be used to redistribute income and provide tax authorities with information that enables them to identify and correct inconsistencies between income flows and wealth held by taxpayers.

The OECD also concludes that taxes on inheritances and gifts are even less distortionary than wealth taxes given that the uncertain date of death makes most inheritances unplanned and certain decisions regarding a person’s wealth are not tax driven. It seems reasonable to have exemptions for small inheritances and to tax primarily large inheritances. A gift tax is considered a reasonable instrument to prevent the avoidance of inheritance tax, the OECD reckons.

Consumption taxes

Consumption taxes are generally VAT or sales taxes, which are applied on a broad range of goods and services. Specific consumption taxes, such as excises and import duties, are applied on a limited number of goods and services.

Since consumption taxes apply the same rate on current and future consumption, their effect on individuals’ saving behavior is very limited. Evidence from the literature on the role of tax elasticity of private savings is inconclusive. The effect of consumption taxes on labor supply and demand is comparable with the impact of a proportional income tax: consumption taxes lower the purchasing power of real after-tax wages. If a bargaining system allows income losses to be offset by higher wages, a decline in labor demand can be anticipated (due to higher labor costs). If the tax burden is transferred to individuals, the loss in purchasing power can be compensated for by increased labor supply.

Governments apply differentiated VAT rates for two reasons: first, to support labor by favorable tax treatment (especially of labor-intensive services) and to make leisure activities more expensive and thus less attractive, and second to redistribute income. Corlett and Hague (1953) as well as Christiansen (1984) recommend levying higher taxes on goods and services complementary to leisure (e.g. skis or golf clubs) while giving favorable tax treatment to goods complementary to work (e.g. public transport or child care facilities). Since higher-income earners

tend to consume relatively more of the low-taxed goods and therefore will benefit more from the lower rates than low-income earners (deadweight effect), reduced VAT rates are less suitable for enhancing equity than direct income transfers.

Personal income taxes and social security contributions

Personal income taxes and social security contributions are taxes on labor and can therefore have adverse effects on labor supply and labor demand, and, consequently, on the level and growth of GDP per capita. High average rates discourage labor participation, high marginal rates reduce the number of hours worked. While the tax elasticity of labor supply for prime age men is relatively low, high income taxes considerably discourage women/second earners from taking up work. Social security contributions increase labor costs and can therefore reduce labor demand. At the same time, firms or industries could switch to the use of other, less cost-intensive input factors, which would result in an inefficient allocation of resources.

According to the OECD, a high degree of progressivity is a disincentive to invest in human capital and discourages entrepreneurship, which may have a negative impact on GDP per capita. High marginal tax rates diminish individuals' willingness to take risks; this may reduce productivity especially in industries with high entry rates. At the same time, progressive tax systems contribute to achieving intended redistribution effects, generating a typical equity-efficiency trade-off.

The taxation of personal capital income may reduce the saving ratio; this assumption, however, is uncertain as it lacks empirical support. Taxing profits both at the corporate level and at the personal level (when they are distributed as dividends) without reducing the tax rate can create a bias towards debt financing rather than equity financing.

Corporate taxes

Corporate taxes affect corporate investment by reducing its after-tax return. As a result, fewer investment projects may be implemented due to yield considerations and the capital available for funding potential future investment projects might be reduced. Taxes affect the productivity of industries and enterprises through various channels: changes in relative factor prices can lead to inefficient factor allocation. Complex corporate tax codes can cause high tax compliance costs for firms and high administrative burdens for governments, absorbing resources that could be used for productive activities. High corporate taxes can diminish a location's attractiveness as a target for FDI inflows, which hinders technology transfers to domestic firms and reduces competition. Yet compared with the adverse effect of high taxes on labor, this aspect seems to be of only minor importance. Though tax incentives for investment in research and development are preferable to direct subsidies, empirical evidence shows they are rather inefficient when it comes to enhancing productivity. If interest payments on loans are deductible, high corporate taxes can encourage debt financing and discourage new share issuance.

Empirical evidence obtained at the firm and industry levels shows that highly productive firms are particularly adversely affected by corporate taxes. Small and young enterprises, by contrast, seem to experience less negative impact. One reason is that these enterprises often enjoy favorable tax treatment, while also having a smaller tax base due to lower profits. Firms catching up in productivity are more severely hit by corporate taxes than those which have suffered productivity losses. International tax competition has become a key consideration in many governments' corporate tax policies.

All the negative effects on capital accumulation notwithstanding the OECD considers corporate income taxes to be a crucial part of a tax system which can prevent personal income from being declared as (tax-advantaged) corporate income.

The empirical results of the OECD study suggest that tax systems relying primarily on property and consumption taxes provide a better environment for growth than tax systems with a strong focus on personal and corporate income

taxes. Therefore, a tax reform shifting the bias from corporate and personal income taxes to consumption and land taxes (the latter being the least distortionary type of property taxes) would be most advantageous for growth.

At this point it should be noted that the OECD's approach in this survey – comparing the shares of individual tax categories in total tax revenues – aims to illustrate the effects on wealth and growth generated by trade-offs between individual tax categories. A small share of corporate taxes in total tax revenues in a country does not necessarily imply, however, that the tax burden for businesses in this country is low. A small share of corporate taxes may also be due to an economy's structure with fewer corporations liable for this tax. Section 2.5 shows that effective tax rates are a more appropriate measure for comparing the tax burden in different countries.

To what extent tax reforms impact on growth is difficult to assess. Changes in one single tax usually feed through to several factors determining the level and growth of GDP per capita, which may generate mutually offsetting effects. Reducing personal income taxes, for instance, has a positive impact on labor supply, as people would find it more attractive to give up leisure time in exchange for higher net wages and salaries. If there is sufficient labor demand, more labor supply generates more wealth and growth. At the same time, higher net wages increase the opportunity costs of investment in education (i.e. wage losses during periods of education) while lowering the incentive to build up human capital. As a result, productivity declines as does GDP per capita growth.

Under the assumption that a tax reform is revenue neutral, cutting one tax requires raising other taxes. Hence,

it does not suffice to analyze changes in individual taxes separately to assess the overall effect of a tax reform on GDP growth.

Finally, the impact of a tax reform cannot be assessed without taking into account other national policy areas and institutions. Cutting personal income taxes will generate positive supply effects in the labor market only if wage formation works efficiently and the price of labor contains information on supply and demand preferences. Apart from the structure and the level of income taxes, other institutions influencing labor market access, such as labor rationing, insider-outsider behavior or high minimum wages (which limit the demand for low-productivity labor), play an equally if not more important role in this context.

2 The Tax-Growth Relation in Austria

With a tax-to-GDP ratio of 41.8%, Austria is often referred to as a high-tax country. Austria takes eighth place in a tax burden ranking of OECD countries and seventh place in a comparable EU ranking (2008); Sweden and Denmark, posting tax-to-GDP ratios of some 50% each, head both lists. Against this background, designing the structure of government revenues so as to maximize efficiency is particularly important in Austria.

2.1 Austria's Tax Structure in International Comparison

The structure of the Austrian tax system is characterized by a high fiscal burden on labor. In particular, social security contributions – rather than personal income taxes – account for a high share of total tax revenues. In addition, payroll taxes, contributing more than 6% of total revenues (the highest share among OECD countries),

weigh heavily on labor. Next to labor income, consumption is a key source of tax revenues. The taxation of corporate profits, immobile factors and property, by contrast, accounts for a comparably small proportion of total tax revenues in Austria.

Chart 1 illustrates the Austrian tax mix and its evolution over the past three decades. Structural changes took place primarily in three areas: First, the share of revenues from the taxation of goods and services has been reduced continuously since the 1970s. Second, revenues from property taxes have declined; and third, the share of social security contributions in total revenues has increased. The relative amount of revenues from personal income and corporate taxes has remained broadly unchanged. The most striking difference to the OECD average is the comparatively small proportion of corporate and property taxes in Austria: While the OECD average share of corporate income taxes in total tax revenues is 10%, the corresponding Austrian figure is only 5%. By contrast, Austria posts a much higher share than the OECD average when it comes to revenues from social security contributions

(34% versus 25.6%). This portion surged between 1970 and 1990 and subsequently grew more slowly.

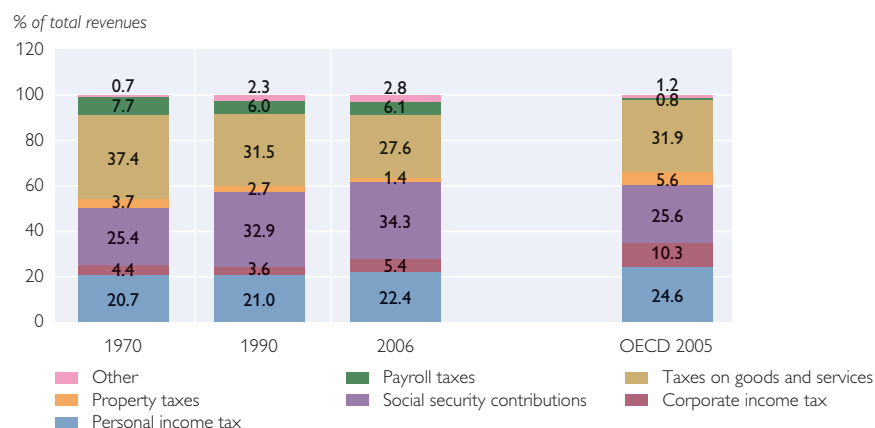
According to the OECD tax ranking, the small proportion of revenues from corporate taxes in total tax revenues in Austria can be considered an advantage, whereas the low taxes on property and the high fiscal burden on labor (due to the high level of social security contributions) represent a disadvantage.

Chart 2a depicts the tax structure in the countries with the highest levels of GDP per capita in the OECD in 2006 (Luxembourg, Norway, the U.S.A. and Ireland). At an average of 5.2%, Ireland (followed by Korea and Slovakia) also posted the highest annual growth rates of GDP per capita. Austria came in ninth in an OECD comparison of per capita GDP level in 2006, recording average GDP growth rates of annually 1.9% between 1990 and 2006.

Interestingly, corporate income taxes and property taxes are a considerably larger source of government income in countries with the highest GDP per capita levels and growth rates than they are in Austria. This differ-

Chart 1

Tax Structure in Austria (1970, 1990, 2006) and the OECD (2005)

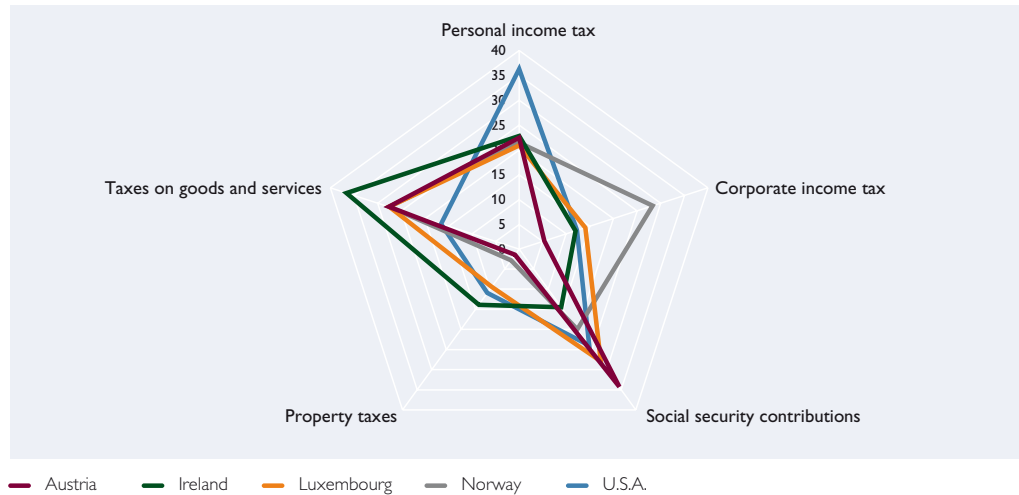


Source: OECD.

Chart 2a

Tax Structure in Austria and the OECD Countries with Top GDP per Capita Levels and Growth Rates (2006)

% of total tax revenues

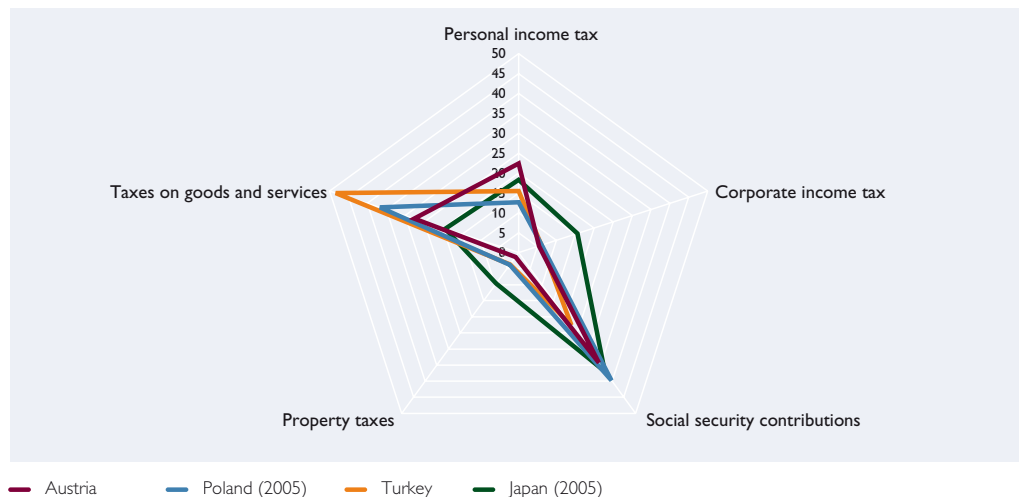


Source: OECD.

Chart 2b

Tax Structure in Austria and the OECD Countries with Top GDP per Capita Levels and Growth Rates (2006)

% of total tax revenues



Source: OECD.

ence cannot be attributed directly to the levels of tax rates (at 12.5%, the tax rate on corporate profits in Ireland is exactly half as high as in Austria), but rather to a country’s economic structure (i.e. the share of corporations

liable for corporate tax), the breadth of the tax base as well as cyclical evolutions of corporate profits. In addition, the level of social security contributions is far higher in Austria than in any of these high-performing countries. The

level of relative consumption tax revenues in Norway and Luxembourg corresponds to the Austrian level. The U.S.A. is the only OECD country without a VAT; therefore its tax revenues from consumption taxes are relatively modest. In Ireland revenues generated by VAT and excise taxes have been soaring since 2001 thanks to a buoyant economy. This is also why personal income tax revenues – also the main source of government revenues in the U.S.A. – have increased markedly in Ireland over the past few years.

Turning to the countries posting the weakest wealth and growth figures (Chart 2b), it appears that Poland (with the third lowest level of GDP per capita) and Japan (with the third lowest growth of GDP per capita between 1990 and 2006) levy high social security contributions on a par with Austria. Similarly, Poland and Turkey (showing the lowest level of GDP per capita) record revenues from corporate taxes that are about as low as those in Austria. Austria's revenues from property taxes are below and its revenues from income taxes are above the levels recorded in Poland, Japan and Turkey. It is interesting to note that the degree of income tax progressivity in Japan and Turkey is very low.

These empirical comparisons suggest that the tax-growth relationship follows a certain pattern: high-performing countries record high revenues from corporate, income and property taxes, while levying rather modest social security contributions. It seems likely, however, that the amount of revenues from individual tax categories is the consequence rather than the cause of buoyant growth.

In countries with a low income level like Poland or weak per capita GDP growth like Japan, the share of social security contributions in total tax

revenues is fairly large or consumption tax revenues are an important source of income (Turkey and Poland). The low revenues from income and corporate taxes in Poland and Turkey are not only attributable to a low wage level and low corporate profits, but also to very low tax rates and – to a certain extent – the significance of the informal sector.

A thorough analysis of the structures within the individual tax categories seems to be key to a clearer picture of the relation between taxes and growth in Austria.

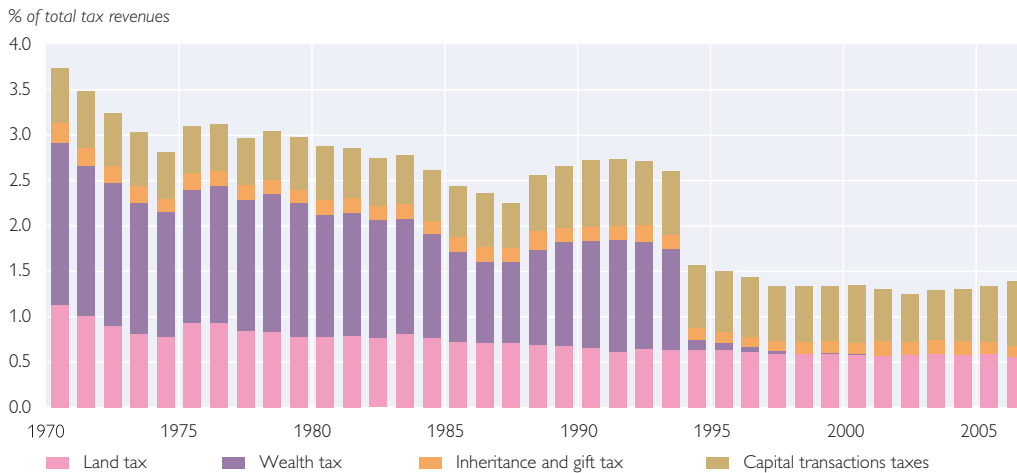
2.2 Property Taxes

The OECD (2008) identifies property taxes as the tax category with the smallest negative impact on growth. This is due to a tax base which is comparatively stable and not directly linked to the production factors labor, capital and human capital. Since there is a close relation between income levels and financial wealth, for which there is also evidence in Austria (Beer et al., 2006; Fessler et al., 2008), taxes on property contribute to equity through desired redistribution effects. Why is it that Austria only collects 1.3% of its total tax revenues from property taxes (OECD: 5.5%, EU-15: 5.3%), bringing up the rear (together with the Czech Republic) among OECD countries?

The most important property taxes in Austria are land taxes, inheritance and gift taxes and capital transactions taxes. Until its abolition in 1994, wealth taxes used to be the most important source of revenue in this tax category (chart 3). The share of property taxes in total tax revenues has been declining since the 1970s. This trend is attributable not only to very low tax rates, but also to the fact that the tax base has not been adjusted to market values (which concerns, e.g., the assessed value of property, which serves

Chart 3

Property Taxes (1970 to 2006)



as the basis for calculating land tax), generous exemptions (e.g. substantial tax allowances for corporate successions) and, in particular, the gradual repeal of various capital transactions taxes, including the trade capital tax, the securities tax, the tax on stock transactions and, most recently, the abolition of inheritance and gift tax.

In addition, property taxes raise questions of political economy, since they are extremely unpopular among the general public. According to a 2007 poll, 84.2% of Austrians were for and 9.6% against abolishing the inheritance tax; 6.2% did not have an opinion.⁵ These results are quite surprising, given that the majority of Austrians is – if at all – only marginally affected by inheritance taxes. According to the Austrian tax statistics, 65,449 inheritances were recorded in 2006, yielding a total of EUR 103.1 million in tax revenues. In 96.1% of all cases, the amounts bequeathed were below EUR 58.400.

61% of inheritance tax revenues were levied on only 3.9% (or 2,566) of all inheritances.⁶ In other words, inherited wealth and therefore inheritance taxation have an impact on a very small proportion of the Austrian population only.

After the Constitutional Court had ruled that the inheritance and gift tax legislation needed to be amended, parliament repealed this highly unpopular tax altogether in the summer of 2008. This step seems questionable not only because of the EUR 155 million losses (2007) in tax revenues but also for reasons of economic efficiency and in light of the generally very low level of property taxes in Austria. In addition, repealing a tax on inheritances and gifts is in sharp contrast to the findings of traditional and recent economic literature. Atkinson and Stiglitz (1976) describe inheritance and gift taxes as instruments to offset the unequal distribution of wealth between high- and low-income earners. Heer (2000) shows

⁵ Poll by Marketing Data, quoted from http://orf.at/070311-10070/?href=http%3A%2F%2Forf.at%2F070311-10070%2F10071txt_story.html

⁶ Response to a parliamentary inquiry dated November 12, 2007, by Minister of Finance Wilhelm Molterer (http://www.parlament.gv.at/PG/DE/XXIII/AB/AB_01441/imfname_092096.pdf).

that the introduction of an inheritance tax both increases overall welfare and enhances the equal distribution of wealth. Brunner and Pech (2008) conclude that the act of bequeathing or giving something away is made for the joy of giving and should therefore see a tax treatment like the consumption of a good. The question of how inheritance and gift taxes impact on growth has already been described in the summary of the OECD study above.

Another aspect limiting the room for maneuver in designing property taxes is the fact that revenues in this tax category (in particular from land taxes) are a major source of funding for local authorities. While the federal government can set a uniform tax base for the land tax, it is up to the local communities to vary tax parameters within a certain range. Unless these powers are reorganized, there will be no uniform taxation of land at the federal level in Austria. Moreover, with land taxes being so unpopular, proposals to adjust the tax base of land taxes to market values are likely to meet considerable opposition.

Despite the difficulties that may be encountered, the economic reasons described above advocate a shift towards property taxes in the Austrian tax mix. Apart from adjusting existing taxes, policymakers could learn from other countries' experience, for instance with the taxation of owner-occupied housing through imputed rents, the capital gains taxation, etc. Allowances can help avoid hardships and potential liquidity shortages.

2.3 Consumption Taxes

According to the optimal taxation theory, differentiated consumption tax rates for various categories of goods (to support consumers with low incomes and to promote the consumption of goods and services complementary to labor) can be beneficial to the tax-growth relation. Some EU countries apply reduced tax rates on labor-intensive services in the low-skill segment (i.e. locally supplied services, for instance in hotels and restaurants). This is a way to prevent the workforce providing these services from drifting into the shadow economy and to increase the demand, and hence wages, for low-skilled workers. The empirical results of a study by the European Commission and Copenhagen Economics (2007) however show that reducing VAT rates for labor intensive services did not achieve the desired effects in some EU countries.

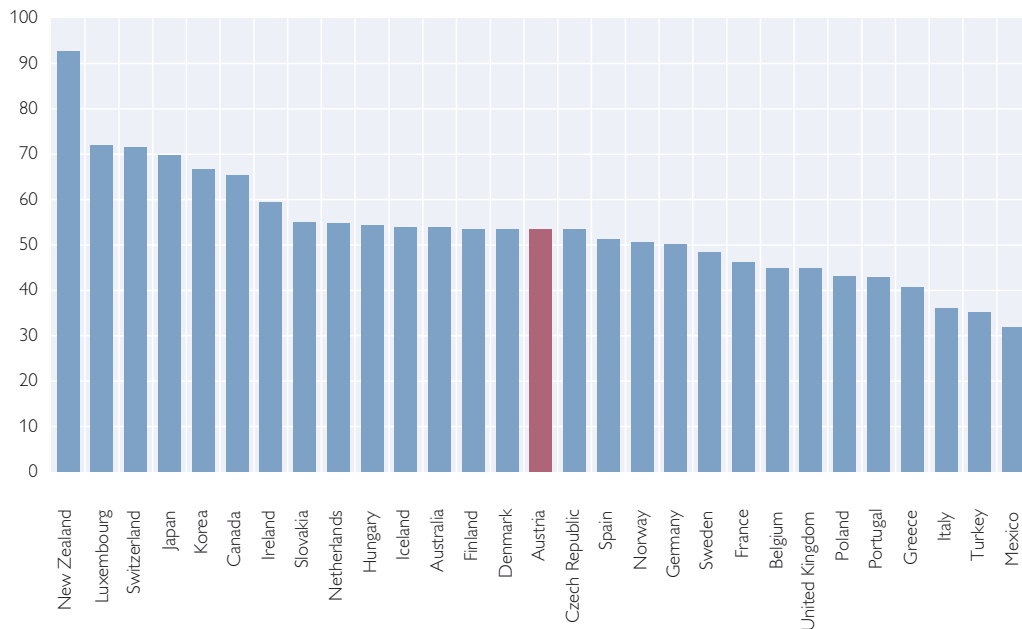
Austria applies a standard VAT rate of 20% as well as reduced rates of 10% (on food, passenger transport and services provided by hotels, restaurants and artists) and 12% (on the supply of wine of the winemaker's own production). The – very long – list of goods and services exempt from VAT is incorporated in Article 6 of the Turnover Tax Act (and includes exports, cross-border transport and public services like education, hospital services or postal services).

One measure of the quantitative significance of VAT exemptions and reduced tax rates is the C-efficiency⁷ (chart 4). The higher the C-efficiency

⁷ The C-efficiency is the result of contrasting effective tax rates (actual revenues from turnover tax/consumption)

$$\text{with statutory tax rates } C\text{-efficiency} = \left[\frac{\left(\frac{rev_{VAT}}{C} \right) 100}{t_{VAT}} \right] 100$$

Chart 4

C-Efficiency of VAT (2005)

Source: OECD.

of a VAT system, the smaller the number of loopholes and the smaller the importance and number of reduced tax rates. According to this calculation, Austria collects only 53% of potential revenues from VAT, ranking in the middle range among OECD countries. New Zealand achieves a C-efficiency of 92.7%; the tax system in New Zealand offers almost no exemptions and yields a higher share (33%) of total tax revenues from the Goods and Services Tax (GST) than Austria (28%), although at 12.5%, the statutory GST tax rate is markedly lower than the average VAT rate in the OECD.

The European Commission and Copenhagen Economics (2007) conclude that uniform tax rates on consumption are preferable to different rates because of lower administration costs and the ambiguous effects that may be generated by excessively differentiated tax rates. Other instruments (transfer pay-

ments, direct taxes, direct subsidies) are usually more effective than reduced VAT rates in achieving welfare objectives. Moreover, reduced tax rates need to be financed, an aspect warranting due attention in the tax incidence analysis.

2.4 Personal Income Taxes and Social Security Contributions

Taxes based on labor, such as personal income taxes or social security contributions (and other payroll taxes) impact on growth by affecting the supply of and the demand for labor as well as the level and growth of productivity. Handler et al. (2005) provide a comprehensive overview of the literature, which confirms the channels identified by the OECD (2008) through which income taxes impact on economic growth: Highly progressive income tax systems, i.e. systems in which the average tax rate rises markedly together

with taxable income, can provide disincentives and dampen labor supply. Excessively high marginal tax rates reduce the amount of hours worked, very high average tax rates discourage labor market participation and moreover involve the danger of labor drifting into unemployment or the informal sector. The groups most affected are low-skilled workers, young as well as older people and second income earners (usually women), whose labor supply elasticity is high with respect to income taxes. While it is usually employees who bear the burden of higher income taxes through lower net wages, higher wage demands may be accepted in times of low unemployment, which in turn can reduce the demand for labor.

One channel through which tax systems affect an economy's productivity level and growth is the impact on incentives to build up human capital. The prospect of higher income after obtaining a diploma is the main reason for people to invest in education.⁸ According to Boarini and Strauss (2007), an additional year of tertiary education can be expected to yield on average an additional 8% in income. High income taxes, however, reduce these income prospects and therefore discourage investment in education. At the same time, a high tax level lowers the opportunity costs of such investment, that is, the forgone net income reduced by high taxes. The former effect seems to be more important than the latter, therefore it can be concluded that high income taxes are negatively correlated with investment in education.⁹

Entrepreneurship is another channel through which income taxes affect

productivity. Corporate taxation (which will be discussed in section 2.5) plays the biggest role in this context, but income taxes also exert a certain influence. The higher income tax progressivity, the smaller the incentive for entrepreneurs to invest in riskier projects.¹⁰ At the same time, a particularly high degree of progressivity can generate incentives to switch from employment to entrepreneurship, either by founding an enterprise liable for corporate income tax or by registering as self-employed liable for income tax with a broader range of tax credits and deductions.¹¹

The question of whether the complete absence of progressivity in income taxation would generate employment and efficiency gains is answered best by taking a closer look at flat rate taxes. Fuest et al. (2007) used a simulation based on microdata to assess the distribution, efficiency and employment effects generated by the introduction of a flat tax in Germany. The results show that inequality would increase to a lesser extent, the higher the chosen level of the tax allowance and the higher marginal tax rates. High marginal tax rates would lead to negative employment effects, however. If the tax allowance and marginal tax rate levels were low, there would be employment gains, but almost exclusively in the upper two income deciles. The authors underline that these results have wider applicability beyond Germany.

The progressivity of the Austrian tax systems has to be analyzed in several steps: there are four income tax brackets with marginal tax rates of 0% (for income up to EUR 10,000), 38.333%

⁸ See Zagler and Dürnecker (2003).

⁹ See Heckman (1976).

¹⁰ See Gentry and Hubbard (2002).

¹¹ See Long (1982) and Blau (1987).

(EUR 10,000 to EUR 25,000), 43.596% (EUR 25,000 to EUR 51,000) and 50% (above EUR 51,000), respectively. What is unique by international standards is the favorable tax treatment of “other earnings” as described in Article 67 of the Income Tax Law (the so-called 13th and 14th monthly wages/salaries and rewards). Since earners of all income classes are treated equally as regards the taxation of the 13th and 14th salaries, high-income earners save more in taxes; calculated over a period of 14 months, income tax progressivity decreases. An employee in a senior position with an annual gross income of EUR 81,500 saves EUR 4,000 in taxes due to the low rate applied to the 13th and 14th salaries. A low-wage earner, on the other hand, with an annual pay of EUR 13,000 before taxes does not benefit from this tax advantage at all. Put differently, thanks to the favorable treatment of the 13th and 14th salaries, the effective marginal tax rate in the first tax bracket decreases by only 4.59

percentage points, while the same rate in the highest income bracket decreases by 6.29 percentage points.

Social security contributions account for the largest share (34%) of total tax revenues, with employers contributing 16%, employees 14% and self-employed the remaining 4%. This share started to increase gradually after 1970 and reached a peak (36%) in 1995; since then, the proportion of social security contribution in total tax revenues has been declining slowly.

The uniform (income-independent) employees’ contribution rate of 18.07% combined with a maximum contribution limit at a monthly gross income of EUR 3,930 make the curve of the income tax ratio which includes social security contributions visibly flatter than the curve of the income tax ratio excluding social security contributions (chart 5). These curves illustrate that the Austrian social security contribution system is indirectly regressive.

Chart 5

Income Tax Ratio (Including and Excluding Social Security Contributions)



Source: Statistics Austria, author's calculations.

At this point it should be noted that proposals for changes in the structure and level of social security contributions in Austria must always be made with a view to maintaining revenue neutrality; in other words, reducing social security contributions must go hand in hand with tapping other sources of funding. European countries like Denmark, Iceland, Ireland or Switzerland use taxes to fund a large part of their welfare systems. New Zealand and Australia do not levy social security contributions at all; their welfare systems are fully tax-funded. In Austria, structural improvements, such as eliminating the earnings cap or introducing a progressive contributions scheme, could help to offset these regressive

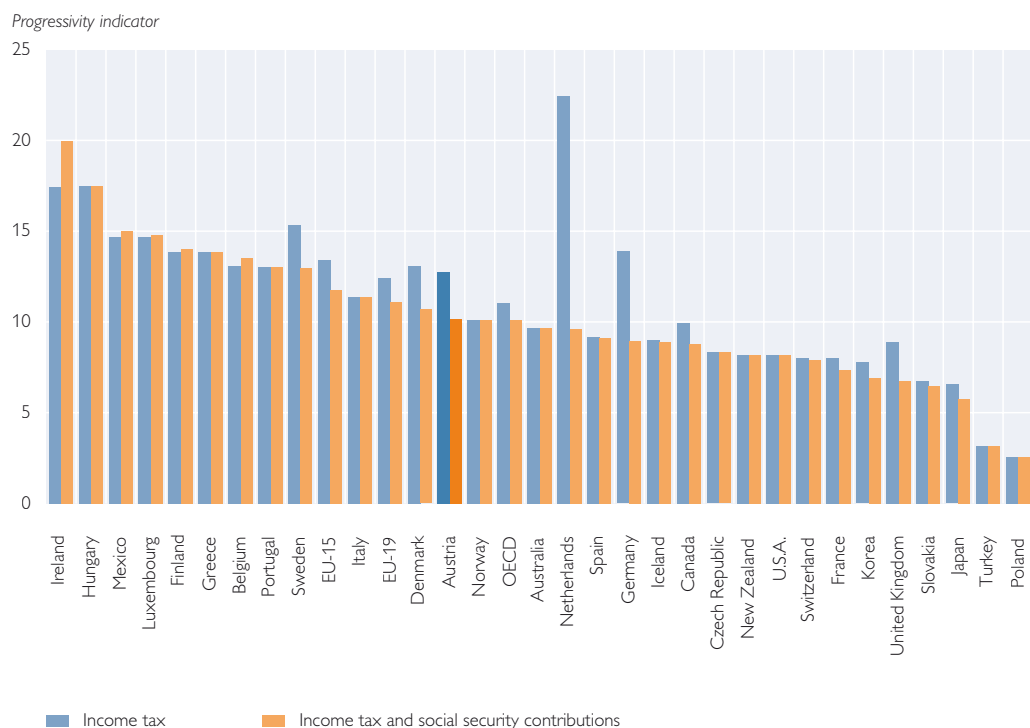
impacts – even without going as far as shifting the funding of the welfare system towards increased tax funding.

The degree of income tax progressivity in Austria corresponds to the OECD average. A progressivity indicator can be calculated on the basis of the difference between the respective tax burdens of two single earners without children, one earning 67% of the average income and the other 167%; the higher the indicator, the higher the degree of tax progressivity.¹²

Chart 6 shows that the income tax progressivity indicator in Austria declines when social security contributions are factored in. A larger regressive effect generated by social security contributions than in Austria can be

Chart 6

Progressivity of Income Taxes and Social Security Contributions (2007)



¹² The calculation of these indicators is based on the income and tax figures provided by OECD Taxing Wages 2007.

observed only in the Netherlands and Germany.¹³ The tax burden of average earners is highest in Germany (42.8% of income before taxes), Austria ranks sixth (33.5%) in the OECD.

Inconclusive findings of economic theory on the effect of tax progressivity on labor supply and demand as well as the empirical data depicted in chart 6 show that the progressivity of income taxes is not a major obstacle to economic growth in Austria. Rather, the high level of social security contributions is a substantial burden on labor that adversely affects potential output growth.

2.5 Corporate Taxes

Corporate taxes impact on growth by reducing the return on capital accumulation, which represents a key factor in the production function. As taxes weigh on corporate profits, pre-tax returns must be higher in order to make investments profitable. Increasing cost of capital prompts a shift in relative factor costs (making labor comparatively cheaper); therefore, owing to the substitution effect, raising taxes on capital can boost employment in the short term and (by fueling labor demand and wages) provide an additional incentive for investment in education.¹⁴ Slower growth due to low investment and a diminishing capital stock, however, can suspend this employment effect in the medium term.

Owing to increasing capital mobility, international tax competition has become an issue in corporate tax policies.

Statutory corporate tax rates in the EU-27 were cut by 10.6 percentage points on average between 1995 and 2008.

