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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.

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Opinions expressed by the authors of studies do not necessarily reflect the official viewpoint of the Oesterreichische Nationalbank or of the Eurosystem.

Analyses

Sluggish Economic Recovery – Conditions in the Labor Market Remain Strained

Economic Outlook for Austria from 2009 to 2011 (December 2009)

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1 Summary

According to the December 2009 economic outlook of the Oesterreichische Nationalbank (OeNB), economic output in Austria is projected to shrink by 3.5% in 2009, but to revert to positive growth in 2010 (+1.2%) and 2011 (+1.6%). These figures reflect a considerable improvement on the OeNB's June 2009 outlook. In June, the decline in GDP growth had been projected to reach as much as 4.2% in 2009, and the forecast for 2010 had been that of a decline by 0.4% of GDP. The revisions made since basically reflect temporary factors (inventory cycle, fiscal stimulus package) and a stronger revival of world trade than anticipated before. Over the medium term, however, the growth prospects remain weak as a result of the financial crisis. By the end of 2011, real GDP will still be slightly below pre-crisis levels.

The global recession spilled over to Austria above all through the export channel, with exports slowing sharply in the fall of 2008. While a gradual recovery of world trade observable since the summer of 2009 has since revived demand for Austrian exports, exports stand to shrink by as much as 12.9% in 2009 as a whole. Looking ahead, the acceleration of export growth is likely to remain moderate compared with earlier recoveries. Moreover, plummeting export demand and the general uncertainty amid the crisis, together with tighter financing conditions, are expected to have caused investment in plant and equipment to contract by a hefty 12.4% in 2009. In the near future, inventory investment should provide positive impulses to growth, since the contraction of GDP was reinforced by destocking in the first half of 2009.

Private consumption has continued to grow – albeit at low rates – throughout the crisis, reflecting the robust expansion of employment in recent years, the high wage settlements for 2009 and the decreasing inflation trend. The purchasing power of households has, moreover, been strengthened by a tax reform that entered into force in the spring of 2009. Consumption was also boosted temporarily in the second quarter of 2009 as the car scrapping scheme entered into force on April 1. However, the unwinding of these temporary measures implies the danger of a setback to the recovery in early 2010. In addition, compensation of employees is expected to stagnate in 2010 on account of the continued rise in unemployment and considerably lower wage settlements. Yet as the economy gradually revives, operating surpluses, self-employment income and investment income will at least stop shrinking and thus stabilize the level of household income in combination with public transfers.

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Table 1

OeNB December 2009 Outlook for Austria – Key Results[1]

	2008	2009	2010	2011
Economic activity	*Annual change in % (real)*			
Gross domestic product	+2.0	−3.5	+1.2	+1.6
Private consumption	+0.5	+0.4	+0.6	+0.9
Government consumption	+3.0	+0.6	+0.7	+1.0
Gross fixed capital formation	+0.5	−4.6	+1.2	+1.9
Exports of goods and services	−0.4	−12.9	+2.8	+3.9
Imports of goods and services	−1.6	−11.0	+2.3	+3.2
Contribution to real GDP growth	*Percentage points of GDP*			
Private consumption	+0.3	+0.2	+0.3	+0.5
Government consumption	+0.5	+0.1	+0.1	+0.2
Gross fixed capital formation	+0.1	−1.0	+0.2	+0.4
Domestic demand (excluding changes in inventories)	+0.9	−0.7	+0.7	+1.1
Net exports	+0.6	−1.8	+0.4	+0.6
Changes in inventories (including statistical discrepancy)	+0.5	−1.0	+0.1	+0.0
Prices	*Annual change in %*			
Harmonised Index of Consumer Prices (HICP)	+3.2	+0.5	+1.5	+1.6
Private consumption expenditure (PCE) deflator	+2.8	+0.9	+1.4	+1.6
GDP deflator	+2.0	+0.4	+1.2	+1.4
Unit labor costs in the total economy	+2.8	+4.9	−0.8	+0.5
Compensation per employee (at current prices)	+2.7	+2.4	+1.3	+1.8
Productivity (whole economy)	−0.1	−2.4	+2.1	+1.3
Compensation per employee (real)	−0.1	+1.5	−0.1	+0.2
Import prices	+3.8	−3.0	−0.4	+1.5
Export prices	+3.8	−3.1	−0.3	+1.3
Terms of trade	+0.0	−0.1	+0.1	−0.2
Income and savings				
Real disposable household income	+1.6	+0.4	+0.6	+0.6
	% of nominal disposable household income			
Saving ratio	12.0	11.9	11.8	11.6
Labor market	*Annual change in %*			
Payroll employment	+2.5	−1.3	−0.6	+0.5
	% of labor supply			
Unemployment rate (Eurostat definition)	3.9	4.7	5.3	5.4
Budget	*% of nominal GDP*			
Budget balance (Maastricht definition)	−0.4	−4.2	−5.6	−5.4
Government debt	62.6	68.9	73.6	76.9

Source: 2008: Eurostat, Statistics Austria; 2009 to 2011: OeNB December 2009 outlook.