The European Commission (2008) calculates implicit corporate tax rates on the basis of actual revenues from this tax and a potential tax base.¹⁵ Implicit tax rates reflect enterprises' actual tax burden by international standards more accurately than statutory tax rates, since first, the way the tax base is defined varies from country to country and, second, numerous exemptions and deductions distort the picture. The implicit rate of corporate taxation in Austria is 21.6%, which puts Austria among the lower middle range of a ranking of EU countries (chart 7).

Delivering substantial tax relief for enterprises, the tax reform package that took effect in 2005 included not only the reduction of the corporate tax rate from 34% to 25% but also the introduction of group taxation. The latter enables groups of corporations to offset losses incurred by an individual corporation within the group against the profits of other corporations of the same group. Since the extension of a group beyond Austrian borders is allowed by the new tax legislation, losses incurred by a group affiliate abroad can also be offset against the overall group's profits; this arrangement is extremely generous by international standards.

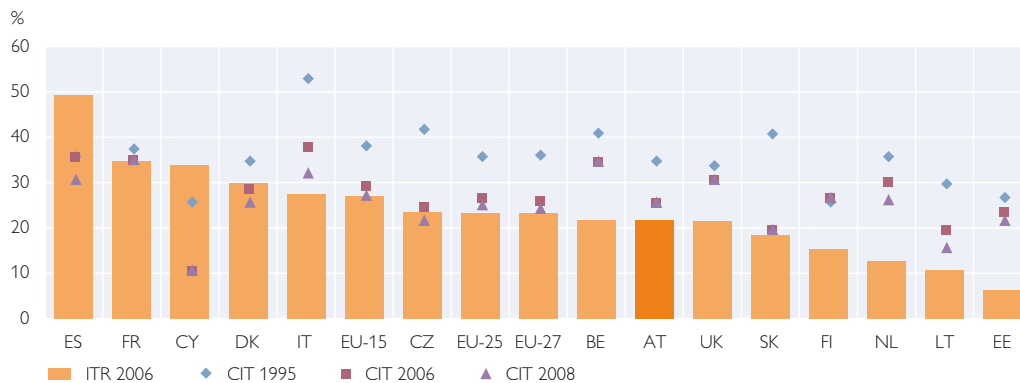
First empirical evidence shows that these tax incentives have resulted neither in higher growth rates of gross

¹³ In the Netherlands this effect is due to a maximum contribution limit at a gross income of EUR 30,015 (covering the first two income tax brackets); no contributions are levied for the parts of incomes beyond this threshold. In addition, a part of social security contributions are paid as fixed amounts per person. In Germany there are different maximum contribution limits in place for different parts of social insurance, ranging from gross incomes of EUR 42,750 EUR (health insurance) to EUR 63,000 (unemployment insurance).

¹⁴ This applies solely to industries where the complementarity between labor and capital is not too strong and substitutability is given.

¹⁵ Including only those EU countries for which data were available.

Implicit and Statutory Corporate Income Tax Rates (ITR and CIT)



Source: European Commission.

investment nor in a reduction in corporate tax revenues since the reform took effect in 2005.¹⁶ This suggests that the corporate tax rate in Austria is an important but not a critical factor in investment decisions. Instead, investment and corporate tax revenues seem to be the result rather than the cause of the international and national business cycle and aggregate demand.

The Austrian tax system promotes corporate innovation by offering a set of instruments (also for small companies liable for personal income taxes only), including a tax credit and a subsidy for R&D as well as (since 2005) subsidies for contract research, which is of particular importance to small and medium-sized enterprises. Although these measures can stimulate Austrian enterprises' productivity, the results of OECD (2008) show that the effects of R&D tax incentives on productivity and growth are quantitatively rather low.

The low level of corporate taxation in Austria, both in terms of its share in total revenues and by international standards (in terms of implicit tax rates), the SME-dominated structure of the Austrian economy and the fact that the majority of Austrian enterprises do not operate at the technological frontier¹⁷ show that further corporate tax relief would not provide additional momentum to economic growth in the short term.

3 Conclusion

The purpose of this study is to identify the channels through which taxes impact on economic growth and to find out, against this background, to what extent the Austrian tax system is conducive to growth. The results of an OECD (2008) study on the relationship between taxes and growth in 21 countries and the analysis of the individual categories in the Austrian tax

¹⁶ Gross fixed capital formation advanced by 1.8% on average in 2004 and by 1.5% after the implementation of the tax reform in 2005. One major factor in this development is the rise in corporate financing costs recorded since 2005. Corporate tax revenues inched up somewhat after the tax reform took effect in 2005 (by a monthly average of EUR 419 million between January 2005 and June 2008 vs. a monthly average of EUR 371 million between January 2002 and December 2004).

¹⁷ According to the OECD (2008), empirical firm-level results show that especially young and small enterprises are hardly affected by corporate taxes. Corporate taxes are a heavier burden for businesses in an intense technological catching-up or development process rather than for businesses with medium or low productivity and technology levels.

system show that the domestic tax mix could be improved to enhance the growth potential in Austria.

The growing reluctance in Austria to tax sources other than labor and capital should be abandoned. A shift in the tax base towards property taxes seems desirable. Against this background, the OECD recommends in its 2007 Economic Survey on Austria that the repeal of the inheritance and gift tax be reconsidered.

The high tax burden on labor hampers potential output growth. The high level of social security contributions and payroll taxes keeps nonwage labor costs high, weighing heavily on the Austrian economy. The progressivity of personal income taxes, which is rather low by international standards, has not been found to be a major impediment to the economic potential in Austria – neither does it substantially contribute to the objective of social equity.

The 2004/2005 tax reform has delivered substantial tax relief for the corporate sector. According to the

OECD's ranking of taxes on the basis of their impact on growth, these measures represent a step in the right direction. However, by international standards, Austria's revenues from the taxation of corporate profits are significantly lower than those of the countries with the highest GDP per capita levels.

Awareness of the tax/growth relation is analytically important. However, it does not provide a sufficient basis to establish a final set of recommendations on how to reform a tax system. The design of a tax system must take into account not only the impact of taxes on growth but also other objectives such as the required amount of fiscal revenues, income distribution effects or fiscal incentives. The question of how much weight should be attached to each of these objectives is a matter of political judgment. In this respect, the findings on the growth effects generated by individual tax categories can provide a valuable analytical input to this process of political judgment.

References

- Altig, D., A. J. Auerbach, L. J. Kotlikoff, K. A. Smetters and J. Walliser. 2001.** Simulating Fundamental Tax Reforms in the United States. In: *The American Economic Review* 91(3). 574–595.
- Atkinson, A. B. and J. Stiglitz. 1976.** The Design of Tax Structure: Direct versus Indirect Taxation. In: *Journal of Public Economics* 6. 55–75.
- Beer, C., P. Mooslechner, M. Schürz and K. Wagner. 2006.** Austrian Households' Financial Wealth: An Analysis Based on Microeconomic Data. In: *Monetary Policy & the Economy Q2/06*. Vienna: OeNB.
- Blau, D. M. 1987.** A Time-series Analysis of Self-employment in the United States. In: *Journal of Political Economy* 95. 445–467.
- Boarini, R. and H. Strauss. 2007.** The Private Internal Rates of Return to Tertiary Education: New Estimates for 21 OECD Countries. OECD ECO Working Paper 591.
- Brunner, J. K. and S. Pech 2008.** Optimum Taxation of Inheritances. Joh. Kepler University of Linz, Department of Economics, Working Paper 806.
- Cellini, R. 1997.** Implication of Solow's Growth Model in the Presence of a Stochastic Steady-State. In: *Journal of Macroeconomics* 19. 135–153.

- Christiansen, V. 1984.** Which Commodity Taxes Should Supplement the Income Tax? In: *Journal of Public Economics* 24. 195–200.
- Corlett, W. and D. Hague. 1953.** Complementarity and the Excess Burden of Taxation. In: *Review of Economic Studies* 21. 21–30.
- Djankov, S., T. Ganser, C. McLiesh, R. Ramalho and A. Shleifer. 2008.** The Effect of Corporate Taxes on Investment and Entrepreneurship. NBER Working Paper 13756.
- European Commission and Copenhagen Economics. 2007.** Study on Reduced VAT Applied to Goods and Services in the Member States of the European Union.
- European Commission and Eurostat. 2008.** Taxation Trends in the European Union. Eurostat Statistical Books.
- Feldstein, M. 2008.** Effects of Taxes on Economic Behaviour. NBER Working Paper 13745.
- Fessler, P., P. Mooslechner and M. Schürz. 2008.** How Inheritances Relate to Wealth Distribution? Theoretical Reasoning and Empirical Evidence on the Basis of LWS Data. Luxembourg Wealth Study Working Paper 6.
- Fuest, C., A. Peichl and T. Schäfer. 2007.** Is a Flat Tax Politically Feasible in a Grown-Up Welfare State? FiFo-CPE Discussion Paper 07-6.
- Gentry, W. M. and R. G. Hubbard. 2002.** The Effect of Progressive Income Taxation on Job Turnover. NBER Working Paper 9226.
- Handler, H., A. Knabe, B. Koebel, M. Schratzenstaller and S. Wehke. 2005.** The Impact of Public Budgets on Overall Productivity Growth. WIFO Working Papers 255.
- Heckman, J. 1976.** A Life-Cycle Model of Earnings, Learning, and Consumption. In: *Journal of Political Economy* 84. 11–44.
- Heer, B. 2000.** Wealth Distribution and Optimal Inheritance Taxation in Life-Cycle Economies with Intergenerational Transfers. Universität München. Department of Economics Discussion Paper 2000-10.
- Lee, Y. and R. H. Gordon. 2005.** Tax Structure and Economic Growth. In: *Journal of Public Economics* 89. 1027–1043.
- Long, J. E. 1982.** The Income Tax and Self-Employment. In: *National Tax Journal* 35. 31–42.
- Lucas, R. E. 1988.** On the Mechanics of Economic Development. In: *Journal of Monetary Economics* 22. 3–42.
- OECD. 2007a.** Taxing Wages.
- OECD. 2007b.** Revenue Statistics.
- OECD. 2008.** Tax and Economic Growth. OECD ECO Working Paper 620.
- Romer, P. M. 1990.** Endogenous Technical Change. In: *Journal of Political Economy* 98(5). Part 2. 71–102.
- Zagler, M. and G. Dürnecker. 2003.** Fiscal Policy and Economic Growth. In: *Journal of Economic Surveys* 17. 397–418.

Annex: Econometric Estimates Used in the OECD Working Paper “Tax and Economic Growth”

The OECD paper starts from a standard production function on the basis of a Solow-Swan model, with output (Y) and the production factors capital (K), human capital (H) and labor (L) as inputs and the level of technological and economic efficiency ($A(t)$). $A(t)$ comprises both the exogenously given technological progress on the one hand and economic efficiency, which is affected by institutions and public policies, on the other hand.¹⁸ The production function takes the Cobb-Douglas form as follows:

$$Y(t) = K(t)^\alpha H(t)^\beta (A(t)L(t))^{1-\alpha-\beta} \quad (1)$$

The approach chosen by the OECD is consistent with both standard growth theory, which assumes technological progress to be purely exogenous, and

$$\begin{aligned} \Delta \ln y_{i,t} = & -\phi_i \left(\ln y_{i,t-1} - \theta_1 \ln s_{i,t}^K - \theta_2 \ln h_{i,t} + \theta_3 n_{i,t} - \sum_{j=4}^m \theta_j \ln V_{i,t}^j - a_{m+1} t_i - \theta_{0,i} \right) + \\ & + b_{1,i} \Delta \ln s_{i,t}^K + b_{2,i} \Delta \ln h_{i,t} + b_{3,i} \Delta n_{i,t} + \sum_{j=4}^m b_{j,i} \Delta \ln V_{i,t}^j + \varepsilon_{i,t} \end{aligned} \quad (2)$$

Assuming constant tax revenues and depicting the different tax categories as proportions of total tax revenues makes it possible to show trade-offs between tax categories by omitting individual tax variables in different rounds of estimations. If consumption taxes are

the assumptions of the endogenous growth theory postulated by Romer (1990) and Lucas (1988). The endogenous growth models either assume rising economies of scale of certain factor combinations or consider technological progress through investment in human capital, research and development, innovation and learning by doing to be an endogenous process. In endogenous growth models, economic policy can influence not only the output level but also long-run growth rates of GDP through the promotion of investment and innovation.

The model estimated by the OECD comprises a convergence component with parameter Φ (first line in equation (2)) and a level component with the short-term variation coefficient (b_s) (second line in equation (2)). The tax variables are included in the equation as vectors.

left out, for instance, the income tax coefficient will show by which amount GDP per capita would increase/decrease in the long term if the tax base were shifted from consumption taxes towards income taxes.

¹⁸ See Cellini (1997).

The estimates for 21 OECD countries¹⁹ for the period from 1971 to 2004 yield the following results:

Table 1

The estimated empirical model is:

$$\Delta \ln y_{it} = -\Phi_i (\ln y_{it-1} - \Theta_1 \ln s_{it}^k - \Theta_2 \ln h_{it} + \Theta_3 n_{it} + \sum \Theta_j \ln V_{it}^j - a_{it}) + b_1 \Delta \ln s_{it}^k + b_2 \Delta \ln h_{it} + b_3 \Delta n_{it} + \sum b_{jt} \Delta \ln V_{it}^j + \varepsilon_{it}$$

Dependent Variable: Log GDP p.c.	(1)	(2)	(3)	(4)
Baseline Model				
Physical Capital	0.18*** (0.05)	0.25*** (0.05)	0.18*** (0.05)	0.16*** (0.05)
Human Capital	1.19*** (0.13)	1.30*** (0.12)	1.18*** (0.13)	1.40*** (0.11)
Population Growth	-0.08*** (0.01)	-0.08*** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)
Control variable				
Overall Tax Burden Total revenues/GDP	-0.27*** (0.05)	-0.24*** (0.05)	-0.26*** (0.05)	-0.22*** (0.04)
Tax structure variables				
Income Taxes	-0.98*** (0.20)			
Personal Income Taxes		-1.13*** (0.19)		
Corporate Income Taxes		-2.01*** (0.32)		
Consumption & Property Taxes			0.93*** (0.20)	
Consumption taxes (excl. property taxes)				0.74*** (0.18)
Property taxes				1.45*** (0.43)
Observations	696	675	696	696
Revenue-neutrality achieved by adjusting	Cons. & Prop. Taxes	Cons. & Prop. Taxes	Income Taxes	Income Taxes

In the estimated model, y refers to output per capita, s_c to the investment rate into physical capital, h to human capital, n to the population growth rate, respectively. The vector V contains a set of policy variables. All equations include short-run dynamics, country-specific intercepts and country-specific time controls. Standard errors are in brackets. *: significant at 10% level; ** at 5% level; *** at 1% level.

¹⁹ AU, AT, BE, CA, CH, DE, DK, ES, FI, FR, UK, GR, IE, IT, JP, NL, NO, NZ, PL, SE, US.

Economic Country Risks Emanating from Austria's International Exposure

Matthias Fuchs¹

Austria's special role as one of the leading investors in Eastern and Southeastern European growth markets increasingly raises questions on the risk capacity of Austria's foreign portfolio. Using selected macroeconomic indicators, this article assesses the economic country risk attached to Austria's external assets. A scoring model facilitates the calculation of individual country risks, which are linked to detailed regional data from the external statistics of the Oesterreichische Nationalbank (OeNB), thus enabling us to draw conclusions on the regional and functional risk structure of Austrian international investment. This reveals that, in capital-weighted terms, the developed and leading financial markets of Europe and the U.S.A. have a far stronger influence on total risk than that of the 12 EU entrants since 2004 (EU-12) or the Eastern and Southeastern European countries. Despite its intensive investment in Eastern Europe, Austria's international risk largely stems from securities holdings in developed industrialized countries. The EU-12 account for no more than a fifth of capital-weighted risk, while the region of Eastern and Southeastern Europe represents just a tenth of total exposure. Nevertheless, some growth markets, such as Hungary, Poland, the Czech Republic or Russia, already have more impact on Austria's total risk than some Western European markets. The projection up to 2009 suggests a leveling off in the total risk presented by Austria's external assets. A generally stable development in the EU-27 is somewhat offset by a more unfavorable risk environment in some European growth markets and in the U.S.A.

JEL classification: F36, G11, G15, G32

Keywords: country risk, financial integration, portfolio choice, international investment position

Given the upsurge in international financial investment over the past two decades, country risk analyses have become an indispensable component of comprehensive risk management. They can be regarded as an important supplement to individual credit quality assessments of potential borrowers. International investors rely heavily on country risk analyses when planning their regional investment strategy. Banks employ them as an aid in structuring their foreign exposure, setting credit terms, and defining regional country lending limits. Financial investors either base their investment decisions on internal rating models or fall back on the services of commercial rating agencies.

Notably for major banks, internal rating models have become far more important in recent years, mainly reflecting the implementation of the new Basel Capital Accord (Basel II), because the now mandatory rating of the borrower with the help of internal models offers greater flexibility than the standardized approach, and hence competitive advantages.²

However, the credit ratings by established commercial agencies – particularly Standard & Poor's, Moody's and Fitch – have been playing a crucial signaling role in the international financial markets for a long time and they have been influencing the refinancing conditions for both public and private bor-

¹ *matthias.fuchs@oebn.at. The author thanks Eva-Maria Nesvadba, Michael Pfeiffer and Patricia Walter for their valuable suggestions and Dieter Kreuz for research assistance.*

² *Moreover, notably banks active in the European markets, which are dominated by small and medium enterprises, have no choice other than to apply internal ratings since external ratings focus mainly on large corporations (Daldrup, 2006).*

Refereed by:
Gerhard Fink,
Vienna University
of Economics
and Business
Administration

rowers considerably. Although rating agencies have come in for criticism in the wake of the recent subprime crisis – for which they were deemed partly responsible – the persistent increase in the information asymmetries between borrowers and lenders consequent on globalization will continue to form a key commercial justification for these institutions in the future. Independent ratings will remain highly important as an instrument for reducing uncertainties in lender/borrower relations (Büschgen and Everling, 2007).

In contrast to the issuer ratings assigned by the large agencies, this study does not relate the term country risk to the sovereign power, but to a country's overall macroeconomic situation. It seeks to assess the economic risks of those countries and regions that bear relevance as targets for Austrian financial investment, looking especially at the Eastern and Southeastern European growth regions. The analysis is confined exclusively to economic risks. Political, legal or institutional aspects of country risks, which are also meaningful in the context of a comprehensive country risk analysis, have been deliberately left out of consideration.

The key assumption of this study is a significant connection between the macroeconomic situation of the borrower's country of residence and the probability of default on the corresponding financial claim. Crisis symptoms in the real economy, such as recessions or rapid currency depreciations, hence generally reduce the likelihood of repayment, no matter which economic sector is liable or what

type of financial instrument is involved. The object of analysis is thus the general economic environment as the key determinant for the repayment capacity and willingness of foreign debtors.³ It goes without saying that analyses from this macroeconomic perspective do not compete in any way with individual risk assessments of borrowers, but rather form a supplement to them.

Section 1 explains the model and the risk factors, while section 2 elucidates the model results. Conclusions are presented in section 3.

1 Theoretical Explanations

1.1 Scoring Methods in Country Risk Analysis

Scoring models are among the most popular tools in the field of country risk analysis (Krämer-Eis, 1998; Lichtlen, 1997). They are based on selected criteria that appear suitable for systematically explaining an economy's risk situation. These factors are weighted and compressed to a synthetic risk measure, the rating. Like other rating procedures, e.g. discriminant analysis or regression models, scoring methods must meet some basic requirements as summarized in table 1.

Table 1

Requirements for Rating Systems

Target measure PD (Probability of Default) can be depicted
Completeness of all information relevant to credit assessment
Objectivity
Acceptance by the user
Consistency with recognized theories and methods

Source: OeNB (2004).

³ *Repayment willingness is lacking if borrowers no longer meet their repayment obligations although they would be financially able to do so. Since such conduct would seriously impair their reputation in the capital markets, rational borrowers would only choose this strategy if the cost of losing their reputation is outweighed by that of the repayment. Related to the payment conduct of sovereign states, such a situation is only conceivable in actual crisis scenarios. Repayment capacity and repayment willingness are therefore generally closely related (Blüml and Neus, 2002).*

A key advantage of the scoring method is the high degree of transparency that allows us to readily reconstruct the scores and draw intertemporal comparisons. Scoring models have hence become widely popular. They are applied in pure form or in combination with other rating procedures in numerous country risk analyses – including those by the Economist Intelligence Unit (EIU) of Euromoney or by BERI (Business Environment Risk Intelligence) in the form of the Foreland Index (Maltritz, 2006).

Scoring methods are not undisputed, however. The subjective selection and weighting of the influencing factors are particularly subject to criticism. In reality, even when every effort is made to ensure objectivity within the scoring method, subjective influences cannot be totally ruled out. However, since other methods of analysis unavoidably rely on assumptions too, the criticism of a lack of neutrality should be seen in perspective. Even econometric methods are affected by the subjective specifications of the model design.

1.2 Selection and Weighting of Risk Factors

The scoring applied in this study comprises six risk factors in the domestic

economy and three in the external sector, weighted as shown in table 2. These established factors for assessing the macroeconomic situation in a given economy are found in many methods of country risk analysis. This selection is underpinned by empirical studies which demonstrate a high correlation between some indicators⁴ and the credit rating by both Standard & Poor's and Moody's (Will, 2001).

The factors listed in table 2 are appraised within a set interval and are entered in the model in accordance with their specific fixed weighting. This results in a risk coefficient that permits comparisons across different countries or regions.

$$K = DI(Ek_{DI}, Fk_{DI}) + PI(Ek_{PI}, Fk_{PI}) + SI(L, D) \quad (1)$$

K = Austria's total external financial assets

DI = Direct investment assets,

Ek_{DI} = Direct investment equity,

Fk_{DI} = Corporate loans

PI = Portfolio investment,

Ek_{PI} = Stocks and mutual fund shares,

Fk_{PI} = Debt securities

SI = Other investment,

L = Credit claims,

D = Currency and deposits

Table 2

Scoring Model Factors

Domestic Economy	%	External Sector	%
Income per capita at PPP ¹	20	Current account in % of GDP	10
Real GDP growth	10	Net external liabilities in % of GDP	10
Consumer prices	10	International liquidity	
Budget deficit	10	(Currency reserves in % of imports)	10
Government debt	10		
Unemployment rate	10		
Total	70	Total	30

Source: Author's model assumptions.

¹ Per capita income at purchasing power parity (PPP).

⁴ GDP per capita, government debt ratio, rate of inflation. In contrast, no clear link could be found for either real growth or the fiscal balance.

$$R_{global} = \sum_{j=1}^N R_i \quad R_{global}, R_i = \{0..1\} \quad (2)$$

R_{global} = Global risk coefficient on country $j=1 \dots N$, R_i = Risk situation in the investment region i

$$R_{global} = \sum_{j=1}^N \sum_{i=1}^n (F_i \cdot g_i) \cdot \frac{k_j}{K} \quad \sum_i g_i = 1 \quad (3)$$

F_i = Risk factor i , g_i = Weighting of factor i , k_j = Austrian financial assets in country j

$$R_{global(DI)} = \sum_{j=1}^N \sum_{i=1}^n (F_i \cdot g_i) \cdot \frac{DI_j}{DI} \quad (4)$$

$R_{global(DI)}$ = Global risk coefficient from direct investment

DI_j = Claims from direct investment in the region j

The capital weighting is performed with the aid of detailed regional data from the OeNB's external statistics. In this context, the term financial assets covers direct investment assets, portfolio investment (securities) and other investment, essentially loans and deposits, (equation 1) in line with the standards laid down in the Balance of Payments Manual, 5th edition (IMF, 1993). The total global risk is made up of the risks of nine different investment regions⁵ (equation 2). Likewise, the global risk can be presented as the sum of the capital-weighted risks of those countries to which the relevant regions belong and which are destinations for significant Austrian financial assets⁶ (equation 3). Moreover, this information structure enables us to assess the risk of individual investment instruments (equation 4).

The key challenge in the application of scoring models lies in selecting the

exogenous variables as well as in fixing the weightings. We require plausible, justifiable assumptions, which convey as true a picture as possible of the functional relations between the determinants and the macroeconomic risk environment. The risk coefficients have no explanatory power in absolute terms, but should only be interpreted within a cross-country or time series comparison. Used within the model, however, they allow us to make a quantitative assessment of the relative risks of individual investment regions or target countries.

Another requirement in selecting the criteria is that the overlap between two or more risk factors should be kept to a minimum. Indicators that supplement each other with marginal added information result in amplification effects and thus lead inadvertently to an overweighting.

1.3 Theoretical Foundations of the Risk Factors

In this study, the macroeconomic risk situation is reflected by nine measures. Each appraisal function ranges from a best case scenario (minimum risk of default) to a worst case scenario (maximum risk). We use linear relations for all factors but one (GDP per capita at PPP)⁷.

Where values fall outside of these intervals, the functional value is equivalent to the nearest limit. A government debt of 140% of GDP is therefore not deemed to present a higher risk than one of 120%, since the latter is already equated with the highest risk of default. The objective in fixing the interval limits was to fully cover the em-

⁵ Western Europe, specifically the euro area, U.S.A., the 12 countries which entered the EU since 2004, Eastern and Southeastern Europe, Asia, Latin America, Africa, offshore areas, other countries. See also table 9 in the annex.

⁶ We examined 67 countries, representing coverage of more than 90% of total capital.

⁷ GDP per capita at purchasing power parity (PPP).

Table 3

Assessment Intervals in the Model

Risk factor	Minimum risk	Maximum risk	Unit
GDP per capita at PPP	30.000	5.000	EUR
Real GDP growth	8	0	% p.a.
Inflation/deflation	0	15/-2	% p.a.
Budget deficit	0	10	% of GDP
Government debt	0	120	% of GDP
Unemployment rate	0	15	% p.a.
Current account deficit	0	10	% of GDP
Net external liabilities	0	120	% of GDP
International liquidity	25	0	Currency reserves in % of imports

Source: Author's model assumptions.

pirically observed data range. Provided this requirement is met, the actual limits that are fixed are of secondary importance for the assessment results: An expansion/contraction of the interval would have no impact on the result but would simply show up in a consistent shift.

GDP per capita: May be seen as a measure of an economy's level of social and economic development. In the model it should be understood as a level-indicating parameter, which – relative to the other indicators – reflects the degree of prosperity in the medium to long term. Compared to the rate of inflation, real growth or the rate of unemployment, GDP per capita remains significantly more stable over time. In view of globalization, prosperous countries are particularly reliant on investor confidence owing to their comparatively high dependency on financing through the international capital markets. If a highly-developed industrialized country fails to meet its financial obligations, it suffers higher economic costs than countries with weaker economic performance. Economic policies hence tend to be risk averse, geared to avoiding a default on payment at all events. At the same time, the govern-

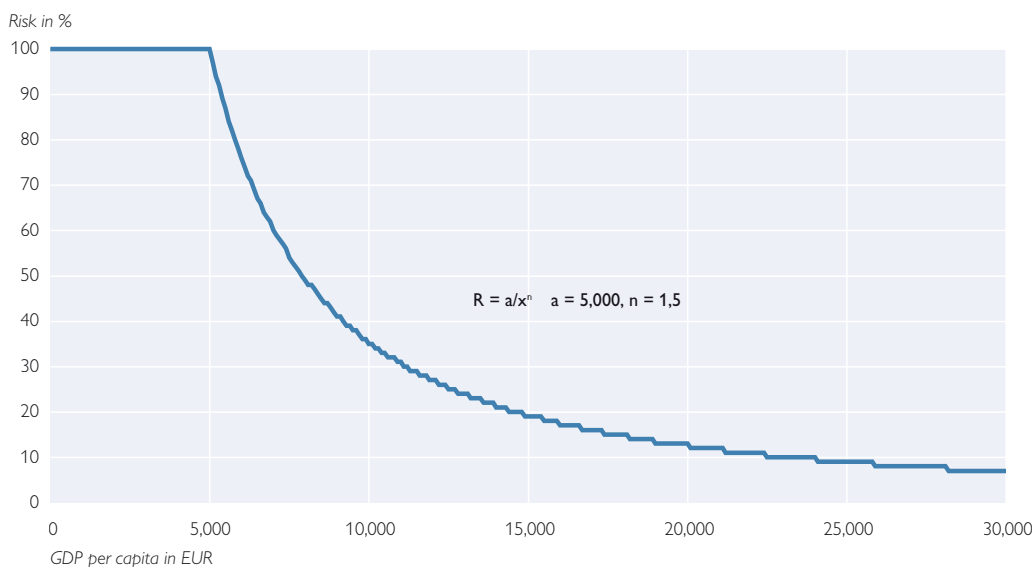
ment in a developed economy has a larger tax base to draw on in the event of an impending liquidity crisis. All in all, the increased significance of these components gives reason to overweight them relative to the remaining factors.

Since, at the edges of the intervals, a linear valuation function overvalues marginal differences in income, we applied an exponential function. High-level differences in income – between around EUR 25,000 and EUR 30,000 – accordingly have clearly less impact on risk than those between EUR 5,000 and EUR 10,000. This function curve also supports the view that marginal capital productivity decreases when GDP increases (Fink, 1993b).

The threshold value for the maximum risk was set at GDP per capita of EUR 5,000. Lower values do not add to the risk. At values exceeding EUR 30,000, this component may be deemed risk-free. In line with economic reality, the income elasticity of risk is comparatively high at around EUR 10,000.

Real economic growth: It is quite evident that only expanding economies are creditworthy, since only they can efficiently deploy the capital and repay it with interest. Rapid growth rates point to prevailing brisk economic ac-

Valuation Function for GDP per Capita



Source: OeNB.

tivity, but do not necessarily imply sustained higher prosperity too, since growth markets actually often experience high population growth.

Rate of inflation: Moderate constant consumer price rises – e.g. in line with the monetary policy target of the ECB of under, but close to 2% p.a. – should be seen as accepted and in no way detrimental to the economy. Given the central function of money as a means of exchange and store of value, the counterproductive effect of higher inflation appears equally indisputable.

The model includes an assessment range of 0% to 15% for inflation, with linear interpolation, implying that a rate of inflation of 15% represents the worst scenario. We can assume that any price rises above that level would have no additional negative impact on the rating. A deflation scenario is also equated with the worst-case scenario. The threshold value of deflation was fixed at –2% p.a. to exclude marginal rates of deflation that fall within statistical tolerance.

Deficit ratio and government debt: A sustainable federal budget is often seen a vital indicator of an economy's creditworthiness. However, the literature disputes the precise definition of sustainability. An established approach is the reasoning that, given a constant deficit ratio and stable economic growth, consolidated gross debt converges to a marginal level. The convergence criteria laid down in the Treaty of Maastricht are based on this relationship (Fink, 1993a).

Unemployment rate: Under-employment undoubtedly generates macroeconomic costs in the form of lost economic performance and higher social welfare expenses. Allowing for a certain level of hard-core unemployment that is generally unavoidable for frictional and structural reasons, the model defines full employment as a jobless rate of 3% at maximum. The highest risk is marked by the threshold level of 15%.

Current account deficit: Sustainable current account deficits signal weak in-

ternational competitiveness, since the import of foreign goods and services cannot be offset by exports. The main risk potential of a current account deficit is that a loss of confidence could trigger a sudden outflow of capital and attendant currency depreciation. The model sets the threshold value for the highest risk level at a deficit of 10% of GDP.

Net external liabilities: The International Investment Position (IIP), which reflects external financial assets minus external financial liabilities, can be regarded as an economy's long-term capital reserve. It is affected by the capital transactions booked in the balance of payments statistics on the one hand, and on the other by the wealth effects from currency rates and securities prices, write-downs and other accounting measures. As the IIP is a far more stable measure than the financial account balance, it can be considered as a longer-term structural indicator. Especially in industrialized countries (with the exception of the U.S.A.), net external liabilities remained virtually stable over the past decade (IMF, 2005). Net external debt should be looked at critically, not just because of the aforementioned loss of confidence among investors, but also in view of adverse wealth effects from the ensuing outflows abroad.⁸ Seen in combination with the current account balance, net external debt therefore gives a good picture of an economy's external financial status.

International Liquidity: The resources readily available to a country for in-

tervention in the event of undesirable movements in its own currency can be gauged from the level of currency reserves. These are often seen in relation to imports to establish the extent of international liquidity. Currency reserves equivalent to the amount spent on imports in three months are deemed a feasible indicator of adequate credit quality (Fink, 1993a). Given the global importance of the euro and the U.S. dollar, the liquidity risk on those currencies was excluded ex ante.

2 Empirical Findings

2.1 Rating Countries and Regions⁹

We can calculate the non-capital-weighted rating of selected investment regions on the basis of individual country assessments. Revised data on the IIP from the OeNB's external statistics are available for the period from 1996 to 2006, while the year 2007 is based on provisional data. A projection for 2008 and 2009 is based on current economic forecasts¹⁰ and assumes the investment structure of 2007.¹¹

2.1.1 Western Europe and the U.S.A. Show By Far the Most Stable Economic Environment

Table 4 presents the credit quality of Austria's main investment regions. The risk coefficient, which can range between 0 and 1, is allocated to five different rating classes. The ranking of the regions matches expectations. Over the period from 2000 to 2006, both Western Europe, including the euro area, and the U.S.A., which share almost the same risk coefficients, show good or

⁸ In exceptional cases, countries with net external liabilities nonetheless earn net investment income, e.g. the U.S.A. See also the discussion on "dark matter" (e.g. Higgins et al., 2006).

⁹ The demarcation of the investment regions can be found in table 9 in the annex.

¹⁰ Eurostat, European Commission (Spring 2008), OECD, national forecasting institutions.

¹¹ The structure of the financial assets changes slowly over time, even though the U.S. real estate crisis is likely to have prompted certain portfolio shifts in 2008 and 2009.

Table 4

Rating Results for Individual Regions

Regions	Risk coefficient	Credit quality
	Average 2000 to 2006	
Western Europe	23%	1
Euro area	24%	1
U.S.A.	27%	2
Offshore areas ¹	27%	2
Asia	31%	3
EU-12	36%	3
Eastern and Southeastern Europe	39%	3
Latin America	42%	4
Africa	42%	4
Total risk, capital-weighted	27%	2

Source: Model results.

Note: Rating intervals: <26 = 1, 26–30 = 2, 31–40 = 3, 41–50 = 4, >50 = 5

¹ The aggregate "offshore" comprises those financial markets that are located beyond the (fiscal) jurisdiction of their respective country and that are generally subject to considerably lighter regulation. In view of the negligible influence of the local economy on international investment activity in offshore markets, it does not seem expedient to assess the economy of offshore areas in line with the model. In fact, these financial markets should be assessed on the basis of the economic areas in which offshore financial assets are invested. Their ratings are therefore derived from the arithmetic mean of the U.S.A., Western Europe and Asia, since we can safely assume that most of the funds allocated to offshore markets are invested in these major investment regions.

very good credit quality. With a risk coefficient of 31%, Asia is in the middle range, while the Eastern and Southeastern European countries and the EU entrants since 2004 can be assigned to a significantly higher risk class.

Assessments for Western Europe have generally been positive since the mid-1990s, even though a noticeable increase in risk was seen in 2000 and the following years (chart 2). This risk can mainly be attributed to the marked slowdown in euro area growth as well as a deterioration in labor market conditions, notably in Germany.

The U.S.A.'s risk situation developed very favorably up to the end of the 1990s thanks to brisk growth, moderate consumer prices and a tight fiscal policy. However, the bursting of the New Economy bubble, several accounting scandals at listed companies and the

terrorist attacks of September 11, 2001, precipitated a crisis of confidence in the U.S. economy, causing a plunge in growth (2002: +0.8%, real). Subsequently, wider current account and budget deficits were the main risk-driving factors. Owing to the real estate crisis, the economic forecasts for the U.S.A. for 2008 and 2009 suggest a strong increase in risk, largely because of the poor outlook for economic growth and the widening budget deficit.

The risk situation in Asia is mainly hallmarked by the 1998 crisis. Likewise, the Argentina crisis between 1998 and 2002, and its repercussions for the entire region, clearly marks Latin America's risk evolution.

The risk assessment for Africa is flattered by the model's restriction to countries, mainly in North Africa, which are actually the target of Austrian investment. The assessment would otherwise have been considerably less positive.

2.1.2 Strong Positive Trend in Risk Development of EU-12

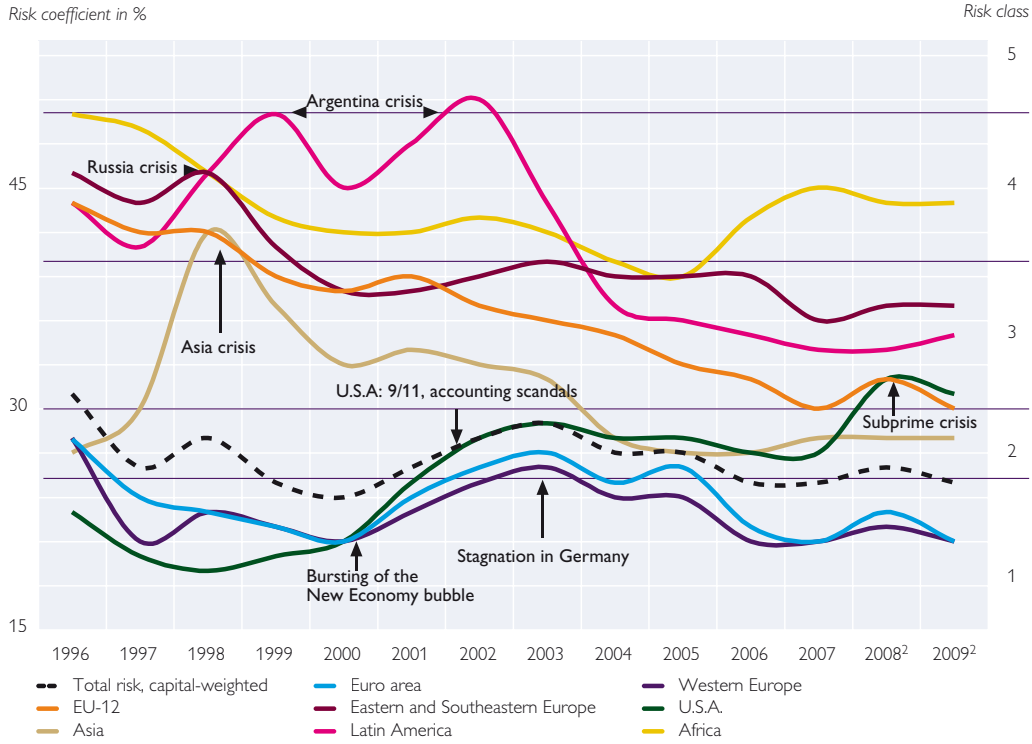
The risk environment of the EU-12 has seen a continued and marked improvement since the mid-1990s (chart 3).

The determining factor was the in some cases dramatic reduction in inflation. In 1996, some of Austria's main target countries were still reporting two-digit rates of inflation, such as Hungary or Poland with 23.5% and 15% respectively. Price developments in the Czech Republic were also unstable at +10%. The situation had markedly improved when these countries joined the EU in 2004 (Romania and Bulgaria: 2007). The risk contribution of per capita income has been slightly declining too. Moreover, the rapid growth since 2001 has had a positive impact. Nonetheless, the labor market

Chart 2

Risk of Selected Investment Regions¹

Non-capital-weighted



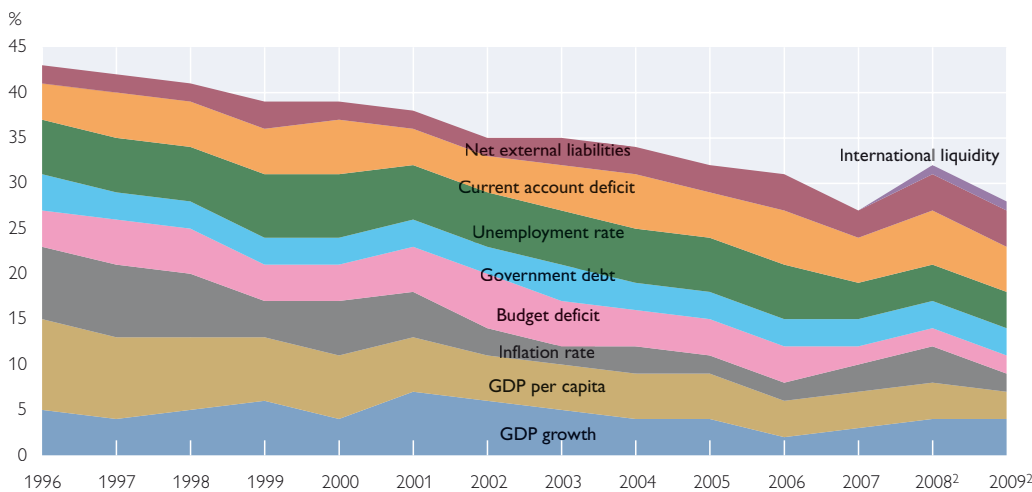
Source: OeNB.

¹ Solely comprises countries in which Austria holds financial assets.

² Projection.

Chart 3

Risk Factors of the EU-12¹



Source: OeNB.

¹ Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

² Projection.

and the large current account deficit represent persistent risk factors. Current forecasts for 2008 suggest that growth and inflation developments will adversely affect the risk environment. All things considered, however, this region has decisively cast off its status as a high-risk investment target, proving that Austrian companies' exposure to it at an early stage was the right decision from the start.

2.2 Austria's Capital-Weighted International Risk Position

2.2.1 Austrian Financial Assets Concentrated in Developed Industrialized Countries

The combination of investment volumes and the risk situation of individual countries illustrates the paramount importance of western industrialized countries as target areas for Austrian investment (chart 4). While most of these countries score positively as expected, the outcome for Greece and Portugal is comparatively poor. Although they belong to the euro area, their ratings over the period from 2000

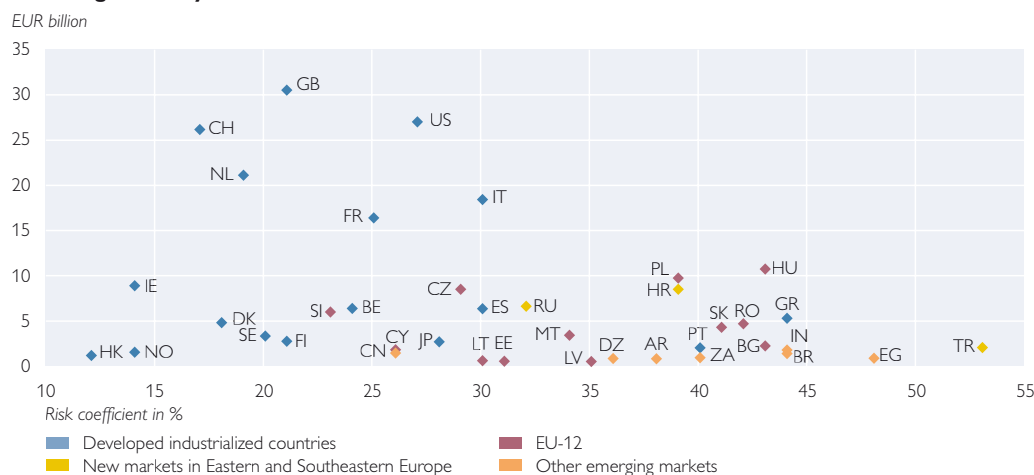
to 2006 are no more than average and, as a result of feeble growth, fiscal deficits and unfavorable current account developments, have not shown any upward tendency in the recent period. In line with expectations, the results for Italy and Spain in the comparison across the euro area are also weak. Germany (risk coefficient: 26%) was by far the most important investment region for Austrian investors at end-2007 (almost EUR 120 billion) but was not included in this chart for the sake of proportionate scaling.

In the EU-12 comparison, Slovenia and Cyprus show a relatively high credit quality, but play a secondary role in terms of investment volumes, whereas Hungary presents a particularly high risk with a coefficient of 43%. Besides low GDP per capita, this reflects a persistently large current account deficit of around 8% of GDP, high net liabilities (2006: 106% of GDP) and a pronounced budget deficit (2006: 9.2% of GDP). Bulgaria (risk coefficient: 43%) and Romania (42%) are also assigned a comparatively weak score. Table 1 in

Chart 4

Risk and Investment Volumes in Individual Target Countries by Stage of Development, 2000–2006

excluding Germany



Source: OeNB.

the annex presents a comprehensive overview of the rating for all investment targets relevant to Austria.

The results of the country scorings may now be linked to the detailed regional OeNB data on Austrian external assets, enabling us to establish how seriously the identified macroeconomic risk in individual countries impacts on aggregate Austrian external financial assets. Table 8 in the annex sets out investment volumes and the functional structure of major Austrian investment regions.

2.2.2 Increasing Exposure to Eastern Europe Has No Major Impact on Austria's Total Risk

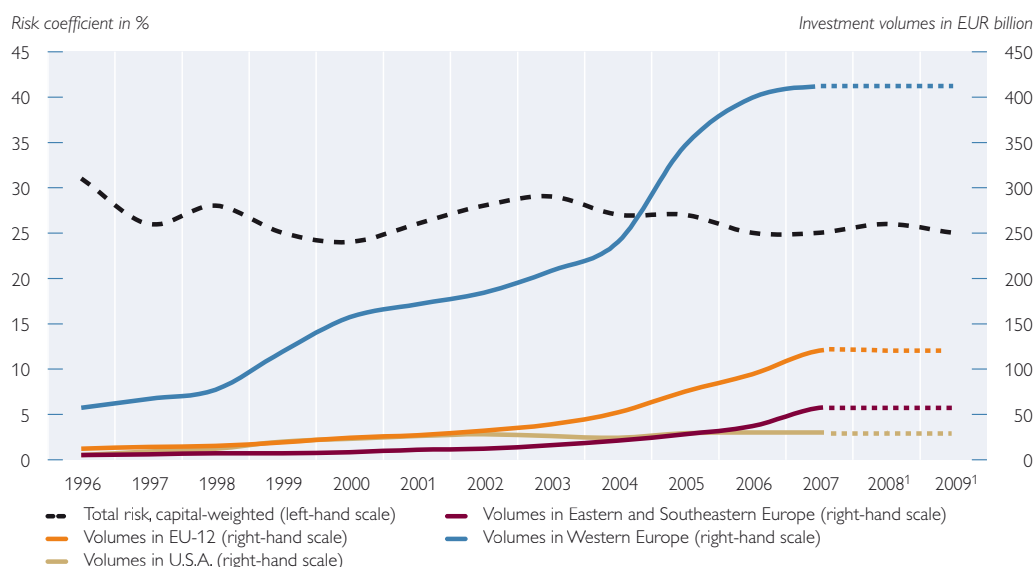
Throughout the entire period under review, from 1996 to 2007, and in the projection up to 2009, Austria's macroeconomic risk remains stable within a corridor from 25% to 30%, equivalent to moderate risk (chart 5). The risk environment displayed a slightly positive trend up to the end of the 1990s, be-

fore a noticeable increase in risk was observed as of 2001, primarily reflecting the economic slowdown in the U.S.A. and in the euro area. Total risk has been gradually easing since 2003, however.

Looked at ex ante, the increasing exposure of Austrian companies to Eastern Europe would suggest a stronger risk expansion, since this region – as shown above – presents markedly higher macroeconomic risks than Western Europe. However, the impressive dynamic development of Austrian external financial assets – which at around EUR 700 billion are now five times higher than in 1996 – all in all did not have an adverse impact on international risk. This can be mainly attributed to the strong growth in assets in Western Europe too, which indeed started from a far higher level. In contrast, the Eastern European growth areas – measured on the financial assets invested there – still have too little weight in the total portfolio to make a significant differ-

Chart 5

Total Risk and Financial Assets in Selected Regions



Source: OeNB.

¹ Projection.

ence to total risk. Moreover, the evolution of risks in the EU-12 is consistently positive (chart 2).

The rapid growth in assets in Western Europe results from the marked differences in the investment structure across regions, showing a considerable overhang in securities. The stock market boom since 2003 boosted growth in this segment specifically. In contrast, the lack of well-developed securities markets prompted investors to take holdings in Eastern Europe through loans and direct investment, which could not yield comparable returns.

2.2.3 Western Europe Accounts for Half of Total Exposure, the EU-12 for a Fifth

A breakdown of Austria's capital-weighted total risk by regional contributions reveals a strongly Europe-dominated profile (chart 6).

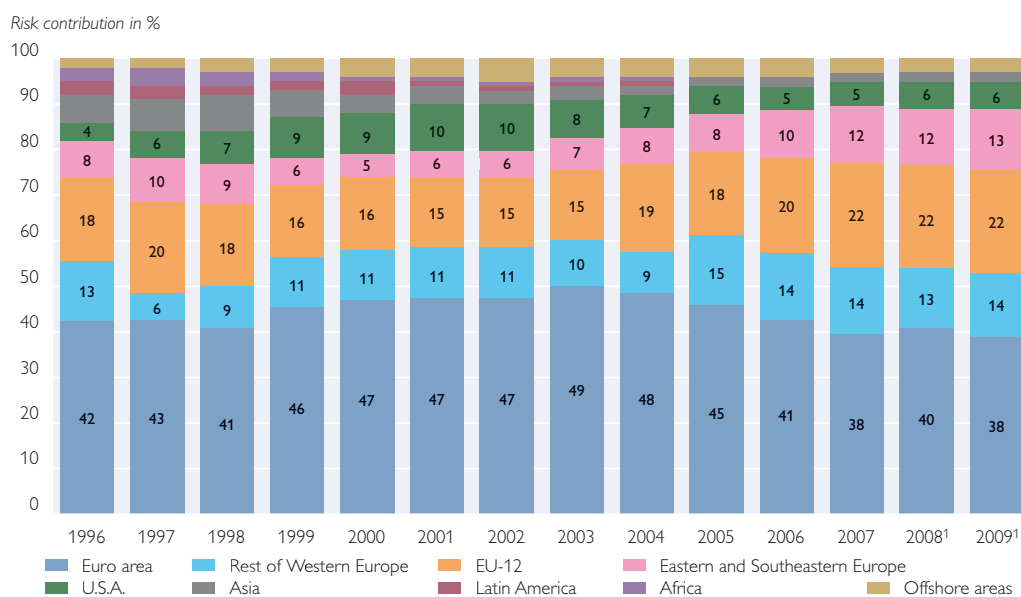
As a result of the large investment volumes, Western European countries

with stable macroeconomic conditions account for more than half of Austria's exposure. The EU-12 contribute around a fifth of the total risk. A similarly large share can be expected for the years 2008 and 2009. As a consequence, the risk contribution from this region has edged up only slightly since the end of the 1990s, implying that Austrian investors' significant exposure to these countries is in no way excessively high risk. The risk contribution of Eastern and Southeastern European countries has also increased since 2002 and, at 13%, will be well ahead of that of the U.S.A. by as soon as 2009. Judging by current forecasts, a difficult external environment and rising inflation are likely to nudge up the risk contribution of Eastern and Southeastern Europe in the years 2008 and 2009.

Aside from during the crisis period 1997 to 1999, Asia has continually represented a risk contribution of less than 5%. Investments in Latin America and

Chart 6

Capital-Weighted Risk Structure by Selected Regions



Source: OeNB.

¹ Projection.

Africa are virtually negligible for Austria's total risk.

2.2.4 Hungary, Poland and Croatia Count among the Ten Major Investment Target Areas

Chart 7 shows a breakdown of total risk by the contribution from individual countries. With a volume of almost EUR 120 billion or just under a fifth of total external claims at end-2007, Germany is still by far the most important investment region. Although Germany obtains a very good rating in the scoring model, the capital-weighted risk in that country is several times higher than in the Eastern and Southeastern economies. The U.S.A., the United Kingdom and Italy also rank well ahead of these growth markets in terms of their risk contribution. An economic crisis in some Western European countries would hence have a considerably more serious impact on Austria than a region-wide slump in Eastern Europe.

Nonetheless, Austria's dependency on certain growth markets, which has increased over the past few years, should not be brushed aside. Besides the EU Member States Poland, Hungary or the Czech Republic, Croatia and Russia are also significant, having a share of more than 4% of total risk. The Baltic states likewise present a higher risk but have next to no impact because of lower investment volumes.

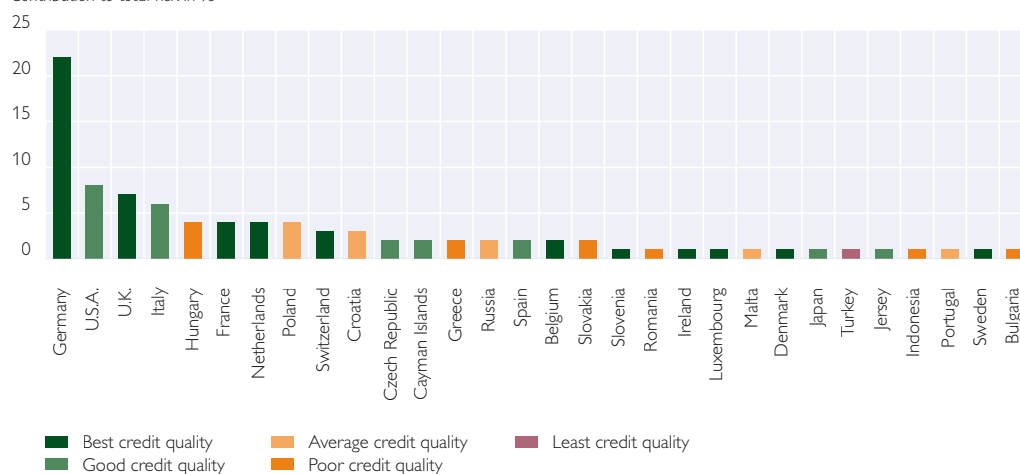
Austria's financial activities in high-risk countries are negligible. Between 2000 and 2006, only one country among the 30 major target countries, namely Turkey¹² was assigned to this rating class. Moreover, the projection to 2009 shows that none of the current Austrian investment targets are likely to be downgraded to this risk class (tables 1 and 2 in the annex). On average over the period from 2007 to 2009, all of the target countries that now seem important for Austria offer stable or favorable risk perspectives. Current pro-

Chart 7

Austria's Capital-Weighted Risk by Target Countries and Rating Classes

Average 2000–2006

Contribution to total risk in %



Source: OeNB.

¹² Turkey's poor rating can be attributed to the economic crisis of the years 2001 to 2003. Turkey regains a higher rating (risk class 4; 41%) over the period from 2007 to 2009.

jections point to substantial advances in notably Slovakia, Poland, Romania and Turkey.

2.2.5 High Credit Concentration in European Growth Markets Signals Higher Risk for Austrian Banks

For the period from 2000 to 2006, the macroeconomic credit risk profile differs markedly from the profile of the total exposure (chart 8). While Germany also heads the field in this subsection, many major debtors belong to the EU-12 or Eastern and Southeastern growth regions: The EU-12 contribute more than a quarter to total credit risk, Eastern and Southeastern Europe account for 16% (table 7 in the annex). All in all, these regions are well ahead of Western Europe (37%).

At around EUR 4 billion, Austrian creditors held somewhat less claims in Croatia between 2000 and 2006 than in the United Kingdom (EUR 6 bil-

lion); however, since macroeconomic conditions in Croatia have been weaker, the risk-adjusted exposure to that country is noticeably higher. Though its liabilities total no more than EUR 3 billion, Russia lies in seventh place on account of its relatively poor ratings. High risk components also emerge in Poland (EUR 4 billion), Hungary (EUR 3 billion), the Czech Republic (EUR 3 billion) and Romania (EUR 1 billion), which together account for a fifth of total credit risk.

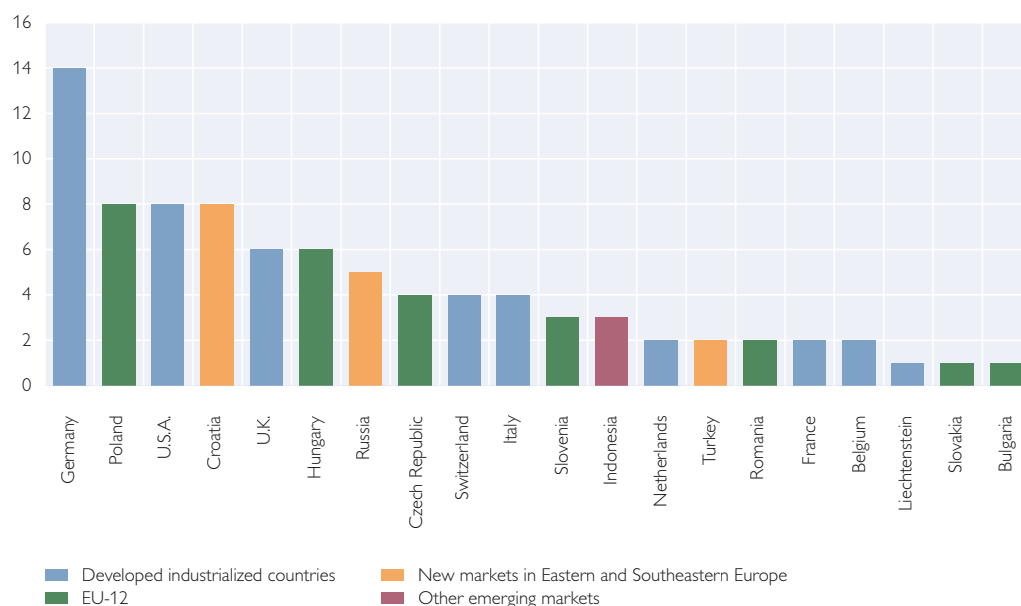
The regional risk concentration in lending illustrates sharply that Austrian lenders – largely banks – bear the brunt of country risk. In contrast to all financial assets, where the total risk is well diversified thanks to a strong weighting for Western Europe, lending by Austrian banks is subject to a degree of concentration risk in the European growth markets. In addition, forecasts

Chart 8

Austria's Capital-Weighted Credit Risk by Target Countries and Stage of Development

Average 2000–2006

Contribution to total risk in %



Source: OeNB.

point to a slight deterioration in the risk outlook up to 2009.

2.2.6 Direct Investment Exposure Mainly to Eastern Europe, Securities Exposure Mainly to Germany and the U.S.A.

The predominance of European growth markets is also apparent in the area of foreign direct investment (chart 9).

Among the top ten target areas are five growth markets – Hungary, the Czech Republic, Poland, Slovakia and Romania – which together represent a third of total risk. This highlights that, besides lending, direct investment is Austria's main financial instrument for opening Eastern and Southeastern European growth markets. Nonetheless, at more than EUR 80 billion at the end of 2007, Western Europe accounts for the lion's share of Austrian wealth from FDI holdings. Just under EUR 40 billion is held in the EU-12,

and around EUR 20 billion in Eastern and Southeastern Europe.

It should be noted that no significant FDI interests are found in growth markets outside of Europe, once again underlining the extremely high concentration of Austrian direct investors in nearby countries.

Chart 10 presents the regional risk distribution of the main components of external assets, i.e. securities.

Between 2000 and 2006, Germany accounted for around a third of total capital-weighted risk from foreign securities holdings (table 2 in the annex). The risk concentration is especially high in debt securities, but the Frankfurt stock exchange is also of key importance for Austrian investors: Germany contributes nearly a quarter of the total capital-weighted risk from stocks and mutual fund shares.

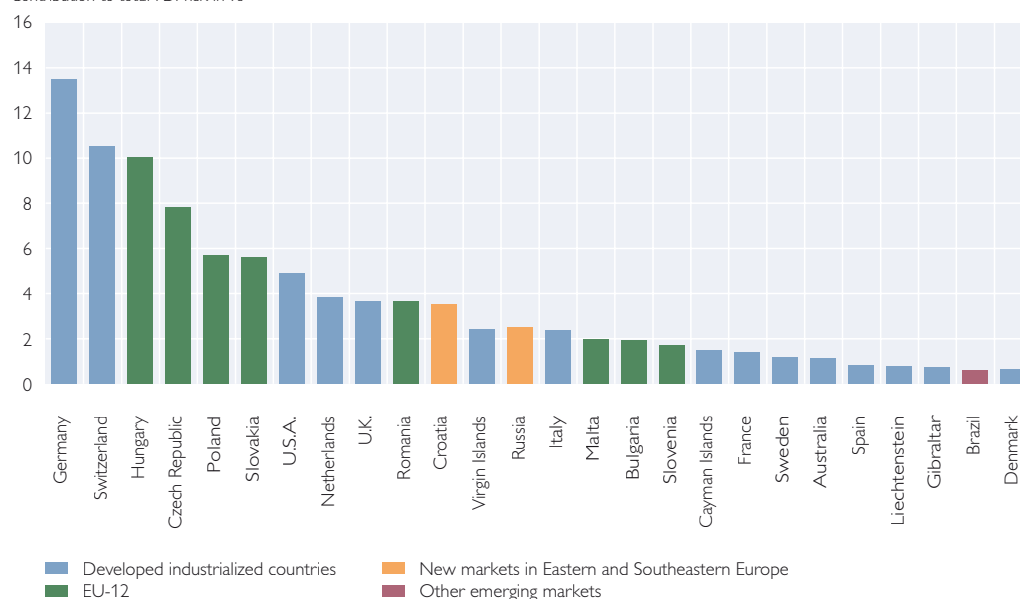
For Austrian investors, the U.S. securities markets, where a fifth of the

Chart 9

Austria's Capital-Weighted Risk from FDI¹ by Countries and Stage of Development

Average 2000–2006

Contribution to total FDI risk in %



Source: Author's calculations.

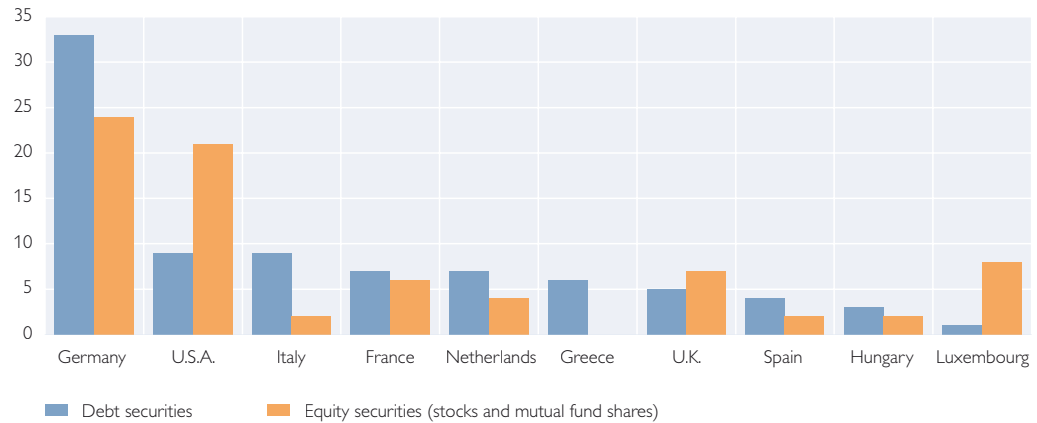
¹ Includes FDI held by special purpose vehicles (SPVs).

Chart 10

Austria's Capital-Weighted Risk from Debt Securities and Equity Securities

Average 2000–2006

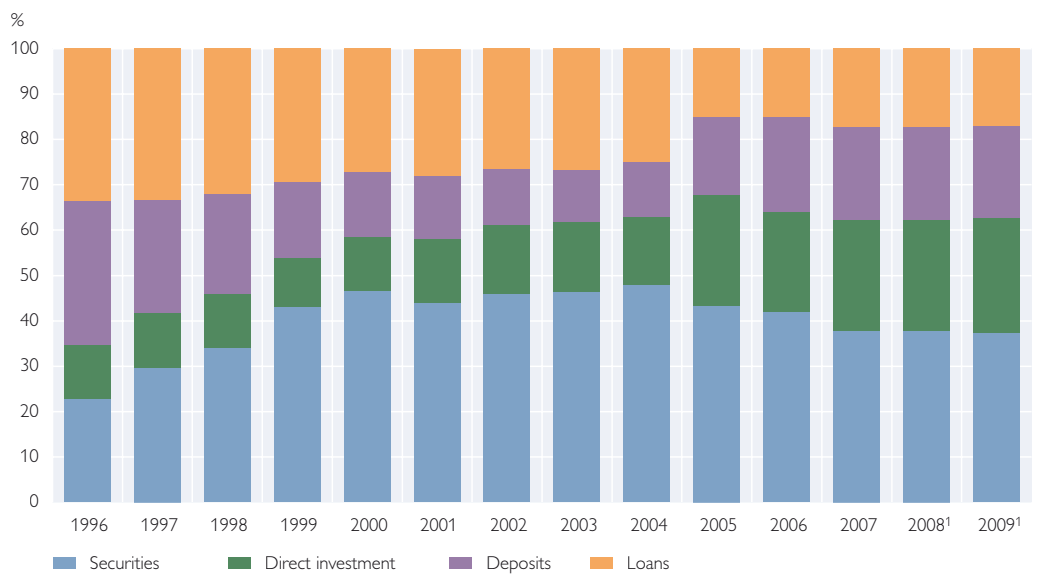
Individual contribution to total securities risk in %



Source: OeNB.

Chart 11

Austria's Capital-Weighted Risk Structure by Instrument



Source: OeNB.

¹ Projection.

total risk from equity securities is concentrated, is naturally of exceptional importance too. Measured by capital-weighted risk, Austria's top ten target regions for securities investment are almost all developed industrialized countries.

Chart 11 shows the significance of individual investment instruments for Austria's foreign portfolio. Given the increasing trend toward securitization, the share of loans in long-term investment, and hence in the risk structure, is shrinking in favor of securities and

direct investment. The combined risk contribution of these latter instruments increased from one-third in 1996 to more than 60% in 2007. The share of loans, like that of deposits, each contracted over the same period from one-third to around one-fifth of total risk.

2.3 Discussion of Results

The scoring model used in this study consistently fulfills its key purpose of providing signals on the macroeconomic risk development in selected countries and investment regions. All in all, these results neatly match the *ex ante* expectation of a regional risk structure, in which highly developed industrialized countries are deemed to be far less sensitive to macroeconomic crises than developing or growth regions. Prominent crisis developments in the past are duly and timely reflected in the model results. We can thus derive a fairly accurate selection of the determinants and their weighting. The decision to overweight domestic risk factors is consistent with the view that domestic and structural policies hold the key to a stable risk environment (Borio and Packer, 2004). Undesirable trends in the external sector, such as ballooning current account deficits or excessive external debt, which are commonly triggered by regional currency crises, are thus a symptom rather than a cause of a high level of crisis vulnerability. First and foremost, past economic mistakes such as socio-economic and structural weaknesses, which are reflected in, say, higher rates of inflation or unemployment, seem to be the key factors behind an unfavorable risk development. Alternative calculations, which take external factors more heavily into account, give a far less accurate reflection of the actual *ex post* risk evolution in the regions under review than the model set-up used in this study.

In interpreting the results we should bear in mind that the applied method is geared solely to direct risks. Nonetheless, since globalization is rapidly increasing, we should also consider the knock-on effects when assessing the total impact of a regional economic crisis on Austria. An economic crisis in the U.S.A. would have relatively few direct consequences for Austria, but its spillover effects on the U.S.A.'s main economic partners, such as Germany, would be formidable. Conversely, we could expect a crisis in Eastern European growth markets to have a much stronger direct impact, whereas its knock-on effects would probably be contained because of these countries' relatively moderate degree of globalization.

3 Conclusions

All in all, Austria's international financial investment runs a moderate macroeconomic country risk. This is true for the entire review period from 1996 to 2007 and – judging by projections of the regional and functional investment structure and current forecast data – should apply up to 2009, despite a cloudier economic outlook in some Eastern European countries or the U.S.A. Debt securities held in Western European developed industrialized countries and in the U.S.A. will remain the principal determinant of Austria's international risk. For all investment instruments (direct investment, securities, loans and deposits) Germany continues to be the dominant target region for Austrian financial investors.

Taking the marginal level seen in the mid-1990s as the starting point, the Austrian economy has vastly expanded its exposure to Eastern Europe. Nonetheless, measured by investment volumes, neither the 12 EU entrants since 2004 nor the Eastern and Southeastern

European growth markets, carry sufficient weight in the country portfolio to bear a significant influence on Austria's total risk arising from international investments. Moreover, the risk situation of the EU-12 has steadily improved over the entire review period. Individual growth markets, such as Poland, Hungary or Croatia, indeed already number among the ten main financial target areas, giving them a stronger influence on Austria's total risk than some financial markets in Western Europe. In addition, the forecasts for 2008 and 2009 suggest a continued high-risk environment in Hungary and Croatia.

The risk concentration in the credit segment is clearly higher than in all financial assets on average. Austrian banks' stronger investment focus on the EU-12 and Eastern and Southeastern European countries in recent years

automatically resulted in a higher risk exposure than in the comparatively well-diversified securities business. It follows that a certain concentration risk in these growth markets should not be denied. In view of their strong orientation toward Eastern Europe, Austria's direct investors likewise face heightened risks. Their exposure expanded rapidly in recent years, both in the EU-12 and in Eastern and Southeastern Europe, with the total level at end-2007 already twice as high as in the euro area.

Besides Asia, which represents a risk contribution of around 5%, other regions, such as Latin America or Africa, are virtually negligible for Austria's international exposure because of the extremely small investment volumes.