[1] *The outlook was drawn up on the basis of seasonally adjusted and working-day adjusted national accounts data. Therefore, the historical values for 2008 may deviate from the nonadjusted data released by Statistics Austria.*

Austria (like Germany) has been among the euro area countries with the lowest increases in unemployment during the crisis so far. In September 2009, the number of jobs was down by 65,000 from September 2008, whereas the number of unemployed persons was up by 51,000. The fact that the labor market has not reacted more strongly to the sharp economic setback can be attributed to a number of reasons. On the one hand, businesses have made an effort not to lay off employees if possible. On the other hand, the repercussions of the crisis on the labor market have been offset to some extent by labor market measures, such as short-term working schemes. Payroll em-

ployment numbers are expected to drop by 1.3% in 2009. The unemployment rate (Eurostat definition) should rise from 3.9% in 2008 to 4.7% in 2009 and is expected to climb further to 5.4% in 2011.

HICP inflation is assumed to rise gradually in the next few months and to peak at 1.9% in January 2010. Thereafter, inflation pressures are expected to subside so that the inflation rate should stand at 1.3% by the end of 2010. This slowdown basically reflects the dynamics of energy prices and, to a smaller extent, food price developments. The continued subdued economic outlook and an expected fall in wage growth in 2010 will dampen inflation pressure in the industrial goods and services sectors. On balance, HICP inflation is projected to average 0.5% in 2009, before rising to 1.5% in 2010 and inching up to 1.6% in 2011.

The fallout from the crisis has been offset to some extent by internationally coordinated expansionary fiscal policy measures. The measures adopted to date by the Austrian government (inflation package, two economic stimulus packages, earlier implementation of the income tax reform, labor market packages, car scrapping scheme) and the measures adopted by the federal provinces will boost GDP growth by approximately 1 percentage point in 2009 and by about 0.7 percentage points in 2010. The Austrian Institute of Economic Research (WIFO) expects the fiscal packages of the Austrian trading partners (above all Germany) to support GDP growth in Austria by 0.8 percentage points in 2009 (2010: 0.0 percentage points). At the same time,

the various stimulus measures and above all the effect of the automatic stabilizers will cause the general government deficit to rise to 4.2% of GDP in 2009 and to 5.6% of GDP in 2010 (2008: 0.4% of GDP). Relatively high primary deficits and a highly unfavorable interest rate growth differential in 2009 will lead to an increase in the level of public debt to 68.9% of GDP in 2009 and to 73.6% of GDP in 2010 (2008: 62.6% of GDP).[2] By 2011, the debt ratio is expected to have climbed to 76.9%.

2 Technical Assumptions

This forecast is the OeNB contribution to the Eurosystem's December 2009 staff projections. The forecast horizon ranges from the fourth quarter of 2009 to the fourth quarter of 2011. November 12, 2009, was the cutoff date for the assumptions on global growth as well as interest rates, exchange rates and crude oil prices. The projections were prepared with the OeNB's macroeconomic quarterly model and are essentially based on seasonally and working-day adjusted national accounts data calculated by WIFO. These data were fully available up to the second quarter of 2009; for the third quarter we used the GDP flash estimate, which covers only part of the national accounts aggregates, though. The underlying short-term interest rate is based on market expectations for the three-month EURIBOR and is assumed to equal 1.2% in 2009 and 2010, and 2.4% in 2011. Long-term interest rates, which reflect market expectations for ten-year government bonds, are assumed to equal 3.9% in 2009 and 2010,

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[2] *The fiscal projections include only adequately specified measures that had passed the legislative process at the time the OeNB outlook was prepared. Therefore, these projections do not reflect any consolidation measures that the government may take from 2011.*

and 4.4% in 2011. The USD/EUR exchange rate is assumed to remain at USD/EUR 1.49 throughout 2010 and 2011. The projected trend in crude oil prices is based on futures prices. For 2009, we assume oil prices of USD 62.2 per barrel (Brent); our assumption for 2010 is USD 81.4, and USD 85.9 for 2011. The prices of commodities excluding energy are also based on futures prices over the forecast horizon.

3 World Economy Back on Growth Path

At the time of writing, the world economy is gradually regaining momentum, led by activities in Asia. An increasing number of indicators point toward an economic recovery, following a range of joint efforts by central banks, governments and international institutions to rescue the financial sector. The support measures taken by central banks have revived the interbank market following its collapse in the fall of 2008 and have stabilized the banking sector. A key impetus for economic recovery has, moreover, come from a range of economic stimulus packages adopted around the world and from the low level to which central banks have lowered official rates worldwide. These combined efforts have made it possible to overcome the recession which had hit most economies when the financial crisis came to a head in the fall of 2008.