References

- Blaschke, W., M. T. Jones, G. Majnoni and M. S. Martinez Peria. 1988.** Stress Testing of Financial Systems: An Overview of Issues, Methodologies, and FSAP Experiences. IMF Working Paper 01/88. Washington D.C.
- Blüml, B. and W. Neus. 2002.** Grenzüberschreitende Schuldverträge und Souveränitätsrisiken. Der Fall privater, relativ souveräner Schuldner. Tübinger Diskussionsbeitrag 245. Eberhard-Karls-Universität. Tübingen.
- Borio, C. and F. Packer. 2004.** Assessing New Perspectives on Country Risk. BIS Quarterly Review. Basel. December.
- Büschgen, H. and O. Everling. 2007.** Handbuch Rating. 2nd edition. Gabler Verlag. 687 ff.
- Daldrup, A. 2006.** Rating, Ratingsysteme und ratingbasierte Kreditrisikoquantifizierung. Arbeitsbericht 17. Georg-August-Universität. Göttingen.
- Fink, G. 1993a.** Über die Mechanik des Schuldenmachens. Österreichisches BankArchiv 4/93. Vienna.
- Fink, G. 1993b.** Unternehmenswert der Banken und Länderrisiko. Österreichisches BankArchiv 8/93. Vienna. 605 ff.
- Krämer-Eis, H. 1998.** Evaluierung hoheitlicher Länderrisiken. Friedrich-Schiller-Universität. Jena.
- Higgins, M., T. Klitgaard and C. Tille. 2006.** Borrowing Without Debt. Understanding the International Investment Position. Fed. Staff Reports 271. New York.
- IMF. 1993.** Balance of Payments Manual. 5th edition. Washington D.C.
- IMF. 2005.** Coordinated Portfolio Investment Survey. Washington D.C. February 28.

- Lane, P. and G.-M. Milesi-Ferreti. 2006.** The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004. IMF Working Paper 69/06. Washington D.C.
- Lichtlen, M. 1997.** Management von Länderrisiken. Bank- und finanzwissenschaftliche Forschung. Volume 243. Bern, Stuttgart, Vienna: Verlag Paul Haupt.
- Maltritz, D. 2006.** Quantifizierung von Souveränrisiken. Hochschulschriften. Volume 102. Marburg: Metropolis Verlag.
- OeNB and FMA. 2004.** Rating Models and Validation Guidelines on Credit Risk Management. Vienna.
- Will, F. 2001.** Länder- und Hoheitsrisiken. Eine kritische Analyse von Methoden und Verfahren zur Risikoevaluierung. Schriftenreihe Finanzmanagement. Volume 3. Hamburg: Verlag Dr. Kovac.

Annex

Table 1

Rating Results for Individual Countries

		2006				2000 to 2006		2007 to 2009	
Rank	Country	Risk coefficient	Credit quality	Rank	Country	Risk coefficient	Credit quality	Risk coefficient	Credit quality
1	Hongkong (HK)	6%	1	1	Luxembourg (LU)	9%	1	11%	1
2	Luxembourg (LU)	8%	1	2	Hongkong (HK)	12%	1	6%	1
3	Denmark (DK)	13%	1	3	Norway (NO)	14%	1	12%	1
4	Ireland (IE)	14%	1	4	Ireland (IE)	14%	1	20%	1
5	Netherlands (NL)	14%	1	5	Switzerland (CH)	17%	1	14%	1
6	Switzerland (CH)	14%	1	6	Denmark (DK)	18%	1	14%	1
7	Norway (NO)	15%	1	7	Netherlands (NL)	19%	1	14%	1
8	Finland (FI)	15%	1	8	Sweden (SE)	20%	1	17%	1
9	Sweden (SE)	18%	1	9	United Kingdom (GB)	21%	1	25%	1
10	Slovenia (SI)	18%	1	10	Finland (FI)	21%	1	15%	1
11	Austria (AT)	20%	1	11	Austria (AT)	22%	1	18%	1
12	Czech Republic (CZ)	22%	1	12	Slovenia (SI)	23%	1	20%	1
13	Belgium (BE)	22%	1	13	Belgium (BE)	24%	1	22%	1
14	Germany (DE)	23%	1	14	France (FR)	25%	1	27%	2
15	Cyprus (CY)	24%	1	15	China (CN)	26%	2	27%	2
16	Japan (JP)	24%	1	16	Germany (DE)	26%	2	21%	1
17	United Kingdom (GB)	25%	1	17	Cyprus (CY)	26%	2	24%	1
18	China (CN)	25%	1	18	U.S.A. (US)	27%	2	30%	2
19	France (FR)	26%	2	19	Japan (JP)	28%	2	25%	1
20	Argentina (AR)	26%	2	20	Czech Republic (CZ)	29%	2	22%	1
21	U.S.A. (US)	27%	2	21	Spain (ES)	30%	2	33%	3
22	Lithuania (LT)	28%	2	22	Italy (IT)	30%	2	29%	2
23	Italy (IT)	30%	2	23	Lithuania (LT)	30%	2	31%	3
24	Russia (RU)	31%	3	24	Estonia (EE)	31%	3	36%	3
25	Estonia (EE)	31%	3	25	Russia (RU)	32%	3	30%	2
26	Slovakia (SK)	31%	3	26	Malta (MT)	34%	3	26%	2
27	Spain (ES)	32%	3	27	Latvia (LV)	35%	3	39%	3
28	Malta (MT)	32%	3	28	Argentina (AR)	38%	3	27%	2
29	Poland (PL)	32%	3	29	Poland (PL)	39%	3	28%	2
30	Latvia (LV)	33%	3	30	Croatia (HR)	39%	3	37%	3
31	Romania (RO)	34%	3	31	Portugal (PT)	40%	3	41%	4
32	Greece (GR)	35%	3	32	Algeria (AL)	41%	4	40%	3
33	Bulgaria (BU)	38%	3	33	Slovakia (SK)	41%	4	23%	1
34	Brazil (BR)	38%	3	34	Romania (RO)	42%	4	35%	3
35	Indonesia (IN)	39%	3	35	Hungary (HU)	43%	4	45%	4
36	Algeria (AL)	39%	3	36	Bulgaria (BU)	43%	4	35%	3
37	Croatia (HR)	39%	3	37	Greece (GR)	43%	4	35%	3
38	South Africa (ZA)	43%	4	38	Brazil (BR)	44%	4	37%	3
39	Portugal (POR)	44%	4	39	Indonesia (IN)	44%	4	41%	4
40	Turkey (TR)	45%	4	40	South Africa (ZA)	46%	4	40%	3
41	Hungary (HU)	46%	4	41	Egypt (EG)	47%	4	40%	3
42	Egypt (EG)	46%	4	42	Turkey (TR)	53%	5	41%	4

Source: Model results.

Note: Rating intervals: <26 = 1, 26-30 = 2, 31-40 = 3, 41-50 = 4, >50 = 5

Table 2

Rating Results for Individual Investment Regions

		2006				2000 to 2006		2007 to 2009	
Rank	Target region	Risk coefficient	Credit quality	Rank	Target region	Risk coefficient	Credit quality	Risk coefficient	Credit quality
1	Western Europe	21%	1	1	Western Europe	23%	1	21%	1
2	Euro area	22%	1	2	Euro area	24%	1	22%	1
3	<i>Total risk, capital-weighted</i>	25%	1	3	<i>Total risk, capital-weighted</i>	27%	2	25%	1
4	Offshore areas	25%	1	4	U.S.A.	27%	2	30%	2
5	Asia	27%	2	5	Offshore areas	27%	2	26%	2
6	U.S.A.	27%	2	6	Asia	31%	3	28%	2
7	EU-12	32%	3	7	EU-12	36%	3	31%	3
8	Latin America	35%	3	8	Eastern and Southeastern Europe	39%	3	37%	3
9	Eastern and Southeastern Europe	39%	3	9	Latin America	42%	4	34%	3
10	Africa	44%	4	10	Africa	45%	4	40%	3

Source: Model results.

Note: Rating intervals: <26 = 1, 26–30 = 2, 31–40 = 3, 41–50 = 4, >50 = 5

Table 3

Capital-Weighted Risk Contribution in the Securities Segment

Rank	Target region	2006	2007	2008	2009	2000 to 2006
%						
1	Western Europe	67	68	65	65	70
	<i>of which euro area</i>	59	59	56	57	62
2	U.S.A.	9	10	11	11	11
3	EU-12	9	9	9	9	6
4	Eastern and Southeastern Europe	3	4	4	4	2
5	Asia	2	2	2	2	2
Rank	Target country	2006	2007	2008	2009	2000 to 2006
%						
1	Germany	23	21	21	19	29
2	U.S.A.	9	9	10	11	11
3	Italy	7	8	8	8	7
4	France	8	8	8	8	6
5	Netherlands	4	4	4	4	6
6	United Kingdom	6	6	5	6	5
7	Greece	5	5	5	5	4
8	Spain	5	5	5	5	3
9	Cayman Islands	3	3	3	4	4
10	Poland	3	2	2	2	2

Source: Model results.

Note: 2007: Preliminary data; 2008 to 2009: Projection.

Table 4

Capital-Weighted Risk Contribution in the Debt Securities Segment

Rank	Target region	2006	2007	2008	2009	2000 to 2006
%						
1	Western Europe	77	75	76	77	80
	of which euro area	70	67	70	69	72
2	U.S.A.	8	9	10	11	9
3	EU-12	13	11	11	11	7
4	Eastern and Southeastern Europe	2	2	2	1	2
5	Asia	0	0	0	0	0
Rank	Target country	2006	2007	2008	2009	2000 to 2006
%						
1	Germany	26	24	23	21	33
2	U.S.A.	8	9	10	11	9
3	Italy	9	10	10	10	9
4	France	9	9	9	9	7
5	Netherlands	5	5	5	5	7
6	Greece	6	7	6	7	6
7	United Kingdom	6	6	6	6	5
8	Spain	6	6	6	7	4
9	Hungary	5	5	4	4	3
10	Belgium	2	1	1	2	2

Source: Model results.

Note: 2007: Preliminary data; 2008 to 2009: Projection.

Table 5

Capital-Weighted Risk Contribution in the Stocks and Mutual Fund Shares Segment

Rank	Target region	2006	2007	2008	2009	2000 to 2006
%						
1	Western Europe	57	60	60	63	61
	of which euro area	45	48	49	51	50
2	U.S.A.	14	12	13	14	21
3	Asia	6	6	5	5	5
4	EU-12	4	3	3	3	4
5	Eastern and Southeastern Europe	8	9	8	2	3
Rank	Target country	2006	2007	2008	2009	2000 to 2006
%						
1	Germany	18	19	18	17	24
2	U.S.A.	14	12	13	14	21
3	Luxembourg	9	10	13	13	8
4	United Kingdom	8	7	7	7	7
5	France	6	6	6	7	6
6	Japan	3	2	2	2	4
7	Netherlands	2	2	2	2	4
8	Switzerland	3	3	3	4	3
9	Cayman Islands	3	5	4	5	3
10	Ireland	4	4	5	6	2

Source: Model results.

Note: 2007: Preliminary data; 2008 to 2009: Projection.

Table 6

Capital-Weighted Risk Contribution in the Direct Investment Segment

Rank	Target region	2006	2007	2008	2009	2000 to 2006
%						
1	Western Europe	52	45	44	44	41
	of which euro area	15	13	12	12	23
2	EU-12	29	29	29	28	37
3	Eastern and Southeastern Europe	10	19	18	19	8
4	U.S.A.	3	2	2	2	5
5	Asia	1	1	1	1	1
Rank	Target country	2006	2007	2008	2009	2000 to 2006
%						
1	Germany	6	6	6	6	14
2	Switzerland	26	20	22	27	11
3	Hungary	7	8	7	9	10
4	Czech Republic	5	4	5	5	8
5	Poland	4	3	3	4	6
6	Slovakia	3	2	2	3	6
7	U.S.A.	3	2	3	3	5
8	Netherlands	3	2	2	3	4
9	United Kingdom	4	3	3	3	4
10	Romania	9	8	8	10	4

Source: Model results.

Note: 2007: Preliminary data; 2008 to 2009: Projection.

Table 7

Capital-Weighted Risk Contribution in the Credit Segment

Rank	Target region	2006	2007	2008	2009	2000 to 2006
%						
1	Western Europe	38	40	40	40	37
	of which euro area	11	9	9	9	8
2	EU-12	33	32	32	31	27
3	Eastern and Southeastern Europe	17	19	18	19	16
4	Asia	3	2	2	2	5
5	U.S.A.	5	4	4	4	8
Rank	Target country	2006	2007	2008	2009	2000 to 2006
%						
1	Germany	18	17	17	19	14
2	Poland	6	5	5	6	8
3	U.S.A.	5	4	4	5	8
4	Croatia	9	11	11	0	8
5	United Kingdom	3	4	4	5	6
6	Hungary	7	7	6	8	6
7	Russia	2	2	2	0	5
8	Czech Republic	4	4	4	5	4
9	Switzerland	4	4	4	6	4
10	Italy	3	3	3	4	4

Source: Model results.

Note: 2007: Preliminary data; 2008 to 2009: Projection.

Table 8

Austria's Financial Assets by Selected Regions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<i>EUR billion</i>												
Western Europe	57	67	77	119	157	171	184	208	240	346	399	412
Portfolio investment	17	25	34	65	86	89	107	124	146	177	194	202
Direct investment	5	6	8	10	13	14	18	18	21	82	84	84
Other investment	34	36	35	44	58	68	59	66	73	87	121	126
Euro area	43	52	63	97	127	134	145	166	192	239	282	301
Portfolio investment	15	21	29	56	75	76	91	107	127	154	169	177
Direct investment	4	5	5	6	10	11	13	14	15	20	22	25
Other investment	24	26	28	34	42	47	40	45	50	65	91	99
EU-12	12	14	15	19	24	27	32	39	52	75	94	120
Portfolio investment	1	1	2	2	3	3	4	6	9	14	18	17
Direct investment	3	4	4	5	8	10	13	14	16	26	31	38
Other investment	8	9	10	11	13	13	15	20	27	34	45	64
Eastern and Southeastern Europe	5	6	7	7	8	11	12	16	21	28	37	57
Portfolio investment	0	1	1	1	1	1	1	2	2	4	5	6
Direct investment	0	0	0	1	1	2	2	3	4	7	9	21
Other investment	5	6	6	6	6	8	9	12	15	18	23	31
U.S.A.	5	9	12	20	23	26	28	26	24	29	30	30
Portfolio investment	2	5	7	11	16	17	16	16	17	20	21	22
Direct investment	0	1	1	1	2	3	3	2	2	3	3	3
Other investment	2	3	5	8	5	7	10	8	5	6	6	5
Asia	7	7	6	7	7	7	7	7	7	10	11	11
Portfolio investment	1	1	1	3	3	2	2	2	2	4	5	5
Direct investment	0	0	0	0	0	0	1	1	1	1	1	1
Other investment	6	6	5	4	4	4	4	5	5	5	5	5

Source: OeNB.

Note: 2007: Preliminary data.

Table 9

Demarcation of Investment Regions

Region	Constituent Countries
Euro area	Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain
Western Europe	Euro area, Denmark, U.K., Iceland, Norway, Sweden, Switzerland
EU-12	Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia
U.S.A.	
Eastern and Southeastern Europe	Albania, Belarus, Bosnia and Herzegovina, Croatia, Russia, Serbia (including Montenegro), Ukraine, Turkey
Asia	China, Hongkong, India, Indonesia, Japan, Kuwait, Philippines, Saudi Arabia, South Korea, Taiwan, Thailand, United Arab Emirates
Latin America	Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay
Africa	Algeria, Egypt, South Africa
Offshore areas	Cayman Islands, Jersey, Gibraltar, Liechtenstein, Virgin Islands
Others	Australia, Canada

Source: Author's model assumptions.

Four Monetary Policy Strategies in Comparison: How to Deal with Financial Instability?

The article provides a review of the monetary policy strategies of four major central banks – the Eurosystem, the Federal Reserve, the Bank of Japan and the Bank of England – and investigates whether these strategies are modified in times of financial instability. The study finds a number of – statutory and actual – differences regarding the central banks’ objective(s), strategies and approaches to achieve the objective(s), and communication, including the publication of forecasts. While central bank laws are often not very explicit about financial stability, there is consensus that the latter is a major concern in practice. Many see the 2007/2008 financial crisis as yet another reminder that central banks in their monetary policy strategies need to take a longer-term and broader view than might have been suggested only a few years ago. All four central banks’ monetary policy strategies in principle allow for adequate incorporation of financial stability concerns. The lender of last resort function poses challenges for the operational implementation of monetary policy and their credibility as competent and reliable policy institutions. While central banks have been praised for their flexibility in dealing with the recent crisis, this very flexibility may also create moral hazard for the future. Empirical estimates of Taylor-type reaction functions, augmented for a measure of financial instability, confirm some relevant differences in the reaction elasticities to inflation and the output gap, as well as significant effects of financial instability on the interest rate setting behavior of the Bank of England, which are in line with the theoretical view that less inertia in monetary policy should be allowed for in times of financial market risks.

Jesús Crespo
Cuaresma,
Ernest Gnan¹

JEL classification: E52, E58, E63, G18

Keywords: central bank, monetary policy, financial stability, monetary policy strategy, Taylor rule

Ten years after the launch of European economic and monetary union (EMU) it is worth taking stock and comparing the Eurosystem’s monetary policy strategy with that of three other major central banks: the Federal Reserve System, the Bank of Japan and the Bank of England. How do the differences in statutory objectives between the Eurosystem, the Bank of Japan and the Bank of England, on the one hand, and the Federal Reserve System, on the other hand, translate into actual monetary policy? How different are the Eurosystem’s “two-pillar strategy,” the Bank of England’s inflation targeting, the Bank of Japan’s “two perspectives” approach

and the Federal Reserve’s pragmatic eclecticism? How do the four central banks communicate with the public, and what information do they reveal to guide inflation and interest rate expectations?

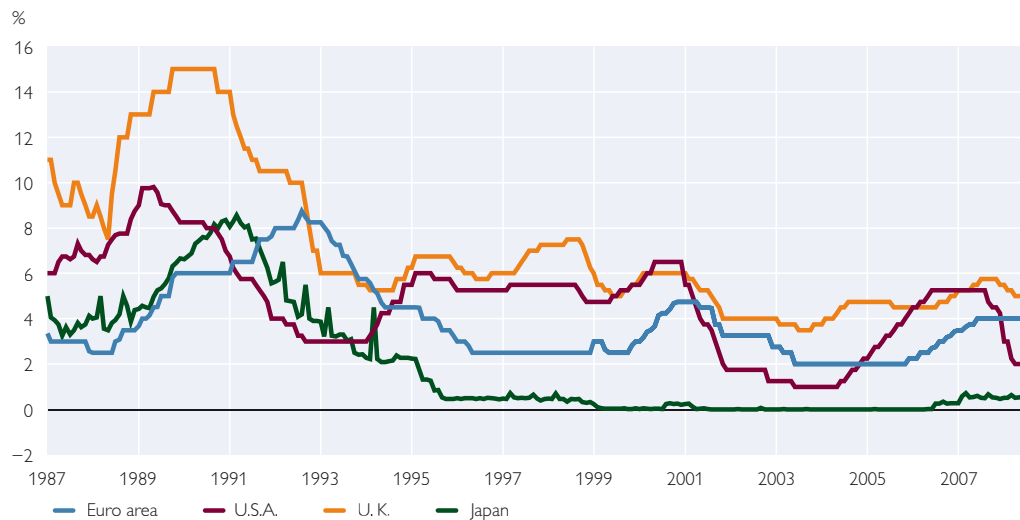
Beyond such general comparison, the 2007/2008 financial turmoil and central banks’ active responses to resolve tensions have highlighted another, more specific question relevant for central banks’ monetary policy strategies, namely how to react to financial imbalances and how to include financial stability considerations among the central bank’s objectives.

¹ Professor of Economics, University of Innsbruck, jesus.crespo-cuaresma@uibk.ac.at; Counsel to the Board and Head of the Economic Analysis Division, Oesterreichische Nationalbank, ernest.gnan@oenb.at. The authors appreciate input to section 2 by Markus Arpa, research assistance by Ernst Glatzer (both OeNB), and useful comments by Tony Yates (Bank of England).

² Professor of Economics and Head of the Economics Department, Rensselaer Polytechnic Institute in Troy, New York.

Refereed by:
Arturo Estrella²

Policy Rates



Source: Thomson Financial.

Note: Values for the euro area prior to 1999 are German rates.

Standard deviations – whole period: euro area 1.8%, U.S.A. 2.1%, U.K. 3.2%, Japan 2.5%; 1999 to 2008: euro area 0.9%, U.S.A. 1.8%, U.K. 0.7%, Japan 0.2%.

This article addresses both of these issues. Section 1 sets the frame for the ensuing analysis by summarizing the major themes in the economic literature, which inform our current understanding, but may also motivate possible differences of views, on central banks' objective(s) and monetary policy strategy. Against this background, section 2 describes and analyzes the main characteristics, and the differences, of the four central banks' monetary policy strategies. Section 3 addresses the nexus between monetary policy and financial stability from various angles: first, a conceptual one (channels of mutual influence, arguments for and against central banks' close involvement in financial stability responsibilities), second, an institutional one (what do the four central bank laws say); and third, a practical one (how do financial stability concerns fit into the monetary policy strategies of the four central banks). Building on the – scarce – em-

pirical literature on the influence of financial stability concerns on central banks' interest-rate setting behavior, section 4 estimates Taylor rules for the four central banks, with proxies for financial instability explaining central banks' inertia in changing policy interest rates. Section 5 summarizes and draws conclusions.

1 Monetary Policy Strategies: Underlying Economic Thinking

An analysis and assessment of central banks' monetary policy strategies needs to take into account a number of threads along which economic thinking has evolved over the past decades.³ Underlying these threads are two fundamental questions:

1. What should the central bank's objective(s) be?
2. How can it best achieve this or these objective(s), and thus maximize society's welfare?

³ For a comprehensive, nontechnical treatment of the subject, see also Mishkin (2007a).

Most economists now clearly agree that a central bank's primary objective should be price stability. This view reflects a substantial body of theoretical and empirical economic research.

The basic argument is that while monetary policy can, due to sluggish adjustment in prices and/or wages, temporarily affect output and employment in the short run, it is neutral with respect to real growth and employment over the longer run. Excessive monetary expansion will over the medium run result only in a rise in the general price level, without positive effects on the level of real activity. In other words, over the medium run, the quantity theory of money holds: There is no medium- or long-run tradeoff between price stability and real economic growth or employment. Thus, the conclusion emerges that monetary policy can – and should – in the first place focus on safeguarding price stability.⁴

A related strain of the literature studies the costs and – at low rates of inflation – the benefits of inflation. On the one hand, inflation entails a number of costs (“sand”) for the economy.⁵ High inflation rates might, according to this literature, even dampen growth, implying that achieving price stability in the medium to long run also supports economic growth and employment. On the other hand, deflation and also positive inflation rates very close to zero have been argued to entail costs⁶ – at low values, inflation can act as “grease” for the economy. Estimates for the “optimal rate of inflation” come up with values between 1% and 3%.⁷ Importantly, the optimal rate of inflation can vary over time. In particular, extended periods of low inflation can soften downward price and wage rigidities, thus reducing the costs of inflation and thus lowering the optimal rate of inflation (see below for the experience in Japan).

⁴ Note, however, that despite broad agreement on these notions among the economic profession, the idea that a central bank should also – or even as importantly – support growth and, along with this, other real economic goal variables, is widespread: It is reflected in the widely-used Taylor rules, which describe central banks' interest rate setting as a function of the development of inflation and output relative to a target or equilibrium value; it is a commonly held view among politicians and the media; and it is in the mandate of the Federal Reserve.

⁵ Often quoted costs of inflation are blurred relative price signals, additional transactions costs from avoidance of cash transaction balances due to losses in real asset value, increasing tax rates due to nominal progressive tax brackets (“bracket creep”), an erosion of companies' value due to depreciation rates not covering inflated replacement costs for a given stock of machinery and equipment, arbitrary redistribution between creditors and debtors resulting from varying inflation rates, and costs for the socially disadvantaged in the absence of less than complete indexation of social benefits and pensions, to name just a few.

⁶ The zero lower-bound for nominal interest rates implies that at inflation rates close to zero, the central bank has less leeway to kickstart the economy by means of negative real interest rates. Nominal wage and price downward rigidities imply, for instance, that in an environment of very low inflation, a downward adjustment of real wages in sectors or entire economies which are hit by negative shocks is hampered, implying a rise in unemployment. The situation is further aggravated by the potential downward spiral of falling prices and wages and falling demand in the event of a fall in the general price level, i.e. deflation.

⁷ Studies performed in the context of the review of the ECB's monetary policy strategy found that an inflation rate of 1% ensures a sufficient distance from the zero lower bound of interest (for details see the studies included in Issing, 2003). Sinclair (2003) arrives at 2% for the United Kingdom, while a recent estimate based on a New-Keynesian model by Billi and Kahn (2008) comes up with an optimum range of 0.7% to 1.4% of personal consumption expenditure (PCE) inflation for the United States.

Once we have accepted that price stability, i.e. a low, but positive rate of inflation,⁸ is a goal worth pursuing, we need to answer the second question of how this can best and most successfully be achieved. This issue needs to be addressed at several levels.

A first level addresses policymakers' incentives and their interaction with economic expectations about the future course of inflation. An important idea is that policymakers may be at risk of giving priority to short-term versus longer-term economic outcomes. Thus, even if they know and accept the medium-term neutrality of money and the medium-term costs of higher inflation, they are tempted to boost real economic activity in the short run, at the cost of higher inflation later. Since economic agents understand these incentives, they anticipate monetary policymakers' short-termism and thus expect inflationary policy in the first place. Since actual inflation is driven, *inter alia*, by inflation expectations, the economy will indeed reach a higher than optimal inflation rate. This so-called time-inconsistency problem (Kydland and Prescott, 1977) has been influential in shaping current thinking about optimal monetary policy and central bank design.⁹ Several solutions to this problem were offered by economic theory, which on the one

hand aim at explicitly changing the monetary policymaker's incentives, and on the other at creating public credibility for the monetary authority's lasting and reliable commitment to price stability.

The most widely used remedy for changing the policymakers' incentive structure is to delegate monetary policy to an independent agent (the central bank), with a clear mandate of pursuing price stability as a priority.¹⁰ A large body of theoretical and empirical economic research shows that greater central bank independence is indeed associated with lower inflation (for a recent study see Crowe and Meade, 2008).

To ensure that the mandate is duly fulfilled by the agent, tools for transparency and accountability (frequent publication of the monetary authority's balance sheet, written reports, hearings before Parliament etc., press conferences on the outcome of meetings of the decision-making body) need to accompany such independence.¹¹ Thus, transparency further increases the incentive for the policymaker to stick to the mandate. At the same time, central bank independence and transparency about the central bank's objective, strategy and ongoing monetary policy also serve to create clarity and credibility among economic agents for the monetary authority's goal and commit-

⁸ Note, however, that there is also discussion whether a central bank should target low rates of inflation or specific levels of the general level of consumer prices. The former, which is common practice nowadays, implies "base drift," i.e. deviation in one year from the target inflation rate does not require compensation in the next year. By contrast, specific "price level targets," while they may also imply positive inflation from one year to the next, would in the event of a deviation from target require offsetting inflation developments in the future. For an overview of the pros and cons of both approaches, see e.g. Gaspar et al. (2007).

⁹ It can be shown that even if the policymaker has exactly the same objective (including the same time horizon) as society, the time inconsistency and credibility problem still generates suboptimal welfare outcomes.

¹⁰ The economic literature of the 1980s and 1990s was full of proposals to ensure central bankers' commitment to price stability, e.g. by designing central bank governors' contracts comprising financial incentives to ensure price stability.

¹¹ Indeed, Crowe and Meade (2008) show empirically that more independent central banks are more transparent. Furthermore, increases in central bank independence have tended to occur in more democratic countries. Finally, they also show that central bank transparency is positively correlated with measures of national institutional quality.

ment to achieving its price stability mandate. In this way, inflation expectations are anchored at a low level, which in turn stabilizes actual inflation developments (Bernanke, 2004a).

This is also where monetary policy strategies come into the picture. Quoting from www.wikipedia.org, “a strategy is a long term plan of action designed to achieve a particular goal. ... Strategies are used to make the problem easier to understand and solve.” Consistent with this general definition, Houben (2000) defines monetary policy strategies as consisting “of the specification of the intended monetary [policy] reaction function to economic developments as well as the communication of this reaction function and of actual policy decisions to the outside world.”¹²

In practice, monetary policy strategies serve several purposes: First, they may prompt policymakers to make explicit choices about their broad philosophy and the analytical framework underlying monetary policy decisions. Particularly in multi-person monetary policy decision-making bodies, such ex ante explicitness may support a structured and focused approach to decision-making. Second, a monetary policy strategy can also play a very useful role in informing agents about the central bank’s broad thinking (“model”) and the indicators informing monetary policy decisions. In this way, monetary policy can be better understood by agents, thus stabilizing inflation expectations and reducing interest rate volatility.

The academic and policy discussion in the last two decades addressed a number of specific issues relevant for central banks’ monetary policy strategies. The older discussion on “rules versus discretion” moved on to more detailed topics such as optimal monetary policy rules. Usually, this literature seeks to optimize a loss function under various assumptions, models and circumstances. Since the 1990s, dynamic stochastic general equilibrium (DSGE) models have formed the basis for developing this research. As opposed to this often highly technical and sophisticated literature, the formulation of the “Taylor rule” (Taylor, 1993) offered an alternative in the form of pragmatic, “simple rules” (Taylor rules are explained in section 4).

Inflation targeting has been adopted by many central banks worldwide over the past years. Pioneers included the Reserve Bank of New Zealand, the Sveriges Riksbank and the Bank of England. Originally a pragmatic approach developed by central banks to replace other nominal anchors, such as exchange rate or monetary targets, inflation targeting also became the subject of a blooming theoretical literature. Major elements of inflation targeting are: (1) an explicit focus of monetary policy on the primary objective of price stability, although, depending on the precision of the inflation target, some flexibility with respect to output stabilization is possible; (2) publication of a numerical inflation target (which may take various forms: point targets versus ranges; measured by headline or “core”

¹² Houben (2000) further elaborates that the first element comprises the key factors that determine the reaction function, including the end objective, the (intermediate) policy target that is pursued towards that end objective, and the institutional framework that is adopted for monetary policy decision-making. The second element encompasses all aspects related to the external presentation of the reaction function, in particular the precommitment to policy targets and the transparency of the policymaking process, which together aim to condition public expectations on the desired monetary policy outcome.

inflation; different time horizons for meeting the target); (3) explanation of interest rate decisions primarily on the basis of deviations of inflation (or the central bank's inflation forecast) from target; and (4) active communication with the public and a strong emphasis on central bank accountability, which is usually reflected in regular "inflation reports" (for surveys on inflation targeting see e.g. Mishkin and Schmidt-Hebbel, 2007; Bernanke, 1999).

A key topic is how monetary policy should deal with uncertainty. Uncertainty arises for instance from lagged or imprecise (later revised) data, uncertainty about the most appropriate economic model (in a given country under specific circumstances), and uncertainty about the transmission of monetary policy measures on the economy (Bernanke, 2007). One conclusion from this literature is that monetary policy should be designed in a robust way: Rather than aiming for an optimum which would hold only under very narrow conditions, monetary policy should aim to avoid gross mistakes in many different circumstances which might arise.¹³ Another possible effect from uncertainty is that central banks move cautiously when changing the level of official interest rates; this "gradualism" (Brainard, 1967; Bernanke, 2004b) has also become a standard feature in empirical estimates of central banks' interest setting behavior (see

sections 3 and 4 for a discussion of Taylor rules).¹⁴

The globally very low inflation rates around the turn of the century¹⁵ triggered work concerned with the conduct of monetary policy in a low inflation environment (Bernanke, 2003b and 2004a). Issues addressed included for instance the identification of a sufficient "safety margin" from the zero lower bound of interest rates (see above on the optimal rate of inflation).

In response to the risk of not only deflation, but also of other severe adverse economic developments, particularly the Federal Reserve in recent years has focused on a so-called "risk management approach," i.e. monetary policy takes into account the likelihood and potential damage of risks. In this respect, the Federal Open Market Committee (FOMC) pays more attention to potential "nonlinear" or "fat tail" events, in order to design monetary policy in a way that helps avoid particularly adverse economic outcomes (Mishkin, 2007a and 2008). Contrary to gradualism, the risk management approach to monetary policy may imply that central banks exhibit an even more vigorous interest rate policy response than under normal circumstances.

Another strand of the literature studied the effect of a long period of low inflation on price and wage formation. One finding is that the persistence of inflation, i.e. the dependence of

¹³ One major contribution of the recent literature in this field is the application of robust control theory to economic policy decisions under model uncertainty (Hansen and Sargent, 2007).

¹⁴ Note, however, that there is also a growing economic literature dealing with circumstances when uncertainty requires aggressive policy steps. For example, uncertainty about the persistence of inflation typically leads to optimal policy being more aggressive than otherwise.

¹⁵ The term "the Great Moderation" was coined for the period of high macroeconomic stability (which included both low and stable inflation and low output growth volatility) from the 1990s until the mid-2000s. The related economic literature discussed whether the great moderation was due (a) to fewer, less severe economic shocks, (b) to a better ability of economies to absorb shocks, due to more efficient markets with fewer frictions, or (c) better macroeconomic, in particular monetary, policies (for an overview see, e.g., Bernanke, 2004d).

inflation on past inflation developments, has declined in the euro area over the past decade, reflecting the central bank's high level of anti-inflationary credibility and the increased importance of inflation expectations in actual price formation (Altissimo et al., 2006).

Nominal anchors, which act as a guidepost to monetary policy and the public's perceptions about future monetary policy decisions and inflation, have long had a firm place in monetary theory. During the time of the gold standard, the price of gold served as nominal anchor for the value of currencies. Later on, nominal exchange rate targets against large and stable world currencies served as nominal anchors in many countries. More recently, many central banks have adopted a publicly announced quantitative inflation target as nominal anchor. Over the past two decades, the role of monetary aggregates in the design and conduct of monetary policy has changed. In the 1970s, a number of countries had adopted monetary targeting as part of strategies to fight what was later to become known as the "Great Inflation." This strategy proved more successful and long-lived in some countries (Germany and Switzerland) than others (United States, Canada and the United Kingdom) (Mishkin, 2000). The reasons why the U.S.A., Canada and the U.K. sooner abandoned monetary targeting include the earlier emergence of financial innovation and changes in the technology of payments and settlements, and the resulting instability of the relationship between monetary aggregates and goal variables, such as inflation or nominal income. Thus, monetary strategies were conditioned

by developments in financial markets (Borio and White, 2004).

Many studies have investigated the stability of money demand functions (i.e. how well the growth in the volume of money demand can be explained by the growth of GDP, the level of interest rates and other variables, such as asset prices) and the leading indicator properties of monetary aggregates for inflation. All in all, the findings can be summarized as follows. First, money demand has become increasingly difficult to model and explain over the past decade or two. Second, the forecasting of inflation by means of the growth of monetary aggregates has also become more difficult.¹⁶ Third, as an empirical matter, money-growth based inflation forecasting works better in the euro area than in the United States (Kahn and Benolkin, 2007); indeed, it continues to work reasonably well in the euro area for medium to long-term horizons (Kaufmann and Kugler, 2008; Hofmann, 2008).

Money and its counterpart credit have recently gained renewed attention for monetary policy as they might provide early signals on emerging financial imbalances that could affect output and inflation (Borio and Lowe, 2004; Detken and Smets, 2004; BIS, 2007), an issue which will be further pursued in section 3.

Naturally, this brief summary cannot do justice to the full breadth and depth of the literature and its many nuanced findings and arguments. What is of interest for the remainder of the article are the broad strands of the discussion to the extent that they appear to have influenced (or, in some cases, have been influenced by) monetary policy strategies in practice. The fol-

¹⁶ This may also be due to the generally increasing difficulty of forecasting inflation in periods of low inflation, and also applies to other methods of inflation forecasting, based, e.g. on the Phillips curve.

lowing analysis in section 2 should accordingly be seen against these trends in monetary theory and policy over the past decades.

2 Monetary Policy Strategies in Comparison: What Central Bank Laws and Official Information Say¹⁷

Central banks' monetary policy strategies are embedded in their legal mandate and the tasks and powers conferred to them. However, the formal legal and institutional framework – out of necessity and with good reason – leaves central banks substantial leeway in designing their actual monetary policy strategy.¹⁸ Major central banks nowadays invest substantial resources into continuously developing and refining their monetary policy strategies in line with latest developments in economic research and in the light of practical experience. So we need to consider legal provisions and their practical implementation simultaneously to obtain a full and adequate picture of central banks' strategies. For reasons of space, this section concentrates on a comparison of the “Big Four's” monetary policy strategies as of mid-2008.

Table 1 provides a comparative overview of key institutional and monetary policy aspects of the central banks under study, including legal provisions

and features that have developed in practice. The table reveals a number of noteworthy differences.

– Statutory Monetary Policy Mandate: Differences Remain

The corner stone of any monetary policy strategy is a clear definition of the central bank's mandate. The prevailing differences among the four central banks reflect different views among legislators on the role of monetary policy: The Eurosystem¹⁹ and the Bank of England²⁰ both have the primary objective of maintaining price stability; subject to that, they shall support general economic policies. The Bank of Japan Law puts it differently, stating that through the pursuit of price stability, the Bank of Japan contributes to the sound development of the national economy. One could conclude that the former two central banks indeed pursue price stability as a goal in itself, while the Bank of Japan Law sees price stability only as a basis for a broader economic goal. What seems most relevant for the practical conduct of monetary policy, however, is that the three central banks' objectives all imply a clear hierarchy of goals, putting price stability first.

By contrast, the Federal Reserve has multiple goals,²¹ namely to “*maintain the growth of monetary and credit aggregates commensurate with the economy's*

¹⁷ The authors appreciate input by Markus Arpa to this section. A detailed account of the Eurosystem's monetary policy preparation and decision-making processes is given in Moutot et al. (2008). Scheller (2006) is a detailed and authoritative reference on institutional aspects of the ECB.

¹⁸ Of course, the legal framework itself can – and does – change over time. However, such changes occur quite rarely, legal frameworks are thus, for this study, taken as given.

¹⁹ The Treaty Establishing the European Community (Article 105(1)) states that “the primary objective of the ESCB shall be to maintain price stability” and that, “without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Community.” The Treaty thus establishes a clear hierarchy of objectives for the Eurosystem.

²⁰ The Bank of England's monetary policy framework was fundamentally redesigned in 1997 with a new Bank of England Act. The Bank of England's Monetary Policy Committee is charged with maintaining price stability, i.e. low inflation, and, subject to that, support of the Government's economic objectives. The Chancellor of the Exchequer sets and reviews the inflation target, which currently stands at 2%.

²¹ The Federal Reserve System's goals evolved over time. The Federal Reserve Act is the legal basis for the Federal Reserve System (12 U.S.C. § 225a, as amended by the Federal Reserve Reform Act of 1977 (P.L. 95–188)).

long-run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.” Federal Reserve officials and independent economists actually refer to the Federal Reserve’s dual, rather than triple, mandate.

– *Is There a Quantified and Published Definition of the Central Bank’s Goal(s)?*

The strategies pursued by the four central banks differ strongly and in several respects. A first aspect is whether there is a quantitative, published definition of the policy goal(s).

Regarding the Eurosystem, the Governing Council of the European Central Bank (ECB) at its meeting on October 13, 1998, (ECB, 1998) agreed on the main elements of the stability-oriented monetary policy strategy of the ESCB. After some minor adjustments and clarifications in May 2003 (ECB, 2003), the current vintage of the monetary policy strategy defines price stability as the year-on-year increase in the Harmonized Index of Consumer Prices (HICP) for the euro area of below, but close to, 2% over the medium term. The “medium term” as such is not defined, since it depends on the type of shocks hitting the economy, and their speed of absorption.

As part of its “New Framework for the Conduct of Monetary Policy,” published on March 9, 2006, the Bank of Japan’s Policy Board defined price stability as approximately 0% to 2% in the medium to long term. The Bank of Japan states that, in principle, price stability is zero inflation; there is no significant measurement bias in Japan’s CPI. To avoid a vicious circle of falling prices and falling demand, a small positive inflation rate may be deemed consistent with price stability. It is further argued that since the average inflation

in Japan over the past decades was lower than in other industrialized countries, the rate of inflation perceived by firms and households to be consistent with price stability is lower than in other countries, and economic decisions are guided by such a low inflation environment. The published range of 0% to 2% is the result of a discussion among the Bank of Japan’s Board members. The Bank of Japan reveals that there were somewhat diverging views among Board members concerning the quantification of price stability, but that the preferred figure of most Board members was around 1%. The definition is reviewed annually (Bank of Japan, 2006). Two points appear particularly noteworthy: first, the Bank of Japan’s reasoning implies that optimal inflation is deemed to be endogenous and depends on past “habits.” Second, the strong consensus on a very low quantitative definition of price stability is remarkable given Japan’s deflation experience during the 1990s and early 2000s.

The Bank of England has a clear inflation target of 2%. Contrary to the other central banks under consideration, the inflation target is set by the Treasury.

By contrast, the Federal Reserve has never put an official figure on what it considers to be a stable price environment. Judging from remarks by successive Federal Reserve Chairmen, the working definition of price stability evolved as follows: “*A workable definition of reasonable ‘price stability’ would seem to me to be a situation in which expectations of generally rising (or falling) prices over a considerable period are not a pervasive influence on economic and financial behavior.*” (Volcker, 1983). “*We will be at price stability when households and businesses need not factor expectations of changes in the average level of prices into*

their decisions.” (Greenspan, 1994). “*The long-run inflation rate that best promotes the dual mandate is likely to be low but not zero.*” (Bernanke, 2007).

Since the late 1980s, some political and academic circles, including Fed Chairmen Greenspan (1989) and Bernanke (2003a), have attempted to put more emphasis on price stability in the U.S.A. by defining it more clearly. The Federal Reserve and the Federal Open Market Committee (FOMC) discussed the advantages and disadvantages of inflation targeting and related communication issues on several occasions. Related to these discussions, the FOMC announced in fall 2007 that it would compile and release projections four times each year rather than twice a year. In addition, the projection horizon was extended from two to three years. FOMC members provide projections for overall personal consumption expenditures (PCE) inflation, as well as for real GDP growth, the unemployment rate, and core PCE inflation. The projections by the FOMC for PCE inflation and core PCE inflation for the longer run (i.e. in three years’ time) are of particular interest, as these projections are made under the assumption of “appropriate” monetary policy and should hence presumably converge at the desired level of inflation (Mishkin, 2007b). Both PCE inflation and core PCE inflation rates in three years time were put at a range of 1.5% to 2% (central tendency: 1.6% to 1.9%).

The Federal Reserve’s goal of maximum employment leaves ample room for interpretation. The FOMC has short-cut the discussion on “maximum employment” by introducing the wording “sustainable economic growth” instead.

– *What is the Central Bank’s Strategy to Achieve the Monetary Policy Goal(s)?*

Another important aspect of any monetary policy strategy is whether there is a structured approach to the making of monetary policy decisions so as to systematically achieve the goal(s).

The Eurosystem uses its own “two pillar strategy” to guide the Governing Council’s decisions. The first pillar, economic analysis, assesses the short to medium-term determinants of price developments, with a focus on real activity and financial conditions in the economy. The second pillar, monetary analysis, mainly serves for cross-checking, from a medium to long-term perspective, the indications from the economic analysis. The two-pillar approach ensures that appropriate attention is paid to different perspectives and time horizons in making an overall judgment of the risks to price stability. The diversified approach to the interpretation of economic conditions reduces the risk of policy error caused by over-reliance on a single indicator, forecast or model (Scheller, 2006). The two-pillar structure is also systematically applied in the Eurosystem’s communication on monetary policy decisions.

The Federal Reserve has no stated strategy to achieve its goals. There are no preferred indicators nor is there a set method of grouping or weighing various indicators to arrive at conclusions. The main source of information on the Federal Reserve’s view regarding its goals and decision-making considerations is speeches by Federal Reserve officials. These – very insightful – speeches emphasize and explain economic concepts and ideas which by implication may be assumed to play a role in monetary policy decision-making – at least as concerns the speaker. Depending on circumstances, these concepts and ideas change. Taken to-

gether, the collection of multiple speeches and testimonials by Federal Reserve officials do reveal much information on the considerations that may be relevant for the Federal Reserve's decision-making at any point in time. So, to sum up, there is no stated overall monetary policy strategy, but fairly clear communication of – changing – strategic considerations.

The Bank of Japan has undertaken two major shifts in its monetary policy strategy over the past decade. First, on March 19, 2001, against the background of a stagnating real economy and weak financial sector, the Bank of Japan embarked on a historical monetary policy experiment by adopting a framework of so-called “quantitative easing.” This term described a set of measures aimed at easing monetary and financing conditions even in a situation where the nominal interest rate already had reached (nearly) zero.²² As the economic recovery in Japan took shape and the “emergency regime” of quantitative easing was no longer needed, the Bank of Japan, as part of the introduction of its “New Framework for the Conduct of Monetary Policy,” in addition to the definition of price stability, announced on March 9, 2006, that it would in future examine economic activity and prices from “two perspectives.” The “first perspective” examines whether economic growth follows a sustainable

path under price stability over a 1 to 2 year time horizon. The “second perspective” takes a longer-term view, focusing on risks to sustainable growth and price stability. Low probability-high impact events are explicitly considered under this perspective (Bank of Japan, 2006). Since the start of the “New Framework,” the Bank of Japan has on various occasions made reference to both “perspectives” in explaining interest rate decisions (BIS, 2007).

The Bank of England's policy can clearly be classified as “inflation targeting.” Relying, among other things, on forecasts of inflation and other economic developments, interest rates are set so as to keep inflation in line with the target. Like other inflation-targeting central banks, the Bank of England documents the considerations that inform the monetary policy decisions for the public in quarterly “Inflation Reports.”

The continued prominence of money in the ECB's two-pillar strategy contrasts with current practices in other central banks. It is often explained by historical developments, i.e. the notion that the ECB hoped to inherit credibility in its first years from the Deutsche Bundesbank's successful monetary policy strategy, which had included published monetary growth targets. In fact, it is more than that. Monetary analysis continues to figure

²² More specifically, the Bank of Japan increased its target for commercial banks' current account balances far in excess of their required reserve levels. The initially set current account target was subsequently raised nine more times until end-2004. As a result, the already very low overnight call rate (the Bank of Japan's key interest rate) was, as desired, further pushed down to zero. The increases in current account balances were primarily achieved by means of open market purchases of Japanese government bonds. The Bank of Japan's government bond purchases had the additional desired effect of bringing down long-term interest rates. The lower deficit-financing costs implied by such organised and explicit “monetary financing of the government” may also have facilitated the Japanese government's parallel high-deficit expansionary fiscal policy. The Bank of Japan also announced and confirmed repeatedly that it would continue quantitative easing until inflation had returned to positive values. This explicit communication may have helped to dampen future interest rate expectations. The policy was accompanied by repeated foreign exchange interventions against the Japanese yen; being unsterilized, they also contributed to increasing the money supply (Spiegel, 2001). Surveying a number of studies, Spiegel (2006) shows that the quantitative easing policy achieved its goals by lowering short and long-term interest rates, by helping weaker Japanese financial institutions, and by generally encouraging greater risk tolerance in the Japanese financial system, thus eventually paving the way for economic recovery.

prominently both in the analyses presented to the Governing Council regularly for their meetings and in explanations of monetary policy decisions to the public. Gerlach (2007) finds that the relative importance of monetary analysis seems to vary over time, depending on the nature and source of the price pressures. In the context of the review of the two-pillar strategy, the scope and nature of monetary analysis was changed: the focus shifted away from the growth of M3 to a more flexible and broader perspective which includes developments in credit and other counterparts to M3 and aspects of financial imbalances at large. The medium to long-term perspective of monetary analysis was emphasized, as was its value for cross-checking with economic analysis.

The other three central banks under study no longer attribute any specific role to monetary or credit developments. However, the longer-term view of inflation nowadays associated with money and credit developments is reflected in the Bank of Japan's "second perspective" of the monetary policy strategy. The Federal Reserve and the Bank of England, while not putting any emphasis on developments in money and credit growth, do not categorically neglect them either. In the words of Bernanke, "*the Federal Reserve will monitor and analyze the behavior of money. Although a heavy reliance on monetary aggregates as a guide to policy would seem unwise in the U.S. context, money growth may still contain important information about future economic developments. Attention to money growth is thus sensible as part of the eclectic modeling and forecasting framework used by the U.S. central bank*" (as quoted in Kahn and Benolkin, 2007). The Bank of England's regular analysis for the Monetary Policy Committee also includes an analysis of

"developments in quantities in the monetary area and credit conditions" (King, 2002). While money and credit are no privileged indicators or even targets in the Bank of England's strategy, the Monetary Policy Committee pays very close attention to these data when the circumstances warrant it. For instance, judging from the minutes, the MPC were for many years worried about the rapid expansion of money and credit. More recently, they have been studying the sharp contraction in money and credit growth.

– *General Trend towards More Transparency and Communication*

Over the past two decades, a general trend towards increasing central bank transparency and more active communication could be observed. This may reflect several underlying factors: greater need for accountability as a counterpart to stronger central bank independence; the increasing role of globally integrated and liberalized financial markets and the need to guide market expectations through effective communication; and an increasing forwardlookingness among economic agents, which also extends to price setting behavior. Transparency and effective communication is now generally acknowledged as a crucial element of effective monetary policy (Bernanke, 2004c). The spread of inflation targeting, which relies heavily on regular and well-structured communication with the public, may also have contributed. Finally, the launch of EMU required the new central bank system to invest heavily in explaining its role, functions and strategy as well as its ongoing monetary policy decisions to economic agents eager to understand the new monetary authority's intentions and behavior.

The four central banks' communication strategy can be loosely divided

into two groups. On the one hand, the Bank of England, Federal Reserve and Bank of Japan convey details of their decision-making by publishing the minutes of the monetary policy meetings. The time lag of publication ranges from two to four weeks. These central banks release only very short press releases immediately after the meetings and offer no press conferences. On the other hand, the ECB issues a detailed “Introductory Statement” immediately after the ECB Governing Council meetings, which the President of the ECB reads out at a press conference and which is followed by an in-depth questions and answers session. The press conference is broadcast live on the ECB’s website and archived on the website both as a video stream and as a transcription. The ECB, however, does not publish the minutes of the ECB Governing Council meetings.

– *General Trend towards Publication of Central Bank Forecasts*

A specific element of central bank transparency, which has attracted more attention over the past 15 years, is the publication of economic, in particular inflation, forecasts by the central bank.²³ The ECB has published staff

forecasts as part of the “economic pillar” since December 2000, releasing them on a quarterly basis since September 2004.²⁴ The Federal Reserve, which had revealed some forecast information since 1979, considerably extended its forecast publication policy in November 2007.²⁵ The Bank of Japan has published forecasts since 2000.²⁶ As an inflation-targeting central bank, the Bank of England has published inflation reports, a key element of which are economic forecasts, since 1993.²⁷

What are the main stylized facts and differences across the four central banks? First, there is a general tendency towards quarterly publication of forecasts; only the Bank of Japan continues to publish its forecasts biannually. Second, the Bank of England and, since November 2007, also the Federal Reserve, cover the next three years, whereas the Eurosystem and the Bank of Japan release forecasts for the current and coming years only. There is a tendency towards longer horizons. Third, the range of forecast variables is generally limited to one or two measures of consumer price inflation, and a limited number of real variables. All central banks publish real GDP growth

²³ Chortareas et al. (2001) show empirically for a large sample of countries that publishing central bank forecasts is associated with lower inflation.

²⁴ Forecasts in December and June are produced by the staff of the entire Eurosystem, those in March and September by ECB staff alone. The practices of national central banks in publishing their forecasts of their respective countries differ, however. The format of such national forecast publications complies with certain rules agreed within the Eurosystem (e.g. on dates of publications, technical assumptions and presentation of the assumptions on the euro area economy).

²⁵ The Federal Reserve had since 1979 published biannually projections of economic growth, unemployment, and inflation in the Federal Reserve’s Monetary Policy Report to the Congress. Summaries of those semi-annual projections were also published in the minutes of FOMC meetings. Since November 2007, the FOMC has compiled and released projections four times each year. In addition, the projection horizon was extended to three years, from previously two. Summaries and explanations of the projections are published along with the minutes of the FOMC meeting at which they were discussed (Federal Reserve Board, 2007a and 2007b; Mishkin, 2007b).

²⁶ For details see the Bank of Japan’s website www.boj.or.jp/en/theme/seisaku/sakiyuki/tenbo/index.htm and Fujiwara (2005).

²⁷ The Bank of England’s quarterly inflation reports start with an overview of economic developments, which is followed by analyses of money and asset prices, demand, output and supply, costs and prices, and an assessment of the medium-term inflation prospects and risks. The reports are presented to the public in press conferences, with webcasts and transcripts documented at the Bank of England website. See the Bank of England’s website www.bankofengland.co.uk/publications/inflationreport/2008.htm

forecasts, the additional coverage by the Federal Reserve of the unemployment rate reflects its triple mandate. The Eurosystem forecasts the broadest range of real variables – various components of aggregate demand, but not the unemployment rate. Fourth, all central banks but the ECB include a discussion on the risks surrounding their forecasts; however, the ECB President usually gives qualitative information on the balance of risks in his Introductory Statement at the post-Governing Council meeting press conference. Fifth, contrary to the forecasts by the other three central banks, the Eurosystem emphasizes that the forecasts are staff forecasts, which need not reflect the views of the ECB Governing Council and are just one piece of information among many others.

Finally, as regards the short-term interest rate assumptions underlying the forecast, the ECB and the Bank of England explicitly use market expectations. The Bank of England offers an alternative scenario based on the assumption of no change in the level of short-term interest rates. In the Fed-

eral Reserve, according to Mishkin (2007b), each FOMC participant makes his own forecast based on his own assessment of the “appropriate” path of monetary policy. The Bank of Japan seems to follow a similar approach. In fact, this leads to an issue raised recently, of whether or not the central bank should publish its own forecast of future policy rates, as some inflation-targeting central banks have been doing (Reserve Bank of New Zealand since 1997, Norges Bank since 2005 and Sveriges Riksbank since 2007). So far, none of the four big central banks publish their own policy rate forecast. However, as has been noted by Moessler and Nelson (2008), the Bank of Japan, the Federal Reserve and the ECB may be seen to have at times provided qualitative information about the future path of policy rates. One may argue that the Federal Reserve’s forecasts are indeed based on assumptions about its future policy rate path, while these assumptions are heterogeneous among the FOMC members and not documented or published.

Table 1

Monetary Policy Strategies in Comparison: Eurosystem, Federal Reserve System, Bank of Japan and Bank of England

	Eurosystem	Federal Reserve System	Bank of Japan (BoJ)	Bank of England (BoE)
Statutory monetary policy mandate	Primary goal: price stability. Without prejudice to price stability, the Eurosystem shall support the EU's general economic policies.	Law: Maximum employment, stable prices, moderate long interest rates. FOMC: sustainable growth and price stability.	BoJ's monetary policy should be <i>"aimed at, through the pursuit of price stability, contributing to the sound development of the economy."</i>	Price stability – i.e. low inflation – and, subject to that, support of Government's economic objectives.
Quantification of goal(s)	Definition of price stability by the Governing Council: HICP inflation below but close to 2% over the medium term in the euro area.	No published quantitative definition of monetary policy goals. Changing preferred inflation measure.	Price stability is defined by the Policy Board as approximately 0% to 2% CPI inflation in medium to long-term.	Price stability is defined by the Government's inflation target of 2% (no "goal independence").
Monetary policy strategy	Two-pillar strategy: economic analysis and monetary analysis.	No published monetary policy strategy. Various and changing doctrines such as "risk management approach" disseminated in speeches.	"Two perspectives approach." First perspective: growth and inflation over one to two years. Second perspective: longer term, explicit mention of low probability/large impact events.	Inflation targeting.
Transparency and communication	Press conference by ECB President after Governing Council meeting (including questions and answers). Introductory Statement refers to decisions, economic activity, inflation, outlook and risks, monetary developments, fiscal and structural policy issues. Printed statement (including questions and answers) released immediately after Governing Council meeting. Governing Council minutes released after 30 years.	Short FOMC press release after FOMC meetings (no press conference). Announces decisions and short, "standardized" assessment of economic activity and inflation (relative risks) and votes. Minutes of FOMC meetings within three weeks. Word protocol: released after five years.	Very short press release after Monetary Policy Meeting (no press conference). Announces decision, votes and persons present at the meeting. Minutes released one month later (at the earliest): decision, reasoning, votes.	Short Monetary Policy Committee (MPC) press release (no press conference): decision, assessment of economic activity and inflation. Minutes, including votes, two weeks after Monetary Policy Committee Quarterly Inflation Report.
Publication of forecasts	Frequency: quarterly. Forecasting horizon: next calendar year. Variables: inflation, real GDP, private consumption, government consumption, gross fixed capital formation, exports and imports of goods and services. All variables are published as ranges (based on past forecast errors). Discussion of risks: not in publication, but in Introductory Statement. Interest rate assumption: market expectations. Responsible: staff.	Frequency: quarterly. Forecasting horizon: three years. Variables: PCE inflation, core PCE inflation, real GDP, personal consumption. Range, central tendency and probability distribution of views of FOMC members. Discussion of risks: qualitatively. Interest rate assumption: Each FOMC participant makes his own forecast based on his own assessment of the "appropriate" path of monetary policy. Responsible: FOMC (based on individual members' forecasts).	Frequency: twice a year. Forecasting horizon: next fiscal year. Variables: Real GDP growth, CPI (excluding fresh food), domestic corporate goods price index. For all variables: median, range, and range excluding outliers. For GDP and CPI excluding fresh food: probability distributions (based on different Policy Board views). Discussion of risks: detailed qualitative and quantitative information. Interest rate assumption: not explained. Responsible: Policy Board (based on members' individual forecasts).	Frequency: quarterly. Forecasting horizon: three years. Variables: CPI inflation and real GDP growth. Mean and probability distributions ("fan charts"). Fan charts reflect the MPC's best collective assessment of outlook and risks. Discussion of risks: detailed qualitative and quantitative analysis. Interest rate assumption: market expectations, with additional scenario based on constant interest rates. Responsible: MPC.

Source: Statutes and websites of the four central banks.

3 Monetary Policy and Financial Stability: Mutual Influences, Central Bank Charters, and Central Bank Strategies

3.1 Complex Mutual Influences

Monetary policy and financial stability are linked through a number of channels. On the one hand, monetary policy needs stable financial institutions and markets, since the operational implementation of monetary policy as well as the transmission of official interest rate changes to the economy crucially hinges on well-functioning financial institutions and markets. Disruption in any segment of the transmission channel may affect the effectiveness of monetary policy in non-linear and unpredictable ways. Furthermore, financial market malfunctioning may affect aggregate demand and inflation, and thus interfere with the central bank's mandate.

On the other hand, banks crucially depend on the steady provision of central bank money. An elastic supply of liquidity in the event of temporary tensions, in particular if a financial institution faces liquidity shortages, ensures a smooth operation of the financial system. Financial markets should also be expected to generally benefit from a stable macroeconomic environment. A smooth business cycle reduces bankruptcies that would otherwise impact on banks and financial markets. Stable and low inflation contributes to stabilizing financial market expectations and helps to avoid large and unexpected transfers between creditors and debtors prompted by large swings in inflation.

For a long time, therefore, there was the perception that low inflation

would also support greater stability of financial markets (Issing, 2003). Against the experience of the past two decades, when inflation was low but financial crises were nevertheless recurrent, this view has been questioned (Crockett, 2003). Indeed, some have even argued that central banks' success in firmly anchoring inflation expectations in an environment of favorable supply shocks (e.g. from globalization and technological advances) may itself have become the source of financial market imbalances, by masking inflationary pressures resulting from globally loose monetary conditions and creating the conditions for over-optimism (see Borio and White, 2004; Borio, 2005).²⁸

Against the background of recurring financial crises and the repeated need for massive intervention by the central banks of major industrialized countries, the central banks' role in supporting financial stability has moved into the limelight. This role dates back to the origins of, and early writings on, central banking (Bagehot, 1873; Thornton, 1802). More recently, the topic has been discussed in two main directions: first, the reaction of central banks to emerging financial imbalances; second, the evolution of the central banks' function as a lender of last resort – in other words, the central banks' role in crisis prevention and in crisis management.²⁹

– *Preemptive Monetary Policy to Curb Emerging Financial Imbalances?*

The first branch of analysis addresses whether, how and to what extent monetary policy should, in a forward-looking manner, take into consideration

²⁸ For a sceptical note on this “paradox of credibility” view, see Issing (2003).

²⁹ A survey of a central bank's tool kit to deal with financial instability as well as a collection of past episodes of financial crises is Estrella (2001).

emerging financial imbalances, such as excessive credit and asset price growth, when determining the appropriate monetary stance. Put more bluntly, even if consumer price inflation is low, in line with the definition of price stability, should the central bank tighten monetary policy (and thus further curb inflation) in order to stop emerging financial imbalances (such as a housing price,³⁰ stock market or consumer credit bubbles, or a combination thereof) from developing further?

The main arguments in favor are that such financial imbalances, if they are allowed to grow further, will first cause an overheating of the economy, with the potential for strong inflationary pressures and then, once the bubble collapses, throw the economy into recession, potentially causing inflation to plunge below desired levels. Thus, monetary policy should act early to avoid severe damage later. The initial loss in output due to a monetary policy tightening beyond what is required to stabilize consumer prices over the short run can be viewed as an “insurance premium” (Bordo and Jeanne, 2002) against the later bigger damage of a boom and bust (Borio and White, 2004; Wadhvani, 2008).³¹

Many counterarguments have been brought forward against such leaning against the wind: With one instrument – the interest rate – central banks can only pursue one goal, namely the maintenance of consumer price stability. Furthermore, central banks are in no

better position to recognize the existence of financial imbalances than market participants. And even if they knew there were imbalances, it would be difficult to calibrate the appropriate interest rate response, given possible non-linear financial market behavior. Furthermore, raising interest rates in the face of emerging financial imbalances is a blunt instrument, which would have undesirable consequences for sectors not affected by the financial imbalances. At the political economy level, central banks would meet with opposition – and potentially come into conflict with their statutory mandate – should they tighten monetary policy to curb an emerging bubble, while consumer price inflation is low (Fisher, 2004 and 2005; Issing, 2003; Ferguson, 2003; Borio, 2006).

This view has in turn been criticized by the proponents of leaning against the wind on the grounds that failure to act preemptively against emerging financial imbalances results in asymmetric monetary policy behavior: Once the bubble bursts, monetary policy “mops up the mess” by cutting interest rates from already low levels and will likely be late in raising them to their equilibrium level later on, thus sowing the seeds for the next bubble. Furthermore, such asymmetric behavior creates moral hazard, thus increasing financial markets’ proneness to further crises. In this way, the central bank itself becomes the cause of “series bubbles” (Wadhvani, 2008).

³⁰ A discussion of the Federal Reserve’s policy since 2000 with implications for housing imbalances is Taylor (2007).

³¹ It has also been argued that also communication by the central bank in itself might play a useful role in counteracting the market information asymmetries, “moods” and resulting market failure which may drive asset prices away from fundamental values, by providing information that is less noisy or biased than information available from the private sector (Fisher, 2005; Ferguson, 2003). Improving common knowledge of fundamental valuations and risk by means of regular publications such as financial stability reviews may thus be seen as a separate instrument contributing to financial stability (Gai and Shin, 2003). A recent review of central banks’ financial stability reviews can be found in Čihák (2007).

More recently, arguments in favor of a forward-looking approach to financial imbalances have been broadened in the direction of creating “a new macro-financial stability framework to resist actively the inherent procyclicality of the financial system.” This framework would combine leaning against the wind by the central bank with macroprudential regulatory instruments. (BIS, 2008; Borio, 2006). This leaves open the issue of the optimal institutional implementation of such an approach.³²

– *Changing Nature of the Lender of Last Resort: “Mission Creep.” Effects on the Monetary Stance and Signaling, and Moral Hazard*

The 2007/2008 financial turmoil has highlighted the importance of liquidity for the smooth operation of the financial system. Before we proceed, it is useful to recall that the term “liquidity” may have different meanings in different contexts (Stevens, 2008; IMF, 2008). For the purposes here, the following dimensions of “liquidity” are relevant: *Central bank liquidity* refers to funds held by commercial banks at the central banks. They acquire such balances through the central bank’s open market or other monetary policy operations. *Funding liquidity* is the ability of an intermediary to raise the necessary cash to fund, or continue to fund, its chosen set of assets. In the 2007/2008 financial turmoil some banks and other financial intermediaries faced severe problems in funding their assets in wholesale markets, as they had become accustomed to do. *Transactional, or market, liquidity* is the ability to buy and sell assets without significantly affecting the price. During the 2007/2008

financial turmoil, transactional liquidity for many credit derivatives and other financial instruments was severely affected.

The provision of central bank liquidity to the banking system is at the very core of a central bank’s functions. This happens, on the one hand, in the context of regular liquidity operations aimed at implementing the central bank’s monetary stance: by providing an appropriate amount of central bank money, the central bank aims at keeping the interbank short-term money market rate close to target. In crisis situations, the lender of last resort takes on a different meaning: then, the central bank’s aim is to provide central bank money to financial institutions that are temporarily unable to meet their short-term payment obligations, in order to maintain or restore confidence in these institutions and in the financial system at large. This type of operation is often referred to as emergency liquidity assistance (ELA).

Although this task of the central bank is generally accepted, it also entails problems such as moral hazard: If the central bank can be expected to intervene when problems arise, then financial institutions might act less cautiously in the first place. The simple rule to solve this problem, recommended by Bagehot (1873), was to lend freely against good collateral at a high rate of interest. The precise terms and conditions in the practical implementation of lender of last resort operations remain a challenge to this date. In their money market interventions during the 2007/2008 financial turmoil, central banks tailored their lender of last resort

³² It has been widely argued (IMF, 2008) that the close links between monetary and financial stability concerns require close central bank involvement in financial supervision. Others have argued that different instruments are required to deal with these two separate functions. By entrusting two different institutions with their pursuit, but requiring close cooperation between them, the potential conflicts between the two objectives would be made explicit, which would contribute to transparent and socially optimal solutions (Fisher, 2004; Restoy, 2008).

operations in several dimensions: the circle of counterparties with access to the facilities, the eligible collateral, the maturity of the operations, and the interest rate charged on emergency lending facilities. Without going into detail,³³ the general tendency was to widen and facilitate access to central bank funding. This has raised the broader question of the widening scale and scope of the lender of last resort function in today's market-based, globalized and crises-prone financial markets (Crockett, 2008; BIS, 2008). Central banks traditionally used central bank liquidity to help banks maintain funding liquidity. In market based systems, however, maintaining market liquidity is also crucial for financial stability. Furthermore, systemic risks for financial stability may not only arise from banks, but also from other financial intermediaries. The question arises how far central banks' responsibilities to ensure financial stability should go in this new environment; and what is an appropriate sharing of responsibilities between central banks, financial supervisors and governments. The possibility of "mission creep," i.e. increasing responsibilities for central banks, resulting from actual practice rather than from design, was raised by BIS (2008) in this context, and will certainly be discussed further in the future.

Let us now explore why the lender of last resort, and its potential widening of scale and scope, may be relevant for monetary policy strategies. While seeming "technical" at first sight, the lender of last resort can interfere with the implementation of the monetary policy strategy in a number of ways. An aspect highlighted by the 2007/2008 financial crisis relates to the relation-

ship between the central bank's monetary stance and its liquidity policy. It has been argued that these two issues may be treated separately: The monetary stance is determined and measured by the central bank's policy interest rate(s). The central bank's liquidity policy aims to achieve a short-term money market rate close to the policy rate by injecting central bank liquidity into or withdrawing it from the banking system.

During times of financial tensions, however, the close links between these two tasks becomes obvious. Since money market rates become more volatile due to rising and time-varying risk-premiums and temporary liquidity shortages at some or more institutions. If money market rates deviate lastingly and substantially from the central bank's policy rate, this de facto affects the monetary stance, since money market rates will eventually also feed through to interest rates at longer maturities and those applicable between financial institutions and their customers (BIS, 2008).

Furthermore, (perceived or actual) lack of liquidity may cause banks to tighten their lending standards, resulting in lower credit volume at a given level of interest rate, and so affecting monetary policy transmission.

Finally, lasting deviations of market rates from the policy rates may blur the signal perceived by market participants on the central bank's desired monetary stance. The very large gross volumes of liquidity operations in periods of financial market tensions, possibly combined with resort to less frequently used or new operational procedures and instruments, may also blur information on the actual net volume of central bank

³³ For details of central banks' liquidity operations during the 2007/2008 financial turmoil see e.g. BIS (2008); Banque de France (2008); IMF, 2008, and individual central banks' official publications.

liquidity being injected into the market. For instance, in the 2007/2008 financial turmoil, the perception among the media, market participants and the general public was that the central banks' net liquidity injections were quite large, whereas central banks mostly modified their way of providing a given amount of liquidity. Such a perception of central banks "flooding" the market with liquidity could ultimately raise inflation expectations.

It has been argued (IMF, 2008) that central banks' differences in operating procedures may also have contributed to such problems of signaling. What may also have made it difficult to distinguish between monetary stance and emergency liquidity operations, however, were actual marked differences in interest rate policy responses to the financial turmoil. While the Federal Reserve lowered rates aggressively from mid-2007 onwards, the Bank of England made only a minor rate cut late in 2007, and the Bank of Japan left interest rates unchanged. The Eurosystem, after adopting a wait-and-see approach, even raised the main refinancing rate on July 3, 2008, in the face of mounting inflationary pressures. In real time, particularly during the initial phase of the crisis, it may not have been obvious for market observers whether these differences reflected: (a) different approaches to crisis management ("risk management approach" by the Federal Reserve as opposed to "steady hand" by the other central banks), (b) a different severity of the crisis of the financial sector in the various countries (stronger measures needed for U.S. financial

institutions), (c) a more severe general economic downturn in the U.S. than in the other countries, which would indeed justify a stronger loosening of the monetary stance, in parallel with and independently from emergency liquidity operations, or (d) differences in central bank mandates (Federal Reserve's dual mandate as opposed to priority for price stability in the other three central banks).