The world's major economies are all reporting signs of economic recovery. At the same time, it must not be overlooked that output levels continue to fall far short of pre-crisis levels. In addition, it is unclear whether demand will be robust enough to support growth when governments start to unwind their economic stimulus packages and start the necessary consolidation measures. Other dampening factors include continued financing constraints as well as asset losses by both businesses and households in many regions.

China is currently at the vanguard of global recovery, but it also spent a lot more on public support measures than most industrial countries. At an estimated 7.8%, GDP growth will not be substantially lower in 2009 than it was in 2008 (+9.0%). Moreover, the Chinese government has reverted to its pre-crisis exchange-rate regime, i.e. it continues to keep the external value of the renminbi yuan artificially low by purchasing U.S. government bonds. In doing so, China supports both its own exports and helps the U.S.A. finance its budget and current account deficits. However, this policy only entrenches macroeconomic imbalances and postpones required adjustments.

The *U.S.* economy has also reverted to a growth path. In the third quarter of 2009, the U.S. GDP expanded by 0.7% (based on the second release of data) against the previous quarter. Looking ahead to the fourth quarter, the leading indicators point to strong growth also in the remainder of the year. This would imply that the U.S. economy has recovered from the recession into which it plunged in mid-2008. At the same time, there are a range of risks and factors that suggest that the recovery is but weak. The stabilization of the economy was brought about almost exclusively by economic policy measures. With a fiscal package worth USD 787 billion, adopted in February 2009, the U.S. government relied above all on cutting taxes, financing infrastructure projects, supporting the U.S. car industry and increasing transfer payments. The Federal Reserve System cut key interest rates to close to zero and contributed to the stabilization of the financial sector through credit easing measures. How the recov-

Table 2

Underlying Global Economic Conditions

	2008	2009	2010	2011
Gross domestic product	*Annual change in % (real)*			
World GDP growth outside the euro area	+3.3	−0.6	+3.5	+3.9
U.S.A.	+0.4	−2.5	+1.9	+2.3
Japan	−0.7	−5.2	+1.9	+1.3
Asia excluding Japan	+6.7	+4.9	+6.9	+7.0
Latin America	+4.1	−2.0	+2.6	+3.1
United Kingdom	+0.6	−4.6	+1.2	+2.1
New EU Member States[1]	+3.9	−3.7	+0.3	+2.8
Switzerland	+1.8	−1.6	+0.5	+1.9
Euro area[2]	+0.5	−4,1 to −3,9	+0,1 to +1.5	+0,2 to +2,2
World trade (imports of goods and services)				
World economy	+3.1	−11.7	+4.3	+4.7
Non-euro area countries	+4.0	−11.5	+6.1	+5.5
Real growth of euro area export markets	+3.8	−12.2	+4.2	+4.7
Real growth of Austrian export markets	+2.6	−12.3	+3.4	+3.8
Prices				
Oil price in USD/barrel (Brent)	97.7	62.2	81.4	85.9
Three-month interest rate in %	4.6	1.2	1.2	2.4
Long-term interest rate in %	4.4	3.9	3.9	4.4
USD/EUR exchange rate	1.47	1.40	1.49	1.49
Nominal effective exchange rate (euro area index)	113.03	113.97	116.42	116.42

Source: Eurosystem.

[1] Member States that joined the EU in 2004 and 2007 and have not yet introduced the euro: Czech Republic, Hungary, Poland, Romania, Bulgaria, Estonia, Latvia, Lithuania.

[2] 2009 to 2011: Results of the Eurosystem's December 2009 projections. The ECB presents the result in ranges based upon average differences between actual outcomes and previous projections.

ery continues to unfold will basically depend on whether the U.S.A. will succeed in closing the demand gap that will open up after the expiry of stimulating measures. Exporters should stand to gain from the depreciation of the U.S. dollar in the medium run. At the same time, the contribution to GDP growth stemming from household demand is unlikely to be substantial in the near future. The decline in real estate and securities prices has led to sharp financial losses. U.S. households have consequently reduced their expenditure on consumption in order to compensate these losses, which is already reflected in a visibly rising saving rate. Rising unemployment as well as tighter financing conditions have further depressed private consumption. Eurosystem projections expect the U.S. economy to grow by

1.9% in 2010 and by 2.3% in 2011. This means that the revival of the economy will be markedly less pronounced than the recovery from past recessions.

The global financial and economic crisis hit the euro area with full force at the turn of 2008/09. From the fourth quarter of 2008 until the second quarter of 2009, real GDP contracted by close to 4%. The second quarter of 2009, finally, brought first signs of stabilization, with the two biggest euro area economies – Germany and France – back on a growth path. In the third quarter of 2009, the euro area as a whole emerged from recession: With GDP rising by 0.4% (Eurostat flash estimate), the growth rate was positive again after three negative quarters. Growth was essentially driven by the recovery of the international economy, that is to say by rebounding world

trade. Other growth drivers include the monetary and fiscal policy measures taken as well as the restocking of inventories that had been depleted in the first half of the year. Conversely, business investment appears to have continued to shrink. The crisis-related reluctance to invest is expected to subside only in 2010. In the field of industrial production, the trend reversal occurred already in May 2009; since then, the monthly change rates have again been consistently positive. In the third quarter of 2009, industrial production was up 2.2% against the previous quarter. Orders have also been on the rise, with a monthly increase by 1.5% in September 2009. However, unlike in industry, there are no signs of a trend reversal in retail trade yet.

Germany was hit particularly badly by the crisis, given its high dependency on exports. From the first quarter of 2008 until the first quarter of 2009, GDP contracted by close to 7%. In addition to the setback in exports, German businesses also reported a sharp decline in investment activity. Interestingly, the rise in unemployment was highly limited, even though output contracted particularly sharply compared with past economic slowdowns. This can be attributed to a high flexibility of working arrangements (averaging arrangements for hours worked) and to short-time working schemes. Recovery started earlier in Germany than in most other countries. Positive growth, driven by domestic demand, was reported as early as in the second quarter of 2009. Domestic demand, in turn, had been strengthened by fiscal policy measures. In the third quarter of 2009, exports took over as the key engine of growth.

The *French* economy suffered a smaller setback than the German economy. Domestic demand, which tradi-

tionally plays a key role, was instrumental in offsetting the effect that the decline of exports had on overall output. Like Germany, France was back on a positive growth track in the second quarter of 2009, and continued to post positive growth in the third quarter. At the same time, the development of France's public finances is a matter of serious concern. The automatic stabilizers have proved to be a large burden on the budget during the crisis. Moreover, the French government adopted a big spending package in June 2009, which will take effect in 2010.

The *Italian* economy had suffered from a permanent loss of competitiveness even before the onset of the economic crisis. Consequently, there was no contribution to growth from either exports or business investments. This is why private consumption expenditure, which contracted sharply at the turn of 2008/09, and public consumption are currently the sole stabilizing factors. Given the dismal condition of public finances, the Italian government refrained from adopting major economic stimulus measures.

The countries in *Central, Eastern and Southeastern Europe (CESEE),* which are of prime importance for Austria, were hit by the crisis through a number of channels. The countries in the area suffered as export demand collapsed and capital inflows reversed given the sharp rise in risk aversion during the financial crisis. Moreover, the sharp depreciation of some currencies posed substantial problems especially for debtors who had taken out foreign currency loans. On balance, however, developments in the area have been highly mixed. While the Baltic states as well as Hungary and Romania suffered huge setbacks, Poland even recorded positive growth in the first and second quarters of 2009. Yet more and more

signs of stabilization are beginning to show. Of course, recovery will be highly dependent on the development of import demand in Western Europe, which is after all the biggest export market for CESEE producers.

4 Export Activity Gradually Regaining Momentum

The global crisis hit the Austrian economy above all through the foreign trade channel. Demand in Austrian export markets contracted by as much as 12.3% in 2009. At the same time, Aus-

trian exporters lost ground through losses in price competitiveness, given the appreciation of the euro – in particular against the U.S. dollar and against most CESEE currencies – and given the sharp rise in unit labor costs in 2009. The loss in price competitiveness from 2007 to 2009 totaled 3%, which led to losses in market share.

In line with the recovery of the world economy, Austrian export activity has been regaining momentum. In the second half of 2009, export growth was still largely driven by temporary

Table 3

Growth and Price Developments in Austria's Foreign Trade

	2008	2009	2010	2011
Exports	*Annual change in %*			
Competitor prices in Austria's export markets	+2.4	−3.4	−0.1	+1.1
Export deflator	+3.8	−3.1	−0.3	+1.3
Changes in price competitiveness	−1.4	−0.3	+0.2	−0.1
Import demand in Austria's export markets (real)	+2.6	−12.3	+3.4	+3.8
Austrian exports of goods and services (real)	−0.4	−12.9	+2.8	+3.9
Market share	−3.0	−0.5	−0.5	+0.1
Imports				
International competitor prices in the Austrian market	+2.1	−3.1	+0.1	+1.1
Import deflator	+3.8	−3.0	−0.4	+1.5
Austrian imports of goods and services (real)	−1.6	−11.0	+2.3	+3.2
Terms of trade	+0.0	−0.1	+0.1	−0.2
	Percentage points of real GDP			
Contribution of net exports to GDP growth	+0.6	−1.8	+0.4	+0.6

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook, Eurosystem.