The risk of moral hazard referred to above was accentuated by the 2007/2008 financial crisis and central bank responses to it. As Goodhart (2008) put it: "*Why should banks bother with liquidity management when the central bank will do all that for them?*" Tirole (2008) argues that state intervention may in fact inject too much liquidity, due to capture by those who benefit from the injections at the cost of taxpayers,³⁴ and for reasons of time inconsistency, i.e. the incentive to boost the economy at a delayed cost which is not visible in the short term when the intervention occurs. The ad hoc adjustments to monetary policy operational frameworks (eligible instruments for collateral, list of counterparties, creation of entirely new facilities) made, in particular, by the Federal Reserve may be viewed as problematic because they may create the expectation that the rules of the game are subject to change at any time if only the emergency is big enough (BIS, 2008). Thus central banks' lender of last resort policy may feed back on financial stability, thus intensifying the future challenges for monetary policy strategies.

³⁴ Ewerhart and Valla (2008) argue that targeted liquidity assistance is preferable to market-wide, non-discriminatory liquidity injections, since liquidity may alternatively be used for speculative purposes during the crisis.

3.2 What Do the Four Central Bank Charters Say on Financial Stability?

Central banks generally say they are concerned with financial stability. This largely reflects necessity, as argued above. But to what extent do central bank laws support this view? Table 2 lists the relevant text passages from the four central banks' laws. A reading of the laws gives some hints, but is not fully conclusive. All central banks are charged with "ensuring" or "promoting" sound payments systems. This includes a lender of last resort function of the central bank, although only the Federal Reserve Act includes an explicit reference. Beyond this, the picture is diverse. The Bank of England's very general formulation of "supporting economic policies of the Government" is translated into rather detailed functions in a Memorandum of Understanding between the Bank of England and the Government (as quoted in Ferguson, 2003).

As do central bank laws in general, the legal texts with respect to central banks' role in financial stability change over time. With some lags, these changes are also influenced by dramatic events which act as triggers for legislative action. Currently, in the wake of the 2007/2008 financial crisis, a bigger role in financial stability and supervision is under discussion in both the United States and in the United Kingdom.

For the ECB, no general financial stability objective can be derived from the Treaty. However, some national central banks have financial stability figuring prominently among their objectives in their national statutes. The difference between the Treaty and national legislation may reflect an explicit and desired division of labor between tasks centralized at the European

level (monetary policy) and those that remain national (financial stability). In addition, it may also reflect diverse views across EU Member States on the appropriate role of central banks in financial surveillance and control. While in practice, this diversity has so far never led to conflicts of interest, e.g. in crisis situation, it might, however, create difficulties when it comes to forward-looking measures against emerging financial imbalances. This might be particularly so if these financial imbalances were limited to some countries (and might even be the result of regulatory and other policies in these countries). In this case, e.g. preemptive tightening by the Eurosystem to curb these imbalances might not be considered optimal, and other, national policy measures, e.g. in the prudential area, might be deemed more appropriate and acceptable.

3.3 How Do Financial Stability Concerns Fit into Various Monetary Policy Strategies?

For the purposes of this paper, it is also useful to consider how a forward-looking approach to financial imbalances would fit into various monetary policy strategies. Basically, there are several ways in which financial imbalances can enter the central bank's reaction function. *First*, they may enter indirectly through the (likely or potential) future effects on inflation and output. If the time horizon for monetary policy decisions is sufficiently long, i.e. beyond the traditional two years it takes for interest rates to unfold their effect on consumer price inflation, then the central bank might just incorporate emerging financial imbalances and their unwinding into their longer-term forecasts, which in turn inform monetary policy decisions. *Second*, financial imbalances could be explicitly seen as

risks to forecasts. This fits well with the “insurance view” explained above, which may also take care of high-risk/low probability events. *Third*, a central bank could explicitly take a separate, longer-term view, besides the one-to-two year perspective taken in the standard forecast.

It has been argued that “flexible inflation targeting” provides a suitable framework for using the first or second approach, since it allows changes in the time horizon and also provides some leeway with respect to reaching the inflation target. The Sveriges Riksbank is an often quoted example of a central bank explicitly leaning against the wind of emerging financial imbalances within an inflation-targeting framework. The

minutes of the Bank of England’s Monetary Policy Committee repeatedly (e.g. March 2004, May 2005) include references to members raising concerns about unsustainable house price developments and household debt, as well as adverse consequences for demand once the imbalances unwind.

Both the Eurosystem and the Bank of Japan use the third approach. The Eurosystem’s monetary pillar explicitly takes a longer-term perspective, its focus on money and credit developments seems well suited to detect financial imbalances (Detken and Smets, 2004). The Bank of Japan’s “second perspective” explicitly refers to the “longer term” and to “risk factors that will sig-

Table 2

Statutory Role of Financial Stability in the Eurosystem, Federal Reserve System, Bank of Japan and Bank of England

Eurosystem	Federal Reserve System	Bank of Japan (BoJ)	Bank of England (BoE)
<p>ESCB/Eurosystem/ECB:</p> <ul style="list-style-type: none"> • “without prejudice to the objective of price stability, support the general economic policies in the Community.” • “promote the smooth operation of the payment system” (Article 105(2) fourth indent of the Treaty establishing the European Community). • “The ESCB shall contribute to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions and the stability of the financial system” (Article 105(5) Treaty). <p>NCBs: diverse involvement in banking; financial market supervision depending on national laws.</p>	<ul style="list-style-type: none"> • 1913: “... to furnish an elastic currency, to afford means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States ...” • 1933: Emergency lending powers. • 1977: “The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long-run growth of the monetary and credit aggregates commensurate with the economy’s long-run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices and monetary long-term interest rates.” <p>Ongoing discussion on bigger role.</p>	<ul style="list-style-type: none"> • “In addition ... the Bank’s objective is to ensure smooth settlement of funds among banks and other financial institutions, thereby contributing to the maintenance of an orderly financial system.” • “Currency and monetary control shall be aimed at, through the pursuit of price stability, contributing to the sound development of the national economy.” 	<ul style="list-style-type: none"> • “subject to [maintaining price stability], support the economic policies of Her Majesty’s Government ...” • Note: Memorandum of Understanding between the Bank of England and the Government that delineates the Bank’s responsibilities in the area of financial stability. It assigns the Bank of England responsibility in three broad areas: stability of the monetary system, stability of financial system infrastructure particularly in the area of payments systems, and monitoring of the financial system as a whole. <p>Ongoing discussion on bigger role, with advisory Financial Stability Committee.</p>

Source: Ferguson (2003), Issing (2003). Adapted.

nificantly impact economic activity and prices when they materialize although the probability is low” (Bank of Japan, 2006). This formulation is obviously inspired by Japan’s experience in the 1990s to early 2000s, but also by recent research on optimal policy.

Given its very broad mandate, and the lack of a public strategy, the Federal Reserve would appear in principle to have all the options available.

4 Monetary Policy Strategies in Practice – What Role for Financial (In)Stability? Some Empirical Results

4.1 Taylor Rules as a Tool to Study the Role of Financial Imbalances in Central Banks’ Interest Rate Setting

Section 3 discussed whether and why financial imbalances may prompt central bank policy reactions, such as leaning against the wind through tighter interest rates while imbalances are building up, and “mopping up” through liquidity operations or interest rate cuts once a crisis has broken out. A number of accounts and analyses on central banks’ liquidity operations in response to the 2007/2008 financial turmoil have been published recently (see e.g. IMF, 2008; BIS, 2008; as well as the official bulletins of the various central banks); they are not considered in this article. Instead, our focus here is on central banks’ interest rate policy.

One way to study this question is to use Taylor rules. Since the publication of John Taylor’s seminal work on monetary policy rules (Taylor, 1993), a myriad of studies have estimated reaction functions of central banks and evaluated or predicted interest rate changes based on the simple but powerful empirical relationship between interest rates, the output gap and inflation (usually after controlling for inter-

est rate persistence and any other relevant variables). This simple rule merges the appeal of simplicity in modeling with the intuition that the central bank adjusts the policy rate to “*lean against the wind of aggregate demand shocks and take a balance approach to aggregate supply shocks*” (Asso et al., 2007). Although, in view of the discussion above, one would expect interest in quantifying the reaction of central banks to financial instability episodes, few pieces of academic literature have explicitly dealt with this problem in the framework of Taylor rules.

One option is to use simple Taylor reaction functions, which only include the inflation gap, output and, possibly, an interest-smoothing term as explanatory variables, and see whether a central bank’s actual behavior during a period of financial imbalances deviates from this function. Following such an approach, in a study on 38 asset price booms between 1970 and 2002 in 18 OECD countries, Detken and Smets (2004) find that central banks generally did not raise real interest rates during periods of asset price booms, despite rising output gaps (i.e. above-potential real growth rates) and broadly constant inflation gaps, thus causing a substantial loosening of the monetary policy stance. In other words, central banks accommodated the emerging financial imbalances.

BIS (2008) compares central banks’ actual interest rate behavior after mid-2007 with simple estimated Taylor rules for a number of countries. The result for the four central banks in question is that the ECB, the Bank of England and the Bank of Japan did not show any exceptional behavior in the aftermath of the crisis. By contrast, the Federal Reserve brought the policy rate down by March 2008 to roughly 1.75 percentage points below the level im-

plied by the Taylor rule.³⁵ This suggests that the Federal Reserve may have reacted to strong downward revisions in growth and inflation forecasts, be it in the baseline forecast or in a low probability/high impact scenario. High downward risks for growth and inflation from the ailing financial and housing sectors may have figured prominently in such a pessimistic scenario. The latter explanation is supported by a close correlation between various central banks' changes in policy rates and the extent of turmoil in money markets: Stronger financial market tensions could be seen as indicators of more severe downward risks to the economy (BIS, 2008).³⁶

Another way of using Taylor rules to study the link between central banks' interest rate policy and financial crises is to include proxies for financial imbalances in the estimated Taylor reaction function. Following this approach, Cecchetti (2003) finds that, over the period from 1990 to 2003, the Federal Reserve reacted to equity market bubbles and banking system stress: judging from his Taylor rule estimates, the Federal Reserve increased interest rates in the face of an equity price bubble (as measured by a reduction in the equity premium), and cut interest rates when bank balance sheets were coming under pressure (as measured by an increase in banking system leverage). The author also reports similar results for Germany (1979–1993) and Japan (1979–2001), with the notable difference that the Bank of Japan appeared to

have reacted far more aggressively than the other two central banks to asset price bubbles, while the response to changes in the banking system leverage shows the wrong sign.

Gerlach-Kristen (2004) investigates for the U.S.A. whether interest-rate smoothing found in empirical estimates of Taylor rates might partly be due to variables omitted in those estimates. She finds that including an unobserved variable correlated with risk spreads in financial markets reduces the empirical importance of policy inertia. She concludes that U.S. interest rates seem to be set gradually in reaction to inflation, the output gap and financial market conditions: In periods of financial stress, interest rates tend to be lowered more than inflation and the output gap would suggest.

Borio and Lowe (2004) include financial stability proxies (credit and equity gaps, measured as deviations from a Hodrick-Prescott trend) in Taylor-rule models for Germany, the United States and Japan and conclude that central banks respond asymmetrically (if at all) to financial imbalances. Furthermore, substantial differences appear across countries; financial imbalances appear to have comparatively more influence on the central bank's interest rate setting behavior in the United States, relative to the other countries under study. Cecchetti and Li (2005) introduce banking stress in an otherwise standard aggregate demand-aggregate supply model and derive the optimal monetary policy

³⁵ The estimated Taylor interest rates in BIS (2008) are based on contemporaneous inflation, the contemporaneous output gap and the lagged interest rate. One could argue that a more realistic description of central banks' interest setting should be based on forecasts of inflation and the output gap in one or two years. The use of contemporaneous explanatory variables could exaggerate the "specialness" of the Federal Reserve's sharp interest rate cutting, since the latter might also be justified by a strong downward revision in the growth and inflation outlook.

³⁶ The correlation also remains after controlling for the effect of revisions in growth and inflation forecasts. Money market turbulences are measured by the average spread between three-month Libor and overnight index swaps of the same maturity.

corresponding to this framework. They conclude that monetary authorities should react to the banking system's balance sheet by decreasing the policy rate as a response to banking stress. The empirical evidence presented by these authors indicates the Federal Reserve indeed reacted to banking stress in this way, while no evidence was found for Japan and Germany.

Gerlach (2007) estimates modified and extended monetary policy reaction functions for the Eurosystem, which include subjective measures of economic growth, rather than output gaps, and money growth as explanatory variables. He finds that the Governing Council reacts to real variables (and thus to demand-pull inflation) but not to supply-push inflation. Regarding the role of money, he finds that money growth influences the Governing Council's decisions in periods when expected growth is high and the risk of inflation is perceived to be greater. This result confirms the relevance for the Eurosystem's actual policy-making of regular cross-checking of short-term economic developments with the longer-term perspective embodied by the monetary pillar.

Finally, from a theoretical point of view, Bauducco et al. (2008) model the response of the central bank to financial instability in the framework of a standard New Keynesian model. Their conclusion is that the standard Taylor rule is a suboptimal reaction function of the central bank as compared to an augmented rule, whereby the central bank decreases interest rates as a reaction to financial sector instability.

4.2 Do Financial Imbalances Affect the Speed of Interest Rate Adjustments?

The usual approach to the empirical assessment of central bank reactions to

financial instability implies the estimation of otherwise classical Taylor rules augmented with variables aimed at proxying financial imbalances. Usually, price-to-earning ratios or leverage ratio gaps are the variables which proxy for financial stability. In this section, we will follow a somewhat different approach. In particular, we do not assume that financial stability affects the policy rate directly. Instead, we hypothesize that the monetary authorities react to financial stress by adjusting the interest rate to the desired rate at a different speed in times of financial instability. This implies that it is the *persistence* of interest rates which will be affected by financial stress.

The analytical framework behind the reaction function can be described as follows (Clarida et al., 1998). Assume that monetary policy in the economies under study can be represented by an interest rate feedback rule such that the central bank sets the short-term interest rate depending on a desired target level of the interest rate, the expected future inflation rate (as compared to a target value) and the observed output gap. In order to account for the observed persistence of interest rate data, we assume that the central bank smooths interest rate changes, so that the actual interest rate is a weighted average of the policy rate implied by the interest rate rule and the last interest rate value observed. The dynamics of nominal interest rates are therefore given by

$$i_t = (1 - \rho)(1 - \delta)\pi^* + (1 - \rho)r^* + (1 - \rho)\delta \pi_{t+n} + (1 - \rho)\gamma g_t + \rho i_{t-1} + \varphi_t$$

where r^* is the natural real interest rate (defined as the nominal interest rate desired by the central bank for zero inflation and zero output gap, minus target inflation, π^*), ρ is the smooth-

ing parameter and δ and γ are the elasticities of the policy rate to inflation (π) and the output gap (g), respectively. The error term, φ_t , is partly composed by the forecast errors in predicting the inflation rate, the natural rate of interest and the output gap. Since this means that some of the explanatory variables in the model are potentially correlated with the error term, usually instrumental variables or generalized method of moments (GMM) methods need to be used in order to obtain estimates of the response elasticity of the interest rate to inflation and the output gap, as well as the persistence parameter.

We estimate the Taylor rule using quarterly data for the economies under study using GMM methods (the source of the data is the OECD statistical compendium) for the samples available for each country. The output gap is estimated as the filtered estimate of the cyclical components of GDP in an unobserved components model resembling simple trend-extraction procedures such as the Hodrick-Prescott filter.³⁷ The natural rate of interest is proxied by the average ex ante real interest rate for the corresponding country (as in Clarida et al., 1998). Lagged values of the explanatory variables were used as instruments for the estimation, as is standard in the modern literature of Taylor rule estimations. The parameter estimates are presented in the appendix.

The estimated Taylor rates (the rate of interest preferred by the central bank according to the estimated reaction function) are presented in chart 2 together with the actual interest rate, the inflation rate and the output gap series, as well as a measure of financial market

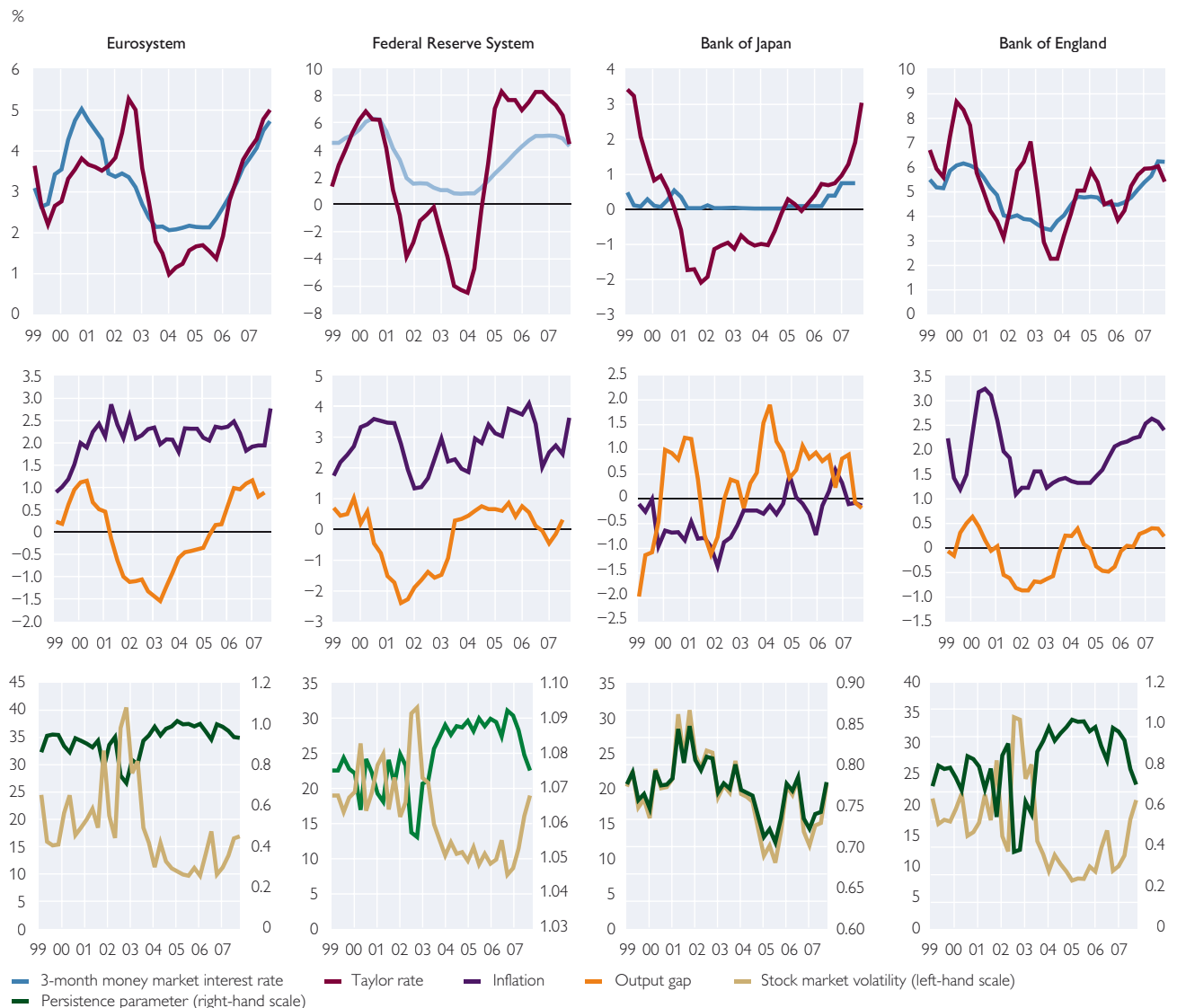
volatility for the period from 1999 to 2005.³⁸ We use observed historical return volatilities for the following indices in order to proxy for financial (in)stability: DJ EURO STOXX price index (euro area), S&P 500 Composite price index (U.S.A.), Nikkei 225 stock average price index (Japan) and FTSE 100 price index (U.K.). By using this measure of financial instability we somehow move away from the existing empirical literature, which tends to concentrate on equity and asset price levels. Since the second moment of asset price returns data for low frequencies is a plausible measure of stability in financial markets, we believe that the use of this variable is also an interesting value added of this contribution.

The resulting Taylor rates shown in chart 2 present the usual characteristics expected from the policy rate in a reaction function: it tends to be positively correlated to inflation and output gap developments, and it reacts in a particularly strong manner to inflation dynamics. Surprisingly, negative values of the Taylor rule appear for the case of the U.S.A. and Japan in the first years of the current decade. While this is in line with the observations of many other economic analysts and empirical research for the case of Japan, it does not appear justified for the U.S. case. This counterintuitive result may be taken as a sign of misspecification of the Taylor rule related to the linearity which is assumed in the interest rate setting behavior of the central bank. In the light of the discussion concerning the zero lower bound of interest rates, nonlinear monetary policy response functions may prove helpful in correcting these estimates. Such an analysis is,

³⁷ We use filtered estimates (instead of the usual smoothed estimates) to allow for the fact that central bank policies at a given point in time are carried out solely on the basis of information available up to that time period.

³⁸ We smoothed the Taylor rate by taking three-year moving averages, in order to avoid short-lived spikes.

Monetary Policy and Financial Market Volatility: Do Central Banks Change the Speed of Interest Rate Adjustment?



Source: OeNB.

however, outside the scope of this contribution. The low speed of adjustment of actual interest rates to the estimated desired policy rate implies that persistence plays an important role in interest rate dynamics for the economies in our study. Casual observation of the volatility series and the interest rate data, as well as estimation results, do not unveil any significant direct effect of financial stability on the level of the

policy rate set by the central banks under study. Financial stability concerns, however, may affect the interest rate setting behavior of central banks in more indirect ways, for instance by changing the momentum of past interest rates in current monetary policy decisions (without necessarily changing the optimal policy rate chosen by central banks).

We thus enlarge the specification by allowing financial instability to affect the adjustment of the policy rate to the targeted interest rate. The premise underlying this approach can be found in Mishkin (2008), who assesses the monetary policy challenges implied by financial market turmoil. In particular, Mishkin (2008) argues that central banks should exhibit flexibility in dealing with risks emanating from financial markets, to the extent that they may affect macroeconomic risks. As a simple test for this type of behavior in the framework of the Taylor rule model put forward above, we can check whether the inertia of interest rate setting, measured by the persistence parameter of interest rates, ρ , is different in volatile versus quiet times in financial markets. We therefore re-estimate the above specification assuming that the persistence parameter is a linear function of financial stability.

Our results are presented in the lower panels of chart 2, which presents the implied persistence parameters from the estimations of this model. With the exception of Japan, on average higher volatility in the respective financial market tends to run in parallel with lower inertia in the central bank's interest rate setting. The effect is, however, not significant for the Eurosystem and the Federal Reserve, but strongly significant for the Bank of England.

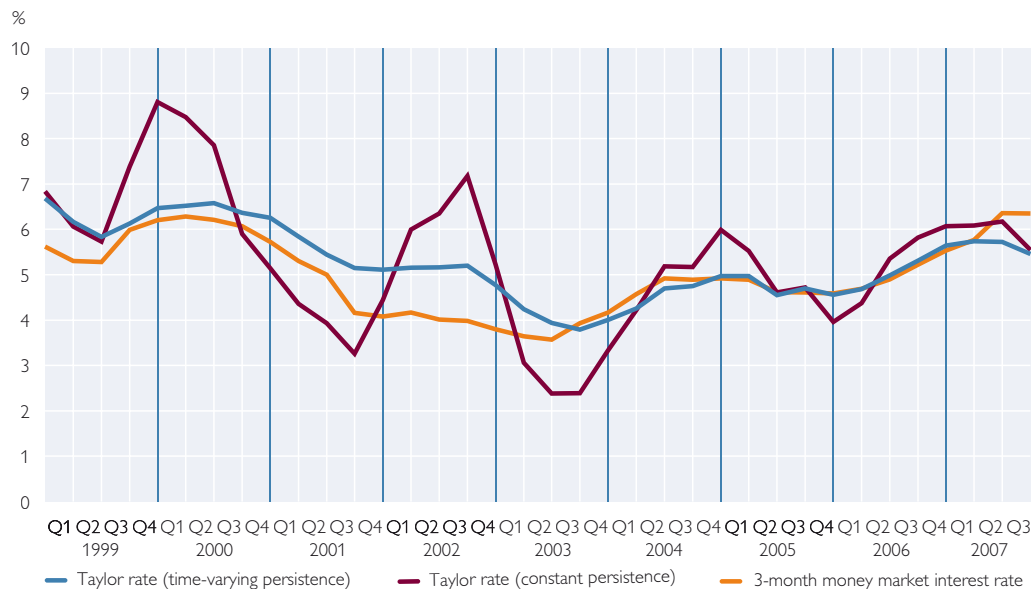
In the case of the Bank of England, the effect is also quantitatively strong, with the estimated persistence parameter of interest rates fluctuating between 0.4 for the episodes of highest volatility and unity for the times with lowest volatility. The results imply that interest rate setting by the Bank of England is consistent with the view put forward in Mishkin (2008), which allows for less inertia in monetary policy when

financial market risks are sizeable. Barker (2007) assesses the interest rate policy of the Bank of England in the last ten years, thus corresponding to the sample used here. She stresses the differential importance of financial market conditions for the inertia of interest rates setting in the U.K. In particular, she shows that interest rates in the U.K. are less persistent than in the U.S.A. (a result which is consistent with our estimations) and that the equity risk premium can partly explain this difference. She concludes that the differences observed between Taylor rule estimates for the U.S.A. and the U.K. can be partly explained by the different importance of financial market variables for interest rate policy. Our results give strong empirical evidence to support this view.

Further evidence on this view is provided by Cobham (2003), who studies the minutes of the Policy Committee in order to assess the determinants of interest rate smoothing in the Bank of England's monetary policy. He finds that the Bank of England's reactions to financial market volatility often take the form of unexpected interest rate changes, thus concluding that the desire to avoid financial market volatility has contributed to less inertia in monetary policy in the U.K. The improvement in the estimates implied by explicitly modeling the effect of financial stability on interest rate persistence can also be observed in the corresponding Taylor rate resulting from the model with time-varying persistence, which is shown in chart 3. The Taylor rate for the model where interest rate persistence depends on financial (in)stability appears less volatile than the rate implied by the standard Taylor rule and traces the dynamics of the actual interest rate in a more realistic fashion.

Chart 3

Estimated Taylor Rates for the Bank of England, Modeled with and without Financial Stability Variable



Source: OeNB.

5 Conclusions

This study has investigated to what extent the monetary policy strategies of the big four central banks of major industrialized countries differ, with a special emphasis on the role of financial stability concerns. The study found a number of – formal and actual – differences regarding the central banks’ objective(s), approaches to achieve the objective(s), and communication. This may reflect many underlying reasons, such as history (when and under which circumstances were central bank charters designed and passed by legislators), the overall geographical and political structure of the currency area (uniform state, federation, multi-country area), different economic structures (financial systems, price and wage setting mechanisms, monetary transmission), different views on how the economy works, but also different national preferences on the central bank’s role and appropriate approach to pursuing its mandate.

Regarding the relationship between monetary policy and financial stability, there is overwhelming consensus among the four central banks that financial stability is a major concern for central banks also in the conduct of their monetary policy. Many see the recent 2007/2008 financial crisis as yet another strong reminder that central banks need to take a longer-term and broader view than might have been suggested only a few years ago by proponents of, e.g., strict inflation targeting. In adopting its two-pillar approach, the Eurosystem appears to have recognized this at a very early point in time. The Bank of Japan’s “two perspectives approach,” while phrased slightly differently, harbors a similar aim, namely to use in parallel various time horizons – shorter and longer – in making monetary policy decisions. The “risk approach to monetary policy,” pioneered by the Federal Reserve, is equally present in the Eurosystem’s and Bank of Japan’s strategies.

The other reason for central banks' obvious concern with financial markets and stability is their role as lender of last resort, with all its implications for, and potential interactions with, not only the operational implementation of monetary policy, but also for their credibility as competent and reliable policy institutions. To fail in the role of lender of last resort would have repercussions on a central bank's reputation in its macroeconomic monetary policy function. It has also been shown that the lender of last resort function can pose challenges, not least for communication, such as keeping the macroeconomic aspect of the monetary stance separate from the microeconomic aspect of liquidity operations. Intervening in the market during times of stress, as the major central banks have also done during the 2007/2008 financial crisis, also creates risk of moral hazard. While central banks have been praised for their flexibility in dealing with the recent crisis, this very flexibility may also create the risk of expectations of increasing emergency interventions by central banks, a phenomenon which the BIS (2008) has appropriately termed as "mission creep."

Empirical estimates of Taylor-type reaction functions, augmented for a measure of financial (in)stability, confirm that the differences in the level and variability of policy interest rates across the four central banks cannot simply be taken to suggest one-for-one differences in the policy stance. We found some relevant differences in the reaction elasticities to inflation and the output gap, as well as significant effects of financial instability on the interest rate setting behavior of the Bank of England which are in line with the theoretical view that less inertia in monetary policy should be allowed for in times of financial market risks.

Future econometric studies will be able to benefit from more evidence of central banks' reaction to the current financial crisis.

As the evolving economic literature and the debates in policy circles seem to indicate, the 2007/2008 financial crisis may become a defining moment in economic history, triggering some fundamental rethinking of received wisdom, and adjustments in established practices. A number of issues will have to be resolved, such as: Should some "leaning against the wind" of emerging financial imbalances, which has so far mainly been theorized about (except for a few notable exceptions), become a standard feature in central banks' policy repertoire? Would it fit in with central bank mandates as they now stand? Could the potential politico-economic resistance be overcome with good arguments? Should there be closer coordination between central banks and supervisors, to create a forward-looking macro-financial stability policy as proposed by the BIS (Borio and Shim, 2007; BIS, 2008)? In the event of another crisis, how could monetary and supervisory authorities as well as governments worldwide cooperate even more efficiently? Is there an optimal institutional model for organizing financial market supervision? Can individual monetary policies, geared towards price stability, in the face of important spill-over's from inflationary pressures, financial imbalances and their unwinding, successfully achieve their aim? How can global demand and supply, and thus inflation, developments be adequately incorporated in the various monetary policies, in order to recognize that, in a globalized economy, there are no more "external shocks" but, in the aggregate, only endogenously generated ones? (BIS, 2008).

It will take some time to address these many important and complex questions, and agreement will not be reached on all of them. In this process, the four central banks will continue to refine their monetary policy strategies to provide adequate solutions to the monetary policy challenges in a changing world.

Annex Taylor Rule Estimates

For the estimates we follow Clarida et al. (1998) and assume that the monetary policy in the economies under study can be represented by an interest-rate feedback rule such that the central bank sets the short-term interest rate (\tilde{i}_t) according to

$$\tilde{i}_t = i^* + \delta[E(\pi_{t+n} - \pi^* | \Omega_t)] + \gamma[E(g_t | \Omega_t)] \quad (1)$$

where i^* is the nominal interest rate target. Monetary policy reacts to changes in the deviation of expected inflation (we hence consider a forward-looking rule) from some target value (π^*) and to changes in the output gap, g_t . In terms of the real interest rate, this implies that

$$\tilde{r}_t = \tilde{i}_t - E(\pi_{t+n} | \Omega_t) = r^* + (\delta - 1)[E(\pi_{t+n} - \pi^* | \Omega_t)] + \gamma[E(g_t | \Omega_t)] \quad (2)$$

where r^* , which we interpret as the real natural rate of interest, is defined as the difference between the nominal interest rate target and the inflation target. We further assume interest rate smoothing, so that the actual interest rate is a weighted average of the policy

rate implied by (1) and the last interest rate value observed,³⁹

$$i_t = (1 - \rho)\tilde{i}_t + \rho i_{t-1} + \zeta_t \quad (3)$$

where $\rho \in [0,1]$ is the smoothing parameter and ζ_t is assumed to be an i.i.d. error. Combining equations (2) and (3), we can write

$$i_t = (1 - \rho)(1 - \delta)r^* + (1 - \rho)r^* + (1 - \rho)\delta \pi_{t+n} + (1 - \rho)\gamma g_t + \rho i_{t-1} + \varphi_t \quad (4)$$

where r^* is the natural real interest rate (defined as the natural nominal interest rate minus target inflation), and the error term, φ_t , is a linear combination of the error in (3) and the forecast errors in predicting the inflation rate, the natural rate of interest and the output gap. The output gap was estimated using the filtered unobserved components of a state space model resembling the Hodrick-Prescott filtering procedure, by means of Kalman filtering in the spirit of Harvey (1989) and Harvey and Jaeger (1993). We therefore assess at least partly the issue of interest rate setting under uncertainty of the output gap estimate: we use the filtered estimate of the stationary component of GDP, which exploits information on the variable up to time t instead of the smoothed estimate, which is usually used in the literature and exploits information of the full sample.

The estimates of the parameters in (4) using the data described in the text can be found in table A1. The Sargan test for overidentifying restrictions does not present any evidence of misspecification in any of the countries considered, and all the significant parameters are correctly signed. The

³⁹ The issue of the nature of persistence in interest rate setting behavior is not without controversy. We abstract from implying that interest rate momentum is exclusively a result of sluggish partial adjustment of policy interest rates, as it may also reflect the effect of omitted variables. For an enlightening discussion, see Rudebusch (2006).

Table A1

Monetary Policy Reaction Functions

Parameter	Euro area	U.S.A.	Japan	U. K.
ρ	0.89*** (0.023)	0.957*** (0.023)	0.933*** (0.032)	0.864*** (0.047)
δ	3.579** (1.619)	2.430* (1.327)	2.257*** (0.558)	1.819*** (0.259)
γ	2.495*** (0.537)	3.075 (2.385)	0.867 (0.778)	-0.058 (0.394)
Implied ρ^*	2.239 (0.164)	3.835*** (0.689)	1.052* (0.565)	0.959* (0.646)
# Observations	47	127	97	102
Sample period	Q2 96 bis Q4 07	Q1 74 bis Q3 07	Q4 80 bis Q4 05	Q4 82 bis Q4 07
Sargan test	11.192 ($p = 0.594$)	15.550 ($p = 0.274$)	11.746 ($p = 0.548$)	11.843 ($p = 0.541$)

Source: OeNB.

Note: Robust standard errors in parenthesis. * (**) [***] stands for significance at the 10% (5%) [1%] significance level. Estimation carried out by GMM, using lagged values up to one year of interest rates, inflation and the output gap as instruments. „Sargan test“ is the test statistic and corresponding p-value of the test statistic for the validity of the overidentifying restrictions in the GMM setting.

estimated responses to inflation imply that all of the central banks under study carried out disinflationary policies in the periods considered.