Table 4

Austria's Current Account

	2008	2009	2010	2011
	% of nominal GDP			
Balance of trade	4.5	3.6	3.8	4.1
Balance on goods	−0.2	−0.8	−0.4	−0.4
Balance on services	4.7	4.3	4.3	4.5
Euro area	−0.2	0.1	0.1	0.4
Non-euro area countries	4.6	3.5	3.7	3.7
Balance on income	−0.7	−0.9	−1.0	−1.0
Balance on current transfers	−0.6	−0.8	−0.7	−0.7
Current account	3.2	1.8	2.2	2.4

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

factors, such as the inventory cycle and the fiscal stimulus packages adopted by numerous countries. As those factors unwind, export activity will weaken somewhat in early 2010. Quarterly growth rates will, however, remain in positive territory, in accordance with demand in Austrian export markets.

Following stagnation in 2008 based on national accounts data, real exports are expected to drop by 12.9% in 2009. The strengthening of economic activity over the remainder of the forecast horizon basically reflects external factors. Even though growth of real exports will fall considerably short of pre-crisis levels in both 2010 (+2.8%) and 2011 (+3.9%), exports will remain the key engine of growth.

The Austrian current account surplus has increased persistently in recent years, peaking at 3.6% of GDP in 2007. Following a slight decline to 3.2% in 2008, the crisis caused the current account surplus to contract more strongly, to 1.8%, in 2009, largely on account of a setback in goods exports. Goods imports, in contrast, have not contracted as much as exports, because domestic consumption has remained stable. Services exports and imports held up much better during the crisis than goods exports and imports. In fact, the tourist industry, which is of paramount importance for Austria, has so far fared better in 2009 than expected. Overnight stays of foreign tourists shrank by 3.3% from January to October 2009. On the whole, the trade balance has not reacted particularly strongly to the crisis. The expected recovery of world trade over the remainder of the forecast horizon will cause the current account surplus to rise again gradually in 2010 and 2011. The goods balance is projected to be balanced again by the end of 2011.

5 Domestic Demand Remains Weak during the Recovery

5.1 Crisis-Driven Sharp Decline in Investment in Plant and Equipment

The industrial sector has suffered by far the most from the crisis. In August 2009, industrial production was 15% below the comparative level of August 2008. While orders have picked up somewhat recently, they are still far below pre-crisis levels. Given markedly lower export demand and widespread uncertainty, businesses cut back on investment in plant and equipment from the second half of 2008 onward. At the same time, they suffered from tightened financing conditions. At the height of the crisis, financing through the issuance of stocks and bonds had virtually dried up. Banks, too, tightened their credit standards, but they did pass on the cuts in key interest rates adopted by the ECB since the fall of 2008. In the second quarter of 2009, capacity utilization dropped to 73%, from 84% in the first quarter. While capacity utilization has since improved again somewhat to 75% in the fourth quarter of 2009, investment activity continues to remain limited given existing excess capacities. Therefore, the main investment motive in the next year or two will be replacement investment rather than the development of new production capacities. Thus, investment in plant and equipment is projected to grow rather slowly in 2010 (+0.3%) and 2011 (+2.7%). Producers and retailers have largely depleted their inventories during the crisis. Restocking will support GDP growth in the short run.

Construction investment, finally, remained fairly strong, among other things because Austria had not seen any real estate bubbles. While residential construction investment has contracted

Chart 1

Domestic Demand Remains Weak during the Recovery

Downward Trend in Growth of Domestic Demand

Annual change in %

Investment in Plant and Equipment Mirrors Exports

Quarterly change in %
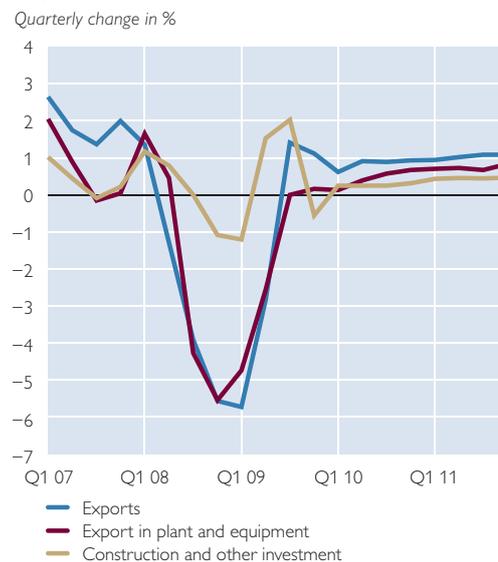
Source: WIFO, OeNB calculations.