The specification enlarged by allowing financial instability to affect the adjustment of the policy rate to the targeted interest rate is given by

$$i_t = (1 - \rho(v_t))(1 - \delta)\pi^* + (1 - \rho(v_t))r^* + (1 - \rho(v_t))\delta\pi_{t+n} + (1 - \rho(v_t))\gamma g_t + \rho(v_t)i_{t-1} + \varphi_t \quad (5)$$

where the persistence parameter is a (linear) function of the financial stability variable

$$\rho(v_t) = \rho_0 + \rho_1 v_t \quad (6)$$

We use the observed historical return volatilities for the indices reported in the text since 1997 in order to estimate the model given by (5)–(6). The estimates of (6) are presented in table A2, and were used to compute the time-varying persistence parameters presented in the text.⁴⁰

Table A2

Financial Market Volatility and Interest Rate Inertia

Parameter	Euro area	U.S.A.	Japan	U. K.
ρ_0	1.089*** (0.161)	1.103*** (0.099)	0.646* (0.343)	1.202*** (0.070)
ρ_1	-0.009 (0.009)	-0.002 (0.006)	0.007 (0.014)	-0.024*** (0.005)
# Observations	41	40	32	41
Sample period	Q1 97 bis Q4 07	Q1 97 bis Q3 07	Q1 97 bis Q4 05	Q1 97 bis Q4 07
Mean volume	18.352	16.573	21.399	16.395
Standard deviation of volume	7.617	5.891	5.581	6.646
Minimum volume	8.135	7.557	10.318	7.702
Maximum volume	40.418	31.331	34.533	34.298

Source: OeNB.

Note: Robust standard errors in parenthesis. * (**) [***] stands for significance at the 10% (5%) [1%] significance level. Estimation carried out by GMM, using lagged values up to one year of interest rates, inflation and the output gap as instruments.

⁴⁰ The GMM estimates presented in table A2 are obtained using the same set of instruments as in the standard Taylor rule estimates. Alternative specifications were also estimated assessing the potential endogeneity of financial stability by using lagged values of the return volatility variable as instruments, leaving the conclusions of the paper unchanged. These results are available from the authors upon request.

References

- Altissimo, F., M. Ehrmann and F. Smets. 2006.** Inflation Persistence and Price-Setting Behavior in the Euro Area. A Summary of the Evidence. ECB Occasional Series 46. June. www.ecb.int/pub/pdf/scpops/ecbocp46.pdf
- Arnone, M., B. J. Laurens, J.-F. Sgalotto and M. Sommer. 2007.** Central Bank Autonomy: Lessons from Global Trends. IMF Working Paper WP/07/88. <http://imf.org/external/pubs/ft/wp/2007/wp0788.pdf>
- Aso, P. F., G. A. Kahn and R. Leeson. 2007.** The Taylor Rule and the Transformation of Monetary Policy. Federal Reserve Bank of Kansas Research Working Paper RWP 07–11.
- Bagehot, W. 1873** Lombard Street – A Description of the Money Market. Reprint. Smith, Elder & Co. 1912.
- Bank of England. 2007.** The Monetary Policy Committee of the Bank of England: Ten Years On. The Bank of England's Submission to the Treasury Committee Inquiry Regarding the Economic Context. In: Bank of England Quarterly Bulletin 2007 Q1. 24–38. www.bankofengland.co.uk/publications/quarterlybulletin/qb0701.pdf
- Bank of Japan. 2006.** The Introduction of a New Framework for the Conduct of Monetary Policy. www.boj.or.jp/en/type/release/zuiji_new/mpo0603a.htm
- Banque de France. 2008.** Financial Stability Review 11. Special Issue on “Liquidity.” February.
- Barker, K. 2007.** Interest Rate Changes – Too Many or Too Few? Bank of England Quarterly Bulletin 2007 Q2.
- Bauducco, S., A. Bulir and M. Čihák. 2008.** Taylor Rule Under Financial Instability. IMF Working Paper WP/08/18. IMF. Washington D.C.
- Bean, C. and N. Jenkinson. 2001.** The Formulation of Monetary Policy at the Bank of England. In: Bank of England Quarterly Bulletin. Winter 2001. 434–441. www.bankofengland.co.uk/publications/quarterlybulletin/qb0104.pdf
- Bernanke, B. S. 1999.** Inflation Targeting. Princeton University Press.
- Bernanke, B. S. 2003a.** A Perspective on Inflation Targeting. Remarks at the Annual Washington Policy Conference of the National Association of Business Economists. Washington, D.C. March 25. www.federalreserve.gov/Boarddocs/Speeches/2003/20030325/default.htm
- Bernanke, B. S. 2003b.** An Unwelcome Fall in Inflation. Remarks before the Economics Roundtable. University of California. San Diego. La Jolla, California. July 23. www.federalreserve.gov/boarddocs/speeches/2003/20030723/
- Bernanke, B. S. 2004a.** FedSpeak. Remarks at the Meetings of the American Economic Association. San Diego. California. January 3. www.federalreserve.gov/BOARDDOCS/SPEECHES/2004/200401032/default.htm
- Bernanke, B. S. 2004b.** Gradualism. Remarks at an Economics Luncheon Co-Sponsored by the Federal Reserve Bank of San Francisco (Seattle Branch) and the University of Washington, Seattle. Washington D.C. May 20. www.federalreserve.gov/boarddocs/speeches/2004/200405202/default.htm
- Bernanke, B. S. 2004c.** Central Bank Talk and Monetary Policy. Remarks at the Japan Society Corporate Luncheon. New York. October 7. www.federalreserve.gov/Boarddocs/Speeches/2004/200410072/default.htm
- Bernanke, B. S. 2004d.** The Great Moderation. Remarks at the Meetings of the Eastern Economic Association. Washington D.C. February 20. www.federalreserve.gov/BOARDDOCS/SPEECHES/2004/20040220/default.htm

- Bernanke, B. S. 2007.** Monetary Policy under Uncertainty. Remarks at the 32nd Economic Policy Conference. Federal Reserve Bank of St. Louis (via videoconference). October 19.
www.federalreserve.gov/newsevents/speech/bernanke20071019a.htm
- Bernanke, B. S. and V. R. Reinhart. 2004.** Conducting Monetary Policy at Very Low Short-Term Interest Rates. Paper presented at the Meetings of the American Economic Association. San Diego, California. January 3.
www.federalreserve.gov/boarddocs/speeches/2004/200401033/default.htm
- Billi, R. M. and G. A. Kahn. 2008.** What is the Optimal Inflation Rate? In: Federal Reserve Bank of Kansas City. Economic Review. 2nd quarter 2008. 5–29.
- Bini Smaghi, L. 2008.** Financial Stability and Monetary Policy: Challenges in the Current Turmoil. Speech at the CEPS Joint Event with Harvard Law School on the EU-US Financial System. New York. April 4.
www.ecb.int/press/key/date/2008/html/sp080404.en.html
- BIS. 2007.** 77th Annual Report. Basel.
- BIS. 2008.** 78th Annual Report. Basel.
- Bordo, M. and O. Jeanne. 2002.** Monetary Policy and Asset Prices: Does “Benign Neglect” Make Sense? IMF Working Paper 02/225.
- Borio, C. 2005.** The Search for the Elusive Twin Goals of Monetary and Financial Stability. Paper presented at the 2nd DG ECFIN Research Conference. European Commission. October.
- Borio, C. 2006.** Monetary and Prudential Policies at a Crossroads? New Challenges in the New Century. BIS Working Paper 216. September.
- Borio, C. and P. Lowe. 2004.** Securing Sustainable Price Stability: Should Credit Come Back from the Wilderness? BIS Working Paper 157.
- Borio, C. and W. White. 2004.** Whither Monetary and Financial Stability? The Implications of Evolving Policy Regimes. In: Monetary Policy and Uncertainty: Adapting to a Changing Economy. Proceedings of a Symposium Sponsored by the Federal Reserve Bank of Kansas City. Jackson Hole. August 28–30. 131–211. Also available as BIS Working Paper 147. February.
- Borio, C. and I. Shim. 2007.** What Can (Macro)prudential Policy Do to Support Monetary Policy? BIS Working Papers 242.
- Borio, C., W. English and A. Filardo. 2003.** A Tale of Two Perspectives: Old and New Challenges for Monetary Policy? BIS Working Paper 127. February.
- Brainard, W. 1967.** Uncertainty and the Effectiveness of Policy. American Economic Review 57. May. 411–425.
- Cavallero, R. and A. Krishnamurthy. 2008.** Musical Chairs: A Comment on the Credit Crisis. In: Banque de France. Financial Stability Review 11. Special Issue on “Liquidity.” February.
- Cecchetti, S. G. 2003.** What the FOMC Says and Does When the Stock Market Booms. Paper presented for the Conference on “Asset Prices and Monetary Policy”. Reserve Bank of Australia. August 18–19.
- Cecchetti, S. G. and L. Li. 2005.** Do Capital Adequacy Requirements Matter for Monetary Policy? NBER Working Paper 11830. National Bureau of Economic Research. Cambridge, Massachusetts.
- Chortareas, G., D. Stasavage and G. Sterne. 2001.** Does it Pay to be Transparent? International Evidence from Central Bank Forecasts. Bank of England Working Paper 143.
www.bankofengland.co.uk/publications/workingpapers/wp143.pdf
- Čihák, M. 2007.** Central Banks and Financial Stability: A Survey of Financial Stability Reports. Paper presented at the Seminar on Current Developments in Monetary and Financial Law. Washington D.C. October 23–27.
www.imf.org/external/np/seminars/eng/2006/mfl/mc.pdf

- Clarida, R., J. Gali and M. Gertler. 1998.** Monetary Policy Rules in Practice – Some International Evidence. *European Economic Review* 42. 1033–1067.
- Cobham, D. 2003.** Why Does the Monetary Policy Committee Smooth Interest Rates? *Oxford Economic Papers* 55. 467–493.
- Crockett, A. 2003.** Central Banking Under Test? In: *BIS Papers* 18. September.
- Crockett, A. 2008.** Market Liquidity and Financial Stability. In: *Banque de France. Financial Stability Review* 11. Special Issue on “Liquidity.” February.
- Crowe, C. and E. E. Meade. 2008.** Central Bank Independence and Transparency: Evolution and Effectiveness. *IMF Working Paper WP/08/119*.
www.kc.frb.org/PUBLICAT/ECONREV/PDF/3q07kahn.pdf
- Detken, C. and F. Smets. 2004.** Asset Price Booms and Monetary Policy. *ECB Working Paper* 364. May.
- ECB. 1998.** A Stability-oriented Monetary Policy Strategy for the ESCB. Press Release. October 13.
www.ecb.int/press/pr/date/1998/html/pr981013_1.en.html
- ECB. 2003.** The ECB’s Monetary Policy Strategy. Press Release. May 8.
www.ecb.int/press/pr/date/2003/html/pr030508_2.en.html
- Estrella, A. 2001.** Dealing with Financial Instability: The Central Bank’s Tool Kit. In: *Economic Review* 2/2001. 34–49.
- Ewerhart, C. and N. Valla. 2008.** Financial Market Liquidity and the Lender of Last Resort. In: *Banque de France. Financial Stability Review* 11. Special Issue on “Liquidity.” February.
- Federal Reserve Board. 2007a.** Press Release. November 14.
www.federalreserve.gov/newsevents/press/monetary/20071114a.htm
- Federal Reserve Board. 2007b.** Minutes of the Federal Open Market Committee. October 30–31.
www.federalreserve.gov/monetarypolicy/files/fomcminutes20071031.pdf
- Ferguson, R. W. Jr. 2003.** Should Financial Stability be an Explicit Central Bank Objective? In: *BIS Papers* 18. September.
- Fisher, C. 2004.** Perfect Partners or Uncomfortable Bedfellows? On the Nature of the Relationship Between Monetary Policy and Financial Stability. In: *Bank of England Quarterly Bulletin*. Summer 2004. 203–209.
- Fisher, C. 2005.** Financial Stability, Monetary Stability and Public Policy. In: *Bank of England Quarterly Bulletin*. Winter 2005. 440–451.
- Fujiwara, I. 2005.** Is the Central Bank’s Publication of Economic Forecasts Influential? In: *Economics Letters* 89(3). December. 255–261.
www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V84-4GV9S6K-1&_user=491456&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000023861&_version=1&_urlVersion=0&_userid=491456&md5=5e41b0c70950e4e69e7fcc801be91f3f
- Gai, P. and H. S. Shin. 2003.** Transparency and Financial Stability. In: *Bank of England Financial Stability Review*. December. 92–98.
www.bankofengland.co.uk/publications/fsr/2003/fsr15art5.pdf
- Gaspar, V., F. Smets and D. Vestin. 2007.** Is Time Ripe for Price Level Path Stability? *ECB Working Paper* 818.
www.ecb.europa.eu/pub/pdf/scpwps/ecbwp818.pdf
- Gerlach, S. 2007.** Interest Rate Setting by the ECB, 1999–2006: Words and Deeds. In: *International Journal of Central Banking* 3(3). September.
- Gerlach-Kristen, P. 2004.** Interest-Rate Smoothing: Monetary Policy Inertia or Unobserved Variables? In: *Contributions to Macroeconomics* 4(1)(3).

- Gertler, M. 2003.** Commentary: Whither Monetary and Financial Stability. In: Monetary Policy and Uncertainty: Adapting to A Changing Economy. Federal Reserve Bank of Kansas City, Symposium. Jackson Hole. August 29–30.
- González-Páramo, J. M. 2007.** The Role of Information and Communication in Central Bank Policy: The Experience of the Recent Financial Turmoil. Keynote Address at SUERF Conference on “Tracking Financial Behavior: Where Do Macro and Micro Meet?” Milan. December 3.
www.ecb.int/press/key/date/2007/html/sp071203_1.en.html
- González-Páramo, J. M. 2008.** Whither Liquidity? Developments, Policies and Challenges. Speech at the 28th Nomura Central Bankers Seminar. Tokyo. April 14.
www.ecb.int/press/key/date/2008/html/sp080414.en.html
- Goodhart, C. 2008.** Liquidity Risk Management. In: Banque de France. Financial Stability Review 11. Special Issue on “Liquidity.” February.
- Greenspan, A. 1989.** Statement Before the Subcommittee on Domestic Monetary Policy. October 25.
- Greenspan, A. 1994.** Testimony Before the Committee on the Budget. June 22.
- Hansen, L. P. and T. J. Sargent. 2007.** Robustness. Princeton University Press.
- Harvey, A. C. 1989.** Forecasting, Structural Time Series and the Kalman Filter. Cambridge University Press. Cambridge.
- Harvey, A. C. and A. Jaeger. 1993.** Detrending, Stylized Facts and the Business Cycle. In: Journal of Applied Econometrics 8. 231–247.
- Hodrick, R. J. and E. C. Prescott. 1997.** Postwar US Business Cycles: An Empirical Investigation. In: Journal of Money, Credit and Banking 29. 1–16.
- Hofmann, B. 2008.** Do Monetary Indicators Lead Euro Area Inflation? ECB Working Paper 867. February.
www.ecb.eu/pub/pdf/scpwps/ecbwp867.pdf
- Houben, A. C. F. J. 2000.** The Evolution of Monetary Policy Strategies in Europe. Springer.
- IMF. 2008.** Global Financial Stability Report. April.
- Issing, O. 2003.** Monetary and Financial Stability: Is There A Trade-off? In: BIS Papers 18. September.
- Issing, O. (ed.). 2003.** Background Studies for the ECB’s Evaluation of its Monetary Policy Strategy. Frankfurt.
www.ecb.int/pub/pdf/other/monetarypolicystrategyreview_backgrounden.pdf
- Kahn, G. A. and S. Benolkin. 2007.** The Role of Money in Monetary Policy: Why Do the Federal Reserve and ECB See it So Differently? In: Economic Review. 3rd Quarter 2007. 5–36.
www.kc.frb.org/PUBLICAT/ECONREV/PDF/3q07kahn.pdf
- Kaufmann, S. and P. Kugler. 2008.** Does Money Matter for Inflation in the Euro Area? Contemporary Economic Policy. Forthcoming.
- King, M. 2002.** No Money, No Inflation – The Role of Money in the Economy. In: Bank of England Quarterly Bulletin. Summer 2002. 162–177.
www.bankofengland.co.uk/publications/quarterlybulletin/qb020203.pdf
- Kydland, F. E. and E. C. Prescott. 1977.** Rules Rather than Discretion: The Inconsistency of Optimal Plans. In: The Journal of Political Economy 85(3). 473–492.
- Lambert, R. 2005.** Inside the MPC. In: Bank of England Quarterly Bulletin. Spring 2005. 56–65.
www.bankofengland.co.uk/publications/quarterlybulletin/qb0501.pdf

- Lombardelli, C., J. Talbot and J. Proudman. 2002.** Committee versus Individuals: An Experimental Analysis of Monetary Policy Decision-making. In: Bank of England Quarterly Bulletin. Autumn 2002. 262–273.
www.bankofengland.co.uk/publications/quarterlybulletin/qb0203.pdf
- Mishkin, F. S. 2000.** From Monetary Targeting to Inflation Targeting: Lessons from the Industrialized Countries. Paper prepared for the Bank of Mexico Conference “Stabilization and Monetary Policy: The International Experience.” Mexico City. November 14–15.
<http://www0.gsb.columbia.edu/faculty/fmishkin/PDFpapers/00BOMEX.pdf>
- Mishkin, F. S. 2007a.** Monetary Policy Strategy. MIT Press.
- Mishkin, F. S. 2007b.** The Federal Reserve’s Enhanced Communication Strategy and the Science of Monetary Policy. Address to the Undergraduate Economics Association. Massachusetts Institute of Technology. Cambridge, Massachusetts. November 29.
www.federalreserve.gov/newsevents/speech/mishkin20071129a.htm
- Mishkin, F. S. 2008.** Monetary Policy Flexibility, Risk Management, and Financial Disruptions. Speech at the Federal Reserve Bank of New York. New York. January 11.
www.federalreserve.gov/newsevents/speech/mishkin20080111a.htm
- Mishkin, F. S. and K. Schmidt-Hebbel (eds.). 2007.** Monetary Policy Under Inflation Targeting. Banco Central de Chile.
- Moessner, R. and W. Nelson. 2008.** Central Bank Policy Rate Guidance and Financial Market Functioning. BIS Working Paper 246. February.
www.bis.org/publ/work246.htm
- Moutot, P., A. Jung and F. P. Mongelli. 2008.** The Workings of the Eurosystem. ECB Occasional Paper 79. January.
www.ecb.eu/pub/pdf/scpops/ecbocp79.pdf
- Palenzuela, D. R., G. Camba-Méndez and J. Á. Garcia. 2003.** Relevant Economic Issues Concerning the Optimal Rate of Inflation. ECB Working Paper 278.
<http://www.ecb.int/pub/pdf/scpwps/ecbwp278.pdf>
- Paulin, G. 2000.** The Changing Face of Central Banking in the 1990s. Bank of Canada Review. Summer 2000. 3–13.
http://econpapers.repec.org/article/bcabcarev/v_3A2000_3Ay_3A2000_3Ai_3Asummer_3Ap_3A3-13.htm
- Pollard, P. S. 2003.** A Look Inside Two Central Banks: The European Central Bank and the Federal Reserve. In: Federal Reserve Bank of Saint Louis Review. January/February. 11–30.
<http://research.stlouisfed.org/publications/review/03/01/Pollard.pdf>
- Restoy, F. 2008.** The Sub-Prime Crisis: Some Lessons for Financial Supervisors. Paper prepared for the 27th SUERF Colloquium on “New Trends in Asset Management: Exploring the Implications.” Munich. June 11–12.
- Rudebush, G. D. 2006.** Monetary Policy Inertia: Fact or Fiction? In: International Journal of Central Banking 2(4). December. 85–135.
- Scheller, H. K. 2006.** The European Central Bank – History, Role and Functions. 2nd edition. Frankfurt: ECB.
- Sinclair, P. 2003.** The Optimal Rate of Inflation: An Academic Perspective. In: Bank of England Quarterly Bulletin. Autumn. 343–351.
- Spiegel, M. 2001.** Quantitative Easing by the Bank of Japan. FRBSF Economic Letter 2001–31. November 2.
- Spiegel, M. 2006.** Did Quantitative Easing by the Bank of Japan “Work”? FRBSF Economic Letter 2006-28. October 20.

- Stevens, G. 2008.** Liquidity and the Lender of Last Resort. Text of the Seventh Annual Sir Leslie Melville Lecture. ANU-Toyota Public Lecture Series at the Australian National University. Canberra. April 15.
- Taylor, J. B. 1993.** Discretion versus Policy Rules in Practice. Carnegie-Rochester Conference Series on Public Policy 39. 195–214.
- Taylor, J. B. 2007.** Housing and Monetary Policy. Paper presented at a Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming. August 30–September 1.
- Thornton, H. 1802.** An Enquiry into the Nature and Effects of the Paper Credit of Great Britain. Reprint. George Allen & Unwin Ltd. London. 1939.
- Tirole, J. 2008.** Liquidity Shortages: Theoretical Underpinnings. In: Banque de France. Financial Stability Review 11. Special Issue on “Liquidity.” February.
- Volcker, P. 1983.** Can We Survive Prosperity? Remarks. December 28.
- Wadhvani, S. 2008.** Should Monetary Policy Respond to Asset Price Bubbles? Paper presented at the 27th SUERF Colloquium on “New Trends in Asset Management: Exploring the Implications.” Munich. June 12. Forthcoming.

Highlights

The Economics of Financial Stability: Research Workshop at the OeNB

Martin Summer¹

On July 7–8, 2008, an international group of researchers met at the Oesterreichische Nationalbank (OeNB) in Vienna to present and discuss current research on Financial Stability. Hyun Song Shin from Princeton University and Martin Summer from the OeNB's Economic Studies Division, who jointly organized this research workshop, titled the program "The Economics of Financial Stability".

Financial Stability Analysis Needs More Economic Concepts

Why is there a need to emphasize the economic aspect of financial stability? Is this not an economic problem par excellence? An answer to this question was provided by Peter Mooslechner, Director of the OeNB's Economic Analysis and Research Department. In his opening address, he pointed out that recent financial stability research at central banks was strongly rooted in concepts based on statistics and actuarial mathematics where financial stability issues are often treated by abstracting away from the underlying economics. From an economic point of view, the determination of prices of financial assets and the risks borne by the investors are core issues which have to be explained. In the financial stability research rooted in actuarial mathematics these prices are often assumed as exogenous. Economics focuses on the explanation of behavior and how collective behavior determines financial stability. The purely statistical approach usually abstracts away from behavior and assumes the perspective of a risk manager of a given portfolio at a financial institution. From the perspective of central bank research there is also

another issue. Research on financial stability and on monetary analysis is usually conducted in different departments. There is a practical delineation between both fields that is in strong contrast to their real world interaction. An economic perspective on financial stability issues reveals the connection between financial stability and monetary research, while a pure risk management approach obscures it. So in this respect, there is a potential benefit from the discussion about the specifically economic approach to understanding issues of financial stability.

Explaining Liquidity, Business Cycles and Monetary Policy by the Interaction of Borrowing and Liquidation Constraints in Financial Markets

The first paper presented by *Nobuhiro Kiyotaki*, Princeton University, and co-authored by *John Moore*, University of Edinburgh, had the title *Liquidity, Business Cycles and Monetary Policy*. The paper presents a monetary macroeconomic framework that explains how shocks to productivity and liquidity determine asset prices and economic fluctuations. The model is applied to the analysis of monetary policy. The theoretical aim is to provide a canonical model that can easily be combined with some standard models used in modern macroeconomic theory.

In the model entrepreneurs and workers produce a homogenous output from capital and labor. The economy is a monetary economy where fiat money is in fixed supply and is an asset together with physical and human capital. While workers cannot borrow against future labor income, entrepreneurs can

JEL classification:
C15, G20, G28, G32
Keywords:
integrated analysis
of market and
credit risk,
risk management,
foreign currency
loans, banking
regulation

¹ martin.summer@oenb.at.

borrow against investment into physical capital when they get access to a new investment opportunity. Not all entrepreneurs do have investment opportunities in each period. Hence, there is a need for financial markets that transfer resources from savings to investment. There are two mechanisms that limit the financial market's capacity to allocate funds between savers and investors: On the one hand, there are financing constraints. Entrepreneurs are not able to raise the full present value of their investment as the ability of a financial investor to enforce the entrepreneur to completely fulfill his future financial commitments is limited. On the other hand, there is a liquidity wedge between money and the existing financial claims. There is a liquidation limit to securities at any point in time, called limited resaleability. An entrepreneur can always fully sell his money holdings but he can only partially sell his financial claims at any point in time. Both constraints are modeled by two exogenous parameters. As a third agent in addition to entrepreneurs and workers the public sector can change the money supply, enter the market for financial claims, and add to aggregate demand for resources.

The equilibrium, concept uses standard competitive equilibrium ideas where agents maximize their respective objective functions taking prices of goods and assets as given. In equilibrium these prices adjust in a way to balance supply and demand in all markets. Equilibria are analyzed in a neighborhood of a steady state. Depending on the exogenous parameters – i.e. borrowing and resaleability constraints, the fraction of entrepreneurs with investment opportunities, and the depreciation rate of physical capital – there are non-monetary and monetary equilibria. In a non-monetary equilibrium,

borrowing and liquidity constraints have no force, money is not needed, the first best allocation is achieved, and the return on the financial asset is approximately equal to the time preference rate. In a monetary equilibrium, money is in circulation and the interaction of borrowing and liquidity constraints generates a feedback between asset markets and output. In particular, the equilibrium capital stock is below the first best, the return on equity is below the time preference rate, and the expected rate of return on money is below the expected rate of return on equity. The expected return on equity contingent on having an investment opportunity in the next period is lower than the expected return on money. Thus, unlike in modern standard models of monetary economics, there is a spectrum of interest rates and the interaction between monetary policy and the real sector cannot be summarized by a single rate.

The equilibrium allows for a recursive representation that opens a perspective on equilibrium dynamics in the face of shocks to aggregate productivity and liquidity. A liquidity shock, modeled by a drop in the resaleability parameter, decreases the ability of investing entrepreneurs to finance their investment. For entrepreneurs without an investment opportunity the financial asset will lose attractiveness as a means of saving relative to money. Thus, the price of the financial asset has to fall and the value of money rises. This drop in the asset price increases the down payment per unit of investment and a decline in investment occurs that is only partially offset by the increased value of money. To restore equilibrium in the goods market consumption has to rise. Over time, there is capital decumulation with lower real asset prices, decreasing investment and consump-

tion until there is a switch in the resaleability constraint.

The model can also be used to analyze policy measures of the central bank against a liquidity shock, modeled as a fall in the resaleability of the financial contract. How should a central bank react to a liquidity shock that impairs the ability of entrepreneurs to resell their financial claims? Kiyotaki argued that a traditional open market operation did not help as it would only change the composition of broad money. What the central bank needed to do instead, was to purchase the financial asset which had partial resaleability and a high liquidity premium.

The discussant of the paper was *Guido Lorenzoni*, MIT and Federal Reserve Bank of Chicago. In his discussion, he summarized the model within a simplified dynamic structure and concentrated on the role of the liquidity parameter. He pointed out that the role of *expected* liquidity changes rather than that of current changes in the liquidity parameter were crucial to explain the feedback effects between asset prices and investment. Lorenzoni acknowledged the potentially important role of this model to understand “unorthodox” monetary interventions such as the Term Security Lending Facility, recently introduced by the Federal Reserve and the Bank of England.

Boom and Bust Cycles and the Role of Frictions in Allocation of Capital between Sectors

The second paper in the first session was presented by *Guido Lorenzoni*, MIT and Federal Reserve Bank of Chicago. It had the title *Inefficient Credit Booms* and dealt with policy questions related to boom and bust cycles. Is there any precise notion that justifies the claim that there is too much ex ante borrowing or lending in a boom? What are the

market incentives to leave spare borrowing capacity and why or when are these incentives not aligned with the social optimum?

To address these questions, Lorenzoni developed a model in which an entrepreneurial and a consumer sector interact over time under financial frictions inhibiting the transfer of resources between different economic sectors over time. Entrepreneurs have access to projects but not enough funds to realize these projects. As a result, they have to borrow from consumers who have resources but no access to projects. Aggregate shocks affect the future return on the entrepreneurs’ projects. Due to limited access to outside finance, entrepreneurs have to sell assets to cover losses if they are hit by a negative shock. The counterpart to this liquidation of assets is a sector that can use these assets not as productively as entrepreneurs. While the debt contracts used by entrepreneurs can individually be written in a state contingent way, they are unable to take into account the general equilibrium effects of assets sales which result from their collective, individually rational behavior. A planner, who could take into account the effects of collective behavior but is subject to the same institutional setup of available financial contracts and frictions, would be able to achieve ex ante an allocation of resources between sectors that achieves a strict Pareto improvement.

In the light of this analysis, Lorenzoni concluded that there was indeed a case for the claim that there was excessive borrowing and as a result excessive volatility of asset prices and investment in boom and bust cycles. These phenomena occur because the sectors in the economy with financial frictions cannot coordinate on an ex ante collec-

tively optimal inter-sectoral allocation of funds.

The discussant *John Moore*, University of Edinburgh, concentrated on extracting the underlying logic of Lorenzoni's result about Pareto improving ex ante resource allocations between sectors. Moore showed that the basic logic of the argument can be told in a stripped down version of the model in which the essential elements that play a role are differentials between sectors in the productive use of capital combined with the inability to ex ante commit to resource transfers in the future that would bring capital to its most efficient use. Moore showed that the planner who is subject to the same frictions as the economic agents in the model can, however, achieve such transfers indirectly by controlling the equilibrium price effects of capital liquidations after a shock. Why are frictions that inhibit efficient reallocations of capital after shocks so prevalent, and why do inefficient liquidation spirals seem to play such a prominent role in real world crises? These were the questions which were recurrently raised during the workshop.

On the Importance of Diverse Portfolios for Financial Stability

Collective liquidation of portfolios stayed on the agenda also in the last paper presented in the morning session: *The Risk of Joint Liquidation: Diversity instead of Diversification* by *Wolf Wagner*, Universiteit van Tilburg. In his paper, Wagner studies a model where investors solve a portfolio allocation problem between risky assets anticipating that in the future they might be in a situation where they collectively have to fire sale their assets in an illiquid market. This anticipation of fire sales can ex ante make it optimal for investors to forego diversification benefits in order to avoid forced

asset selling into an illiquid market ex post. Wagner discussed two implications of his analysis: one for regulation and the other one for asset pricing. Viewed from the perspective of his model, an efficient allocation of portfolios in the economy under the risk of potential forced liquidations or fire sales does require that not every investor individually holds a fully diversified portfolio. The market outcome may entail both under- and overdiversification compared to an efficient allocation. The asset pricing implications are that assets held by many investors simultaneously should be traded at a discount, reflecting the effect of potential future joint liquidations in an illiquid market.

The discussant, *Alexander Stomper*, IAS Vienna and MIT, organized his remarks around a set of questions related to Wagner's model. He first asked for the reasons as to why investors in the model were forced into liquidation when the portfolio value dropped below the debt level. He pointed out that there were other ways to model liquidity needs. He also discussed the assumption that investors' objective was reasonably well modeled by assuming that their goal was to minimize expected liquidation costs. Under limited liability, this would, for instance, not be an obvious goal of investors since the liquidation costs would be borne by creditors. More generally, Stomper asked for a more thorough discussion about the relations between equilibrium and the institutional structure of portfolio choice. Finally, he questioned the separation between liquidity provision and portfolio management suggested in the paper.

Why Private Liquidity Co-insurance is not Viable in a Crisis

Viral Acharya, London Business School, presented a paper co-authored with *Denis Gromb*, London Business School, and *Tanju Yorulmazer*, Federal Reserve Bank of New York, with the title *Imperfect Competition in the Interbank Market for Liquidity as a Rationale for Central Banking*. He developed a theory motivated by a rich set of historical cases that showed why private co-insurance arrangements between banks for managing crises situations may not be viable and why public provision of liquidity can improve liquidity transfers in such critical circumstances. The theory is built on the observation that crises can create market power for some institutions in the interbank market. These institutions can then use this market power to their advantage. This leads to the breakdown of private co-insurance arrangements. He presented ample historical and modern evidence for the problem that in a crisis banks with surplus liquidity use their market power to force banks in liquidity needs to inefficient asset sales.

The model is formulated within the structure of a liquidity model based on Holmström and Tirole. One of two banks owns a portfolio of risky assets, e.g. loans to the corporate sector. The payoff to the loan portfolio depends on a random event and an unobservable monitoring effort where the bank has a benefit from poor monitoring. After the monitoring stage, a random refinancing need arises and the second bank is in the position to provide excess liquidity. The bank with liquidity needs can decide whether to borrow or whether to sell assets. Since assets are specific, borrowing is more efficient than asset sales, but the transfer of ownership is better than managing a

portfolio of assets with poor monitoring effort. The equilibrium of the model, which is derived as the solution to a bargaining game in the interbank market, has the property that there is a market power threshold for the liquidity surplus bank that makes it individually optimal for all banks with market power above this threshold to force inefficient asset sales. This inefficiency is increasing with the market power of the liquidity provider. There is an inefficient allocation of liquidity in equilibrium. A central bank can alleviate the inefficiency by improving the outside option of the liquidity needing bank, even if it does not lend in equilibrium. In order to improve on the market allocation, the central bank must be prepared to lend against collateral outsiders would not lend against and it must have some comparative advantage in the efficiency of monitoring lenders. Therefore, it is an advantage to combine supervision with the liquidity provision role of the central bank. If a central bank has sufficient informational advantages and loss bearing capacity, it can implement the first best liquidity allocation and prevent inefficient fire sales of assets.

The discussant *Falko Fecht*, Deutsche Bundesbank, was critical about the assumption that the bargaining between the banks involved forced fire sales and suggested to model the bargaining only over the mark-up on an interbank loan and let the liquidity needing bank simultaneously decide to sell assets at a competitive rate. Fecht also pointed out that the typical instruments of the lender of last resort were standing facilities such as marginal lending facilities, which are all collateralized loans. Such loans were not very well described by the framework of the model. In Fecht's view, the authors' argument rather corresponded to a situation of

emergency liquidity assistance; but for these kinds of lendings it was hard to see how this could alter the outside option of the liquidity needing bank, since terms and conditions of such lending arrangements were not known in advance. Finally, he raised an issue concerning the market power of the liquidity providing bank. He suggested that there was evidence that the existence of a lender of last resort created incentives for banks to underinvest in liquidity. The market power of the liquidity providing bank increased the return to liquidity holding and thus might counteract these incentives.

Why is Leverage of Financial Institutions Procyclical?

Tobias Adrian, Federal Reserve Bank New York, presented a paper co-authored with *Hyun Song Shin*, Princeton University, titled *Procyclical Leverage*. The paper seeks a contract theoretical explanation for the empirical fact that large investment banks seem to manage the capital structure of their balance sheets in such a way that there is a positive one-to-one relation between balance-sheet growth and leverage. This implies a capital structure theory that is in contrast to a world where the size of the balance sheet (the selection of projects) is separated from the financing decision. The data seem to suggest a situation where equity grows at an exogenous rate, while total assets and leverage move up simultaneously when perceived risk is low and take the opposite move when perceived risk is high. This collective behavior fuels boom and bust cycles because it implies that banks react to increases in asset prices by buying more assets and to decreases in prices by selling assets, thus counteracting the usual intuition about the stabilizing role of prices as an adjustment mechanism to balance excess

supply and demand. Procyclical leverage therefore implies that banks have an increasing demand curve and a decreasing supply curve for risky assets.