Table 5

Investment Activity in Austria

	2008	2009	2010	2011
	Annual change in %			
Total gross fixed capital formation (real)	+0.5	−4.6	+1.2	+1.9
of which: Investment in plant and equipment (real)	−1.4	−12.4	+0.3	+2.7
Residential construction investment (real)	+1.9	−2.3	+0.8	+1.6
Nonresidential construction investment and other investment	+1.6	+1.5	+2.0	+1.5
Government investment (real)	+2.1	+1.0	+0.5	−1.5
Private investment (real)	+0.4	−4.9	+1.2	+2.1
	Contribution to total gross fixed capital formation growth in percentage points			
Investment in plant and equipment (real)	−0.5	−4.7	+0.1	+0.9
Residential construction investment (real)	+0.4	−0.5	+0.2	+0.4
Nonresidential construction investment and other investment	+0.6	+0.6	+0.9	+0.6
Government investment (real)	+0.1	+0.0	+0.0	−0.1
Private investment (real)	+0.4	−4.7	+1.1	+2.0
	Contribution to real GDP growth in percentage points			
Inventory changes (real)	−0.3	−1.8	+0.1	+0.0

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

slightly since the end of 2008, the decline is expected to be fairly limited in 2009 at –2.3% compared with the more substantial decline in investment in plant and equipment (–12.4%). Civil engineering, in contrast, has benefited from the government's economic support measures (development of road and railway infrastructure) and is expected to grow by 1½% in 2009.

5.2 Car Scrapping Scheme and Tax Reform Support Consumption in First Half 2009

Given the economic crisis and a massive setback in property income, self-employment income and operating surpluses, consumer spending turned out to be surprisingly robust in the first half of 2009. This fact can be attributed to a combination of factors. On the one hand, real disposable household income developed very favorably as of late, following several years without substantial gains, as the size of payroll employment increased by 2½% in 2008. In addition, wage settlements for 2009 broadly reflected the high inflation levels prevailing in the fall of 2008, when most settlements were concluded, but inflation has since dropped sharply; this has caused real household income to rise considerably.

On the other hand, two temporary factors had a positive impact on consumption in the first half of 2009. First, the tax reform that entered into force in the spring of 2009 has strengthened the purchasing power of households.[3] Second, the car scrapping scheme applicable from April 1, 2009 temporarily stoked household demand, after having initially depressed the level of new car registrations in the first quarter following the announcement of the new scheme. The number of new passenger car registrations continued to grow vigorously even after the incentive expired in July 2009, as high discounts made up for it. Thus, passenger car sales did not start to decrease – and thus dampen consumption – until the fourth quarter of 2009.

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[3] Together with the family package, the tax reform reduces the burden on households by EUR 2.1 billion in 2009.

Box 1

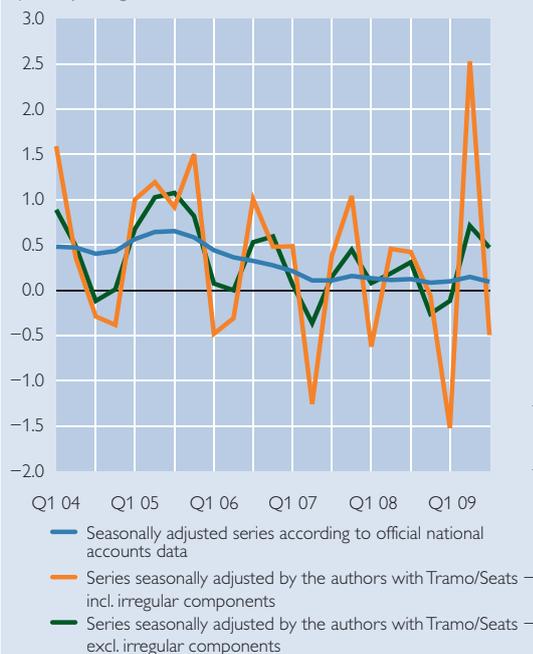### Development of Private Consumption in the First Half of 2009

The official seasonally and working-day adjusted national accounts data available at the time of writing (= flash estimate for the third quarter of 2009) do not reflect the changes in consumption levels that the temporary support measures should have created. The underlying reason is that the official series exhibits a high degree of smoothness. This series shows private consumption to have been growing at a steady quarterly rate of 0.1% for the past seven quarters in a row. Having adjusted the consumption series for seasonal and working-day effects with the Tramo/Seats[1] program, we arrived at very different results. Including the irregular component (which accounts for outliers and special effects), consumption expenditure grew by 2½% in the second quarter of 2009 against the previous quarter. The seasonally adjusted trend series (i.e. excluding the irregular component) suggests that consumption increased by 0.7% in the second quarter. Both series show negative growth for the first quarter of 2009, which is likely to reflect the announcement effect of the car scrapping scheme.

Chart 2

Car Scrapping Scheme Supports Private Consumption in Second Quarter 2009

Private Consumption

Quarterly change in %

New Passenger Car Registrations

Change in %

— Seasonally adjusted series according to official national accounts data
— Series seasonally adjusted by the authors with Tramo/Seats – incl. irregular components
— Series seasonally adjusted by the authors with Tramo/Seats – excl. irregular components

— Against the previous quarter
— Against the same month a year ago

Source: WIFO, OeNB calculations.
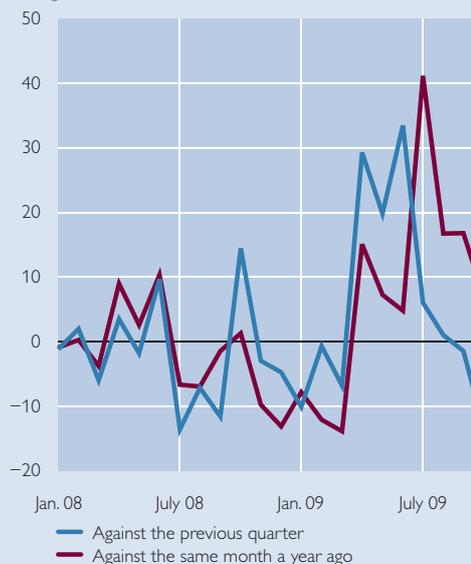
[1] *The Tramo/Seats program, which is also being used by Eurostat, decomposes time series into a trend/cyclical component, a seasonal component, and an irregular component. For a (German) description of Tramo/Seats, see e.g. Wüger (1995): Das neue Saisonbereinigungsverfahren des WIFO. WIFO-Monatsberichte 10/95. 625–635.*

In 2010, compensation of employees will stagnate on account of the continued rise in unemployment and considerably lower wage settlements. Operating surpluses, self-employment income and investment income are projected to have dropped sharply in 2009 and will continue to shrink somewhat there-after. At the same time, public transfer payments will stabilize household income. Employment levels are expected to start rising again in 2011. The ensuing growth of household income would imply an — albeit subdued — acceleration of consumption growth.

Table 6

Determinants of Nominal Household Income in Austria

	2008	2009	2010	2011
	Annual change in %			
Employees	+2.5	−1.3	−0.6	+0.5
Wages per employee	+2.7	+2.4	+1.3	+1.8
Compensation of employees	+5.3	+1.0	+0.6	+2.3
Mixed income and operating surplus, net	+8.5	−13.7	−0.2	+4.8
Property income[1]	+3.4	−2.4	−0.2	+2.6
	Contribution to disposable household income growth in percentage points			
Compensation of employees	+4.3	+0.9	+0.5	+1.8
Mixed income and operating surplus, net	+1.1	−1.9	+0.0	+0.6
Property income	+0.7	−0.5	+0.0	+0.5
Net transfers minus direct taxes[1]	−1.7	+3.0	+1.6	−0.4
Disposable household income (nominal)	+4.4	+1.3	+2.0	+2.3

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

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

Table 7

Private Consumption in Austria

	2008	2009	2010	2011
	Annual change in %			
Disposable household income (nominal)	+4.4	+1.3	+2.0	+2.3
Private consumption expenditure (PCE) deflator	+2.8	+0.9	+1.4	+1.6
Disposable household income (real)	+1.6	+0.4	+0.6	+0.6
Private consumption (real)	+0.5	+0.4	+0.6	+0.9
	% of nominal disposable household income			
Saving ratio	12.0	11.9	11.8	11.6

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

5.3 Labor Market Conditions Expected to Remain Strained over the Entire Forecast Horizon

While the crisis has not left the labor market unscathed, payroll employment only dropped by close to 2% in recent months (year on year) according to data released by the Association of Austrian Social Security Institutions. Adjustments on the labor market typically occurred through a reduction of hours worked rather than through job cuts. The most recent data on employment (based on the labor force concept) show hours worked to have shrunk by 5.2% in the second quarter of 2009 com-pared with the same quarter of 2008, whereas the number of employed persons declined by a mere 0.7% over the same period. At the firm level, these reductions were basically achieved through a reduction of overtime hours worked and through the use of vacation leave credits, as well as through the use of averaging arrangements. Economic policymakers managed to prevent larger job cuts by gradually expanding the short-term working scheme. Thus, the unemployment rate (Eurostat definition) rose relatively moderately from 3.5% in mid-2008 to 4.8% in September 2009. Other factors that helped contain this rise include the massive