The aim of the paper is to offer an explanation for this kind of collective behavior based on contract theory of capital structure. In this theory the agent is a financial intermediary financed by issuing a standard debt contract. The principal is a creditor to the bank. The incentive problem arises because the agent can choose to invest in two different projects A and B. A has a lower expected return and is more risky than B. Since the debt financing makes the agent's claim a call option on the underlying assets, he has an incentive to choose riskier low return investment when the strike price of the option (the level of debt) is sufficiently high. An optimal contract has to ensure that creditors are willing to provide finance, but that at the same time the agent has an incentive to invest into good projects. It turns out that an optimal contract between a principal and an agent in this way collectively leads to procyclical leverage.

The discussant *Helmut Elsinger*, OeNB, pointed out technical difficulties in the model and gave examples which suggested that it might be difficult to guarantee that the contracting problem will be well defined and well behaved. He saw the difficulties mainly in the assumptions needed to establish procyclical leverage. He pointed out that the assumption that the creditor uses a standard debt contract might be considered as problematic as within the context of the model better sharing rules could be offered to the lenders. Finally, he pressed the authors to give a more thorough explanation as to why this particular capital structure theory applied to banks but not to the behavior

of other industries and why banks did not adjust equity.

Sophisticated Risk Management at the Level of Individual Institutions and its Aggregate Consequences

Hans Gersbach, ETH Zurich, gave a paper co-authored with *Jan Wenzelburger*, Keele University, on the macroeconomic consequences of banking regulation titled *Sophistication in Risk Management, Bank Equity and Stability*. Gersbach presented a macroeconomic model where some issues related to the new Basel II framework for capital regulation can be brought into perspective and analyzed within a coherent macroeconomic model. In particular, the following questions were addressed: While a more sophisticated risk assessment for individual obligors is clearly an improvement for an individual bank under given macroeconomic conditions, is this also true at the system level? Will Basel II affect lending and make it difficult for small and medium-sized enterprises to get loans? How will interest rates and bank capital be affected?

In the model consumers provide an exogenous supply of deposits at a given deposit rate. Since aggregate deposits cannot fund all investments, there is a need for equity financing, too. Entrepreneurs have access to risky projects which are subject to macroeconomic shocks and have an idiosyncratic quality level affecting their production output. The quality level is their private information. Instead of investing into a risky project, entrepreneurs may invest into an outside option earning the same rate as bank deposits or into bank equity which has a similar rate in equilibrium. Banks in the economy compete by setting a lending rate. If risk assessment is simple, banks can only set one rate for all entrepreneurs. In a sophisticated

system, rates can be made more “risk sensitive” and may depend on the obligor’s risk. For a given lending rate, there is a critical quality level so that entrepreneurs with a higher level will invest into the risky projects and entrepreneurs with a lower level will invest into the outside option. When entrepreneurs face a realization of a shock that makes it impossible to honor their debts, they default and the bank gets the project return. Otherwise the bank gets the loan repaid with interest.

In equilibrium, the lending rate must be such that bank equity earns the return of the outside option. In a simple system this condition must hold in aggregate, in a sophisticated system this condition must hold loan by loan. From this model Gersbach derived a series of results which can be grouped into three broad categories: results on the level of project financing in the economy, results on financial stability, and results on the default rate of loans. On the project finance issue, the central result is that more projects are financed with a simple system. High-quality borrowers subsidize low-quality borrowers. Financial stability issues are discussed by comparing the level of bank equity in a simple and in a sophisticated system. The central results in this respect are that a simple system has more bank equity on average and – more importantly – in times of bad macroeconomic shocks than a sophisticated system. Finally, on the issue of default rates, Gersbach tried to characterize conditions under which a simple system can exhibit a lower default rate than a sophisticated one.

The discussant of this paper was *Ronel Elul*, Federal Reserve Bank of Philadelphia. Elul pointed out that the cross subsidization idea – good projects subsidize bad projects – would have more appeal if it also led to higher aver-

age consumption. Yet, in the model aggregate consumption in a simple system is lower on average as the additionally financed projects are actually projects with a negative net present value. Since these projects should not be financed anyway for efficiency reasons, Elul suggested considering a setup where the sophisticated system leads to actual underinvestment. Regarding the stability results, he made clear that it was an issue whether bank equity was indeed the appropriate measure of financial stability. But given one accepts this measure, he liked particularly the result that a simple system provided more equity for bad macro shocks. If a bad shock hits the economy, low-quality entrepreneurs default both under a sophisticated and under a simple system. In a sophisticated system, equity compensates for default by charging a higher interest rate for bad borrowers but this premium is only realized in good times. In the simple system, bank equity holders are compensated for low-quality project defaults by the good quality entrepreneurs, who repay their loans also in bad times. Elul found the results on default rates not too convincing since the conditions used to characterize lower default rates in a simple system were all described in terms of endogenous parameters.

Ambiguous Information and Illiquidity

The last presentation of the workshop was given by *Jan Werner*, University of Minnesota, based on a joint paper with *Han Ozoylev*, University of Oxford, titled *Liquidity and Asset Prices in Rational Expectations Equilibrium with Ambiguous Information*. The authors study information transmission in asset markets by explicitly modeling the concept of ambiguous information. The framework in which this issue is dis-

cussed goes back to a model by Vives where a market with risk-averse informed investors, risk-neutral competitive arbitrageurs, and a noisy supply of the risky asset is analyzed in a standard decision theoretic framework with unambiguous information. The authors find that under ambiguous information the sensitivity of asset prices to information and signals and to changes in asset supply increases, markets are less liquid, and there is excess volatility of asset prices. Ambiguity is formally modeled by assuming that arbitrageurs in the market consider in their decision not only one prior probability distribution over future asset prices but multiple prior distributions. It is assumed that in taking their decisions arbitrageurs are ambiguity averse and hence always give particular weight to the worst case. Illiquidity occurs at a range of prices at which arbitrageurs will not trade.

In his discussion, *Jürgen Eichberger*, Universität Heidelberg, first showed how the ambiguity model was related to the case with no ambiguity and discussed in depth some of the concepts related to the formal modeling of ambiguous information. He asked whether ambiguity aversion of arbitrageurs was a good parable for explaining illiquidity in financial markets. His interpretation of the stark contrast of a stop in trading under ambiguity and limitless arbitrage with no ambiguity was that it could be seen as an insight about the role of risk neutral arbitrageurs in financial markets. At the conceptual level of the model, Eichberger pointed out a certain tension between extreme sophistication in extracting information from observed prices and yet an extreme naive approach to the set of prior probability distributions, where arbitrageurs never learn the actual underlying probability distribution.

Some Common Threads

The papers covered many different aspects and details of the economics of financial stability and showed an impressive variety of different threads current research into financial stability is working on. But is there also a common thread in all these different papers? An issue raised in several papers and discussions was the fact that financial markets seem to show some frictions that made it difficult to apply standard arguments from the analysis of competitive markets. In an asset price bust, why is it apparently so difficult to take advantage of the opportunity of buying assets at lower prices and why can capital “waiting on the sidelines” not be quickly and easily mobilized to step in? Why do we so frequently see liquidation spirals and collective selling of assets exactly when prices are falling? What some of the papers showed was that by taking these frictions seriously,

there was room for policy intervention. What also became clear was that standard regulation often failed to distinguish sufficiently clearly between individual institutions and the system as a whole. Individual institution thinking does not necessarily lead to correct conclusions for the aggregate. There seems to be much room and indeed a need for a stronger macroeconomic perspective on policy issues regarding the regulation of financial markets. Finally, the workshop showed very clearly that the economics of financial stability was a very active and exciting field of economic research where there was much to be gained by fostering the interaction between research at universities and central banks, by rethinking some old issues with the new tools of advanced modern economic theory, and by combining and interweaving the traditionally separated fields of monetary analysis and financial stability.

Global Market Disruptions – Will Global Imbalances Unwind?

Peter Backé,
Franz Nauschnigg¹

From June 12 to 14, 2008, the Oesterreichische Nationalbank (OeNB) hosted a roundtable discussion on global imbalances at Weißenbach/Attersee co-organized by the European Affairs and International Financial Organizations Division of the OeNB and the Reinventing Bretton Woods Committee (RBWC).

The participants, consisting above all of public sector representatives (especially central bankers), market participants and academics, engaged in a lively discussion and a fruitful exchange of information.

JEL classification: F02, F15, F34, F42

Keywords: global imbalances, capital flows, role of the U.S. dollar, sovereign wealth funds, Bretton Woods

Summary of the Roundtable Discussion “Global Market Disruptions – Will Global Imbalances Unwind?”

In his opening remarks, *Josef Christl* (Executive Director of the OeNB) addressed today’s formidable challenges: high oil and commodity prices and the concomitant high inflation rates and a slowdown in economic growth. The financial market turbulence and global imbalances likewise pose daunting problems, in particular for central banks. Christl expressed his appreciation for the high-level participation and encouraged all contributors to lead an open discussion.

Session 1 “The Repricing of Risks: Origins, Remedies and Outcome” centered on the costs and implications of the financial market turmoil that had commenced in summer 2007.

According to *Anthony Santomero* (Senior Adviser, McKinsey), global losses attributable to the financial crisis have so far run up to around USD 800 billion or 5.9% of the U.S. GDP. Banks account for USD 550 billion and other financial institutions for USD 250 billion. These figures are based on a scenario which assumes only a mild and temporary crisis-induced recession in the U.S.A. Two other McKinsey scenarios peg the losses at USD 625 billion and USD 1,280 billion.

As banks have recapitalized by USD 232 billion to date, they still need about USD 300 billion. Recapitalization is becoming increasingly difficult, however, and will to a considerable extent stem from retained earnings in the future. Banks’ remaining recapitalization needs equal three years of profits. To weather the crisis, banks will have to clean up their balance sheets. This is the only way to restore investor confidence and stabilize the liquidity situation in the markets, especially in the credit market. To revitalize asset securitization it will take straightforward and transparent financial instruments with high-quality underlying assets.

Christoph Avenarius (Director, Credit Suisse) noted that the Federal Reserve System had assumed the role of ultimate prime broker in combating the financial crisis. The turbulence made evident the weaknesses of the existing framework. Value-at-risk models, for instance, work only in liquid markets, and it is problematic that banks all use the same risk models. The Fed stabilized the U.S. markets at a dangerously high price level. Sovereign wealth funds (SWFs) might benefit in the medium term as they could purchase assets at relatively low prices.

Tryggvi Herbertsson (President, Askar Capital) shed light on developments in Iceland and expressed his

¹ peter.backe@oenb.at; franz.nauschnigg@oenb.at.

doubt about the effectiveness of monetary policy in small open economies with large globally active banking systems. A restrictive monetary policy is immediately undermined by carry trades, which moreover increase the vulnerability of these economies to the repricing of risk. Under such circumstances, fiscal policy is made to bear the main burden of stabilizing the economy with Keynesian demand management. Iceland, however, also has the option of adopting the euro in the medium to long term.

In the subsequent discussion, the insufficiently regulated U.S. mortgage market was identified as one of the causes of the market turmoil. The rescue plan put forth by U.S. Treasury Secretary Henry Paulson was viewed with skepticism. Only a sweeping reform, which would equal a considerable political feat, would ensure a truly effective institutional and regulatory framework. It was also pointed out that the risks to the Fed's balance sheet had increased significantly due to the liquidity support it had provided. More than 50% of the assets held by the Fed were in the meantime considered to be risk laden.

European banks have likewise suffered disproportionately high losses from their U.S. investments. The magnitude of these losses depends heavily on the U.S. economy, with a severe recession set to drastically increase the damage.

Session 2 was titled “Unwinding of Global Imbalances – Orderly or Disorderly Adjustment?”

According to *Kristin Forbes* (Professor, MIT), the unwinding of global imbalances has hitherto been carried out in an orderly fashion. It is, however, uncertain whether the required net capital flows into the U.S.A. are sustainable. In 2008, the U.S.A. would

need gross capital inflows of USD 1,800 billion to USD 2,700 billion (current account deficit: USD 627 billion, capital outflows: USD 1,200 billion to USD 2,000 billion). There is substantial risk that foreign investors' willingness to provide net financing to the U.S.A. will decline in the medium term. In this context, *Forbes* named the following determining factors: (a) the recent history of low returns for foreigners investing in the U.S.A., (b) many countries continue to develop and strengthen their financial markets, (c) the turmoil in U.S. financial markets since 2007, (d) hostility to foreign investment in the U.S.A. perceived in some sectors, (e) the danger of excessive regulation of U.S. financial markets in response to the crisis; such a reregulation might be an overreaction and poorly thought out.

Menzie Chinn (Professor, University of Wisconsin) talked about prospects for U.S. adjustment and the U.S. dollar. He argued that the decrease in the U.S. current account deficit over the past few quarters was traceable chiefly to the sluggish U.S. economy. Forecasts from Taylor Rule fundamentals indicated that the U.S. dollar would continue to depreciate against the euro in the adjustment process. It remains to be seen whether the U.S. dollar can retain its hegemony as primary reserve currency in the medium to long term. While a shift from the U.S. dollar to the euro is a low probability event according to Chinn, it may nevertheless not be ruled out completely.

Sophia Drossos (Executive Director, Morgan Stanley) explained why the framework conditions for an orderly unwinding of global imbalances had deteriorated noticeably since the second half of 2007. Further adjustment and the costs involved will be determined by capital flows into the U.S.A.

by public sector investors (central banks, sovereign wealth funds). The increase in U.S. asset prices has been driven largely by the vast sums invested in the U.S.A. Furthermore, Drossos doubted that Asian economies would be able to continue to grow so dynamically if the advanced industrialized countries faced an economic downturn. The U.S. dollar's downward slide is bound to end since the ensuing costs to the U.S.A. exceed the benefits, especially as a weak dollar also means that U.S. assets will become less attractive to foreign investors.

The U.S. dollar's weakness of the past months dominated the discussion that followed. It was pointed out that foreign retail investors' sinking willingness to hold U.S. assets might explain part of the depreciation of the U.S. dollar, which, via valuation effects, had led to a decrease in the U.S. net debt. Whether the U.S. dollar will have to depreciate further against the euro for the U.S. current account deficit to shrink to a sustainable level will depend not least on the speed at which Asian currencies will appreciate against the U.S. dollar and the euro in the future.

In the second part of Session 2, *Miranda Xafa* (Alternate Executive Director, IMF) showed that the weakness of the U.S. dollar was attributable to domestic factors, referring to developments in the U.S. real estate and credit markets as well as the marked decline in U.S. dollar interest rates. As U.S. households are holding fewer assets and saving more, the U.S. current account deficit will contract further.

Michael Dooley (Managing Director, Cabezon Capital) expressed the opinion that Bretton Woods II (i.e. the U.S. dollar exchange rate peg of many emerging market economies) repre-

sented a stable system in the medium, perhaps also longer, term. Some of these economies, e.g. Brazil, naturally "graduate" from the system at some point and switch to more flexible exchange rate regimes, but then other developing countries are set to join Bretton Woods II. China and India represent the core of these countries pegged to the U.S. dollar and are bound to remain at the center of the system in the foreseeable future because they will continue to pursue an export-driven growth strategy based on undervalued exchange rates. In a nutshell, Bretton Woods II remains firmly in place according to Dooley and is set to evolve further.

Arnab Das (Managing Director, Dresdner Kleinwort) contended that the global economy was undergoing a disorderly nonadjustment and that the question was how stable this imbalance was. When the rise in asset prices had started to abate, investors in U.S. assets turned to commodity markets. Investors thus amplified the price increases of many commodities, which resulted in a price bubble. The fundamental macroeconomic issue of the past few years – too much liquidity in the global financial system – still exists and will give rise to other price bubbles.

The subsequent discussion again zeroed in on the U.S. dollar. The U.S. currency was said to come under enormous pressure should U.S. residents lose their willingness to hold U.S. dollars at the given interest and exchange rates. Global inflationary pressures and the monetary policy response were another hotly debated issue. It was criticized that many central banks had reacted too late to the ongoing rise in inflation. Countries with a U.S. dollar peg temporarily tolerated increased inflation in hopes of reaping the benefits of the peg, namely stability, in the

longer run. Many countries, e.g. the Gulf states, lack an alternative monetary anchor in the short to medium term. The surpluses of the oil exporting countries (and thus the deficits of other countries) are bound to contract once people realize that the higher oil price is here to stay and the oil exporting countries step up consumption. As to Bretton Woods II, it is necessary to introduce restrictions on capital movement in the light of the export-driven growth strategy Asian countries pursue by maintaining undervalued exchange rates. Such capital controls would become less and less sustainable on the back of a successful catching-up process. The euro could play a greater role in this system; after all, with the U.S. dollar and gold, Bretton Woods also had had two anchors.

Session 3 revolved around the issue “The World in the Emerging Market Mirror: New Suppliers of Financial Stability,” putting the spotlight on several country accounts.

The chair of this session, *Ousmène Mandeng* (Head of Public Sector Investment Advisory, Ashmore Group), remarked at the very outset that the emerging markets, while representing one-third of the international economy, accounted for half of global economic growth. He thus concluded his statement with the recommendation: Sell U.S. dollars and buy emerging market currencies.

Cristian Popa (Deputy Governor, Banca Națională a României) briefly described the current economic situation in Romania, where a dynamic catching-up process goes hand in hand with great imbalances. There are signs of consolidation efforts, which should be supported with stability-oriented policies. Monetary policy bears the brunt of the adjustment effort in Romania, but its effectiveness is lim-

ited. In addition, the sustained rapid increase in real wages raises some concern at the Romanian central bank. Popa expects the economy to slow down but does not see a hard landing on the horizon. At the current juncture, Romania plans to introduce the euro in the year 2014.

Mehmet Yörükoglu (Deputy Governor of the Turkish central bank, Türkiye Cumhuriyet Merkez Bankası), provided an overview of worldwide inflation developments and monetary policies in emerging market and advanced economies. According to Yörükoglu, price increases of food, commodities and energy impact much more strongly on inflation in the emerging economies than in the industrialized countries, as these product groups are more significant in the consumer price baskets of the former and developing economies. Monetary policy in the emerging economies will thus have to decouple from that of the advanced countries. In emerging and developing economies, this will lead to tighter monetary policy, exchange rate appreciation and higher inflation targets.

Paulo Vieira da Cunha (former Deputy Governor, Banco Central do Brasil) provided an overview of the remarkable stabilization and catching-up process of the Brazilian economy, where a leftist administration applied a mainstream macro policy and set off a virtuous circle. At the same time, he criticized the shift to big government (transfer economy) and fiscal policy, which he called procyclical. It is hard to dampen the excess demand triggered by booming commodity prices, even though inflationary developments and the current account deficit call for a tighter macro policy.

Lawrence Brainard (Chief Economist, Trusted Sources) stressed the difficul-

ties faced by China: more than USD 1,700 billion in international reserves, inflows of speculative capital to the tune of USD 46 billion per month. As an interest rate raise would only reinforce capital inflows, China cannot avail itself of this option for cooling the overheated economy. For this reason, it will attempt to combat inflation by means of administrative measures and a currency revaluation. China's transition to post-Bretton Woods II will likely prove disorderly and entail instability.

The consensus in the discussion that followed was that the current state of the global economy provides a litmus test for the inflation targeting strategies pursued in some emerging economies. Opinions differed as to whether today's inflationary pressures call for an upward revision of the – in some cases quite ambitious – inflation targets. The argument was put forth that repeated breaches of the targets could impede the credibility of central banks; yet, central banks would risk losing face by (prematurely) changing inflation targets in the first place. Perhaps inflation targeting strategies will suffer the same fate as monetary targeting strategies. Inflationary developments in China were deemed to be precarious since under the current conditions the government and the central bank lacked instruments to curb inflation.

Session 4 was dedicated to the “Prospects for the International Financial Architecture: Merits and Demerits of the Current International Monetary System.”

Richard Portes (Professor, London Business School and CEPR) claimed that there was no international monetary system, but rather a non-system. Owing to capital account liberalization, low transaction costs and new players, such as hedge funds, capital flows have

increased substantially, by far exceeding trade flows.

The number of financial crises has likewise risen, and so have the efficiency of capital allocation and the options for financing current account imbalances and the possibility of parallel financial market development. This deepening of international financial integration promotes the development of national financial markets.

The hegemony of the U.S. dollar in the international monetary system is increasingly being eroded. It remains to be seen whether the ascent of the euro will lead to greater instability (hegemonic stability theory). Before 1914, the pound sterling did not play as dominant a role as the U.S. dollar after World War II, given its rivalry with the French franc and the Deutsche mark.

The weakness of the IMF, which has yet to reinvent itself, and the lack of both a lender of last resort and an international bankruptcy court have taken their toll on the international monetary system. Furthermore, there is room for improvement in how the large central banks, i.e. the Federal Reserve Board, the Eurosystem and the Bank of England, cooperate; as liquidity pools are international, suboptimal cooperation proves problematic.

According to *Alexander Swoboda* (Professor, University of Geneva), the economic developments of the past few years, i.e. a sound macro background (Goldilocks economy and the Great Moderation), unexplainably low bond yields (“Greenspan conundrum”), a flat yield curve, quasi-reliable interest rate cuts in times of stock market downturns (“Greenspan put”), global imbalances and overspending by U.S. consumers, have led to a situation of abundant liquidity in the financial markets, bubbles and excessive leverage. The current financial crisis will make macro

developments more volatile and put a stop to the Great Moderation. A decoupling of these developments is not in the offing.

Financial markets are procyclical and prudential regulation amplifies this procyclicality, which is a problem when dealing with general macroeconomic shocks. Here, it is necessary to integrate buffers. Monetary policymakers are faced with the problem that they have multiple mandates and only a limited number of instruments at their disposal. Hence, one can either reduce the number of targets (the Eurosystem solution) or increase the number of (short- and long-term) instruments. As for central bank cooperation, Swoboda sees three and a half players, namely the Federal Reserve, the Eurosystem, the Bank of England and the Swiss National Bank as half a player.

Banks that are too big to rescue rather than too big to fail, such as UBS in Switzerland, pose another problem, especially for smaller countries with large banking systems.

Stijn Claessens (Division Chief, Research Department of the IMF) presented results of IMF analyses showing that 21 OECD countries experienced 122 recessions between 1960 and early 2007. Furthermore, there were 114 cases of falling real estate prices, 233 occurrences of declining stock prices and 105 cases of a credit crunch. Most macro and financial variables respond procyclically to a recession. A credit crunch amplifies a recession; recessions that go hand in hand with falling real estate prices last longer. Real estate investment and credit growth have the best forecasting properties for recessions. Today's slowdown in U.S. economic growth corresponds to the pattern of previous recessions, but U.S. monetary policy has responded more quickly and more ag-

gressively than in earlier periods of recession.

Harold James (Professor, Princeton University) stated that financial institutions tended to act procyclically in financial crises. However, in the past there has always been the odd big financial market player that acted in an anti-cyclical fashion and thus defused crises. Cases in point and thus quasi-forerunners of the IMF were the Rothschilds in the 19th century and JP Morgan in the 1907 crisis.

In the current crisis, the sovereign wealth funds could assume this anti-cyclical role. Were he still alive, Lenin would describe the SWFs as the highest form of capitalism.

The IMF, whose influence has been decreasing over the past few years, might take on a new role and invest SWF reserve assets. This would, on the up side, depoliticize SWF investments (guaranteeing no problems with the host countries of investments) and efficiently ward off speculative attacks.

Naturally, IMF governance would have to be adapted accordingly.

Servaas Deroose (Director, European Commission) affirmed that the euro had established itself as the second most important international currency after the U.S. dollar. It is particularly popular in countries geographically close to the euro area. Some 40 countries use the euro as an anchor or reference currency; reserves have been diversified away from the U.S. dollar to the euro. Despite warning calls predating its introduction, the euro has on balance successfully promoted stability.

The euro and the U.S. dollar dominate the global monetary system (bipolar system), and some, e.g. Chinn, believe that the euro could overtake the U.S. dollar in the coming decades. Deroose, by contrast, sees a tripolar monetary system on the horizon. To

strengthen the international role of the euro, the euro area has to remain economically sound and to deepen financial integration. Furthermore, a consolidated representation would raise the profile and increase the bargaining power of the euro area in the international arena. In other words, the euro area has to speak with a single voice in international fora such as the IMF, the G-7 and the G-20.

In the discussion, some called for tightening financial market regulation – variable minimum capital requirements for banks, preventing excessive leverage, special regulations for major banks, strengthening oversight in the EU under the auspices of the Eurosystem.

U.S. participants stressed that the euro's role as an international reserve currency had been underestimated, recalling former Federal Reserve Chairman Greenspan's statement that it

would take the euro 100 years to become a challenge to the U.S. dollar. Some warned of impending instabilities in the battle for predominance between the euro and the U.S. dollar (citing the interwar years when the U.S. dollar replaced the pound sterling), while others found a stable system with several reserve currencies conceivable, giving the pre-World War I period as an example.

SWFs rather got a vote of confidence as they were seen to help stabilize financial markets by buying undervalued companies and by injecting additional capital into banks. The IMF as a reserve manager was regarded with skepticism because SWFs are unlikely to shell out capital to the IMF and the IMF would have to compete with private reserve managers and the BIS.

Notes

Abbreviations

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

Legend

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

Discrepancies may arise from rounding.

List of Studies

Published in Monetary Policy & the Economy

For further details on the following publications see www.oenb.at

Issue Q3/07

Robust Economic Activity in the Euro Area
Inflation Remains Moderate

Andreas Breitenfellner, Johann Elsinger, Klaus Vondra

Economic and Financial Education:
Concepts, Goals and Measurement

Ernest Gnan, Maria Antoinette Silgoner, Beat Weber

Financial Capability of Austrian Households

Pirmin Fessler, Martin Schürz, Karin Wagner, Beat Weber

Financial and Economic Education Products and Services of
Austrian Institutions and Enterprises

Sabine Schlögl

Selected Central Banks' Economic and Financial Literacy Programs

Manfred Fluch

Human Capital and Economic Growth –
Summary of the 35th Economics Conference
of the Oesterreichische Nationalbank

Jürgen Janger, Burkhard Raunig

Issue Q4/07

Growth Prospects for Austria Are Weakening
Economic Outlook for Austria from 2007 to 2009 (December 2007)

Christian Ragacs, Klaus Vondra

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

Christian Ragacs, Martin Schneider

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

Klaus Prettnner, Alfred Stiglbauer

The Competitiveness Challenge: EU Member States in International Trade

Antje Hildebrandt, Maria Antoinette Silgoner

International Trade & Domestic Growth:
Determinants, Linkages and Challenges

Lukas Reiss

Issue Q1/08

Inflationary Pressures Worldwide despite Downturn in Growth
Dampened Growth also Expected in the Euro Area

Wolfgang Pointner, Martin Schneider, Josef Schreiner

Current Inflation Developments in Austria

*Friedrich Fritzer, Ernest Gnan, Walpurga Köhler-Töglhofer, Fabio Rumler,
Alfred Stiglbauer*

The Importance of Lease Financing for Austrian Municipalities

Bernhard Grossmann

The Treaty of Lisbon

Amendments to the EU Treaties and Their Consequences for EMU
of the Oesterreichische Nationalbank

Sylvia Gloggnitzer

Issue Q2/08

Financial Crisis and Spike in Commodity Prices Dampen Growth and Fuel Inflation
Economic Outlook for Austria from 2008 to 2010 (June 2008)

Gerhard Fenz, Martin Schneider

Supply-Side Triggers for Inflation in Austria

Jürgen Janger

Do Aggregate Demand Factors Influence Current Inflation Developments?

Fabio Rumler, Maria Teresa Valderrama

Stock Holdings in Austria

Pirmin Fessler, Martin Schürz

The Impact of EU Enlargement in 2004 and 2007 on FDI and Migration Flows
Gravity Analysis of Factor Mobility

*Andreas Breitenfellner, Jesús Crespo Cuaresma, Peter Mooslechner,
Doris Ritzberger-Grünwald*

Toward the First Decade of Economic and Monetary Union –
Summary of the 36th Economics Conference

Ernest Gnan, Martin Summer

Issue Q3/08

Global Economic Downturn Persists

Crisis in Financial and Real Estate Markets Dampens Growth

Gerhard Fenz, Ingrid Haar-Stöhr, Maria Antoinette Silgoner

Tax and Economic Growth in Austria

Konrad Pesendorfer

Economic Country Risks Emanating from Austria's International Exposure
Matthias Fuchs

Four Monetary Policy Strategies in Comparison: How to Deal with
Financial Instability?
Jésus Crespo Cuaresma, Ernest Gnan

The Economics of Financial Stability: Research Workshop at the OeNB
Martin Summer

Global Market Disruptions – Will Global Imbalances Unwind?
Peter Backé, Franz Nauschnigg

Periodical Publications of the Oesterreichische Nationalbank

For further details see www.oenb.at

Monetary Policy & the Economy quarterly

This quarterly publication, issued both in German and English, offers analyses of current cyclical developments, medium-term macroeconomic forecasts and studies on central banking and economic policy topics. It also summarizes the findings of macroeconomic workshops and conferences organized by the OeNB.

Statistiken – Daten & Analysen quarterly

This publication contains brief reports and analyses focusing on Austrian financial institutions, cross-border transactions and positions as well as financial flows. The contributions are in German, with executive summaries of the analyses in English. The statistical part covers tables and explanatory notes on a wide range of macroeconomic, financial and monetary indicators. The tables and additional information and data are also available on the OeNB's website in both German and English. This series also includes special issues on selected statistics topics published at irregular intervals.

econ.newsletter quarterly

The quarterly English-language newsletter is published only on the Internet and informs an international readership about selected findings, research topics and activities of the OeNB's Economic Analysis and Research Department. This publication addresses colleagues from other central banks or international institutions, economic policy researchers, decision makers and anyone with an interest in macroeconomics. Furthermore, the newsletter offers information on publications, studies or working papers as well as events (conferences, lectures and workshops).

For further details see www.oenb.at/econ.newsletter

Financial Stability Report semiannual

Issued both in German and English, the Financial Stability Report contains first, a regular analysis of Austrian and international developments with an impact on financial stability and second, studies designed to provide in-depth insights into specific topics related to financial market stability.

Focus on European Economic Integration semiannual

The English-language publication Focus on European Economic Integration is the successor publication to Focus on Transition (published up to issue 2/2003). Reflecting a strategic regional research priority of the OeNB, this publication is a channel for communicating our ongoing research on Central, Eastern and South-eastern European (CESEE) countries ranging from economic country studies to studies on central banking issues and related topics. One of the purposes of publishing theoretical and empirical studies in the Focus on European Economic Integration, which are subject to an external refereeing process, is to stimulate comments and suggestions prior to possible publication in academic journals.

Workshops – Proceedings of OeNB Workshops

three to four issues a year

The Proceedings of OeNB Workshops were introduced in 2004 and typically comprise papers presented at OeNB workshops at which national and international experts, including economists, researchers, politicians and journalists, discuss monetary and economic policy issues. Workshop proceedings are generally available in English only.

Working Papers

about ten papers a year

The OeNB's Working Paper series is designed to disseminate, and provide a platform for discussing, findings of OeNB economists or outside contributors on topics which are of special interest to the OeNB. To ensure the high quality of their content, the contributions are subjected to an international refereeing process.

Economics Conference (Conference Proceedings)

annual

The Economics Conference hosted by the OeNB is an international platform for exchanging views and information on monetary and economic policy as well as financial market issues. It convenes central bank representatives, economic policy-makers, financial market players, academics and researchers. The conference proceedings comprise all papers presented at the conference.

Conference on European Economic Integration (Conference Proceedings)

annual

This series, published in English by a renowned international publishing house, reflects presentations made at the OeNB's annual conference on Central, Eastern and Southeastern European issues and the ongoing EU enlargement process (formerly East-West Conference).

For further details see ceec.oenb.at

Annual Report

annual

The Annual Report of the OeNB provides a broad review of Austrian monetary policy, economic conditions, new developments in the financial markets in general and in financial market supervision in particular as well as of the OeNB's changing responsibilities and its role as an international partner in cooperation and dialogue. It also contains the OeNB's financial statements.

Intellectual Capital Report

annual

The Intellectual Capital Report is a review of the OeNB's intellectual capital and its use in the OeNB's business processes and services. The report clarifies the relationships between different types of human, relational, structural and innovation capital and describes various determinants that influence the OeNB's intellectual capital. The report provides an integrated view of the OeNB and serves to assess the consistency of the OeNB's intellectual capital with its knowledge-based strategic orientation.

Addresses of the Oesterreichische Nationalbank

	<i>Postal address</i>	<i>Telephone</i>	<i>Telex</i>
Head Office			
Otto-Wagner-Platz 3 1090 Vienna, Austria Internet: www.oenb.at E-Mail: oenb.info@oenb.at	PO Box 61 1011 Vienna, Austria	(+43-1) 404 20-6666 Fax: (+43-1) 404 20-2398	(1) 114669 natbk (1) 114778 natbk
Branch Offices			
Western Austria Branch Office			
Innsbruck			
Adamgasse 2 6020 Innsbruck, Austria	Adamgasse 2 6020 Innsbruck, Austria	(+43-512) 594 73-0 Fax: (+43-512) 594 73-99	
Southern Austria Branch Office			
Graz			
Brockmanngasse 84 8018 Graz, Austria	PO Box 8 8018 Graz, Austria	(+43-316) 81 81 81-0 Fax: (+43-316) 81 81 81-99	
Klagenfurt			
10.-Oktober-Straße 13 9020 Klagenfurt, Austria	10.-Oktober-Straße 13 9020 Klagenfurt, Austria	(+43-463) 576 88-0 Fax: (+43-463) 576 88-99	
Northern Austria Branch Office			
Linz			
Coulinstraße 28 4021 Linz, Austria	PO Box 346 4021 Linz, Austria	(+43-732) 65 26 11-0 Fax: (+43-732) 65 26 11-99	
Salzburg			
Franz-Josef-Straße 18 5027 Salzburg, Austria	Franz-Josef-Straße 18 5027 Salzburg, Austria	(+43-662) 87 12 01-0 Fax: (+43-662) 87 12 01-99	
Representative Offices			
Oesterreichische Nationalbank London Representative Office Gracechurch Street 48, 5 th floor EC3V 0EJ London United Kingdom		(+44-20) 7623-6446 Fax: (+44-20) 7623-6447	
Oesterreichische Nationalbank New York Representative Office 450 Park Avenue, Suite 1202 10022 New York, U.S.A.		(+1-212) 888-2334 Fax: (+1-212) 888-2515	(212) 422509 natb ny
Permanent Representation of Austria to the EU Avenue de Cortenbergh 30 1040 Brussels, Belgium		(+32-2) 285 48-41, -42, -43 Fax: (+32-2) 285 48-48	
Permanent Representation of Austria to the OECD Rue Albéric-Magnard 3 75116 Paris, France		(+33-1) 53 92 23-39 (+33-1) 53 92 23-44 Fax: (+33-1) 45 24 42-49	