Table 8

Labor Market Developments in Austria

	2008	2009	2010	2011
	Annual change in %			
Total employment	+2.1	−1.2	−0.8	+0.3
of which: Payroll employment	+2.5	−1.3	−0.6	+0.5
Self-employment	−0.2	−1.0	−1.2	−0.4
Public sector employment	+2.0	+0.1	+0.0	−0.1
Registered unemployment	+1.7	+19.5	+10.6	+1.8
Labor supply	+1.7	+0.0	−0.1	+0.4
	% of labor supply			
Unemployment rate (Eurostat definition)	3.9	4.7	5.3	5.4

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

expansion of training activities and the hoarding of labor at the beginning of the crisis. Above all in the manufacturing industry – the sector that has been hit hardest by the crisis – has the experience of labor shortages before the onset of the crisis prevented larger and more rapid job cuts.

With the unwinding of these factors, some of which were temporary, and given the lag with which the labor market tends to react to cyclical developments, further job cuts appear to be in the offing for 2010. Following a drop by 1.3% in 2009, payroll employment is expected to decrease by another 0.6% in 2010. Employment losses are likely to bottom out in mid-2010, by which time payroll employment (based on national accounts data) is expected to lie about 80,000 employees below the peak value reached in the third quarter of 2008. Payroll employment will not start to grow again until 2011 (by 0.4%).

As in the past, the growth of labor supply will be highly procyclical. The influx of workers from abroad will slow down considerably and will not start to rebound more strongly until all workers resident in the countries that joined the EU in 2004 and 2007 have gained full access to the labor market in mid-2011. The effects of the pension reform of 2003 have been strongly limited by an early retirement scheme for workers with long employment histories (the so-called "Hacklerregelung"). Demographic developments will have a slightly negative impact on the supply of labor in 2010 and 2011.

The changes in employment levels and in the supply of labor indicate that labor market conditions will remain strained over the entire forecast horizon. Based on the national accounts definition, around 300,000 persons will be unemployed in both 2010 and 2011. The unemployment rate (Eurostat definition) is thus expected to rise from 4.7% in 2009 to 5.4% in 2011.
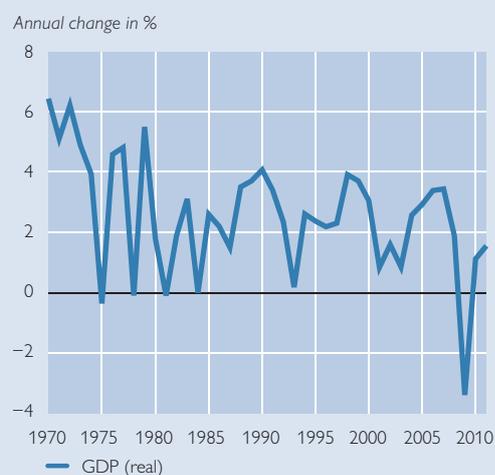
Box 2

Changes in Employment Levels in the Current Crisis

The size of the current growth setback by far exceeds all other recessions in recent decades. At the same time, the number of actual or anticipated job losses is lower than would have been expected compared with past crisis episodes. Indeed, the losses in employment are virtually no higher than they were in the early 1980s and in the mid-1990s. This box looks into the underlying factors and also discusses whether these factors will have a limited effect, or whether they are likely to keep the reaction of employment figures moderate also in the medium to long run.

Chart 3

Economic Growth and Employment from 1970 to 2011

Real GDP Growth

Annual change in %

Employment and Unemployment

Annual change in % %

GDP (real)

Payroll employment (seasonally adjusted, left-hand scale)
Unemployment rate
(national definition, seasonally adjusted, right-hand scale)

Source: Statistics Austria.

We have looked at productivity growth during the latest crisis for pointers. During the economic slowdown from the first quarter of 2001 to the second quarter of 2003, labor productivity (defined as value added per employee) rose by roughly ½% each year on average. Based on the assumption that productivity patterns will develop along similar lines also during the current crisis, we arrive at hypothetical employment patterns based on realized and projected GDP growth rates (chart 4, left panel). Actual employment growth (including projections) is, however, more favorable.[1] The right-hand panel of chart 4 shows the discrepancy between employment figures as projected in the current economic outlook and hypothetical employment figures for the final quarters of 2009, 2010 and 2011. This discrepancy is moreover broken down into four underlying factors (sectoral impact, overtime, short-term working, residual).

*The most important factor, also in the medium run, is the difference in the **impact** of the crisis **on individual sectors.** The current crisis has hit above all the manufacturing industry. This industry is particularly capital-intensive, and its labor productivity is more than 1½ times as high as that of the economy as a whole. Therefore, any decline in GDP that almost exclusively hits the manufacturing industry will trigger a markedly weaker employment reaction than an economic slowdown that affects all industries uniformly. From today's point of view,*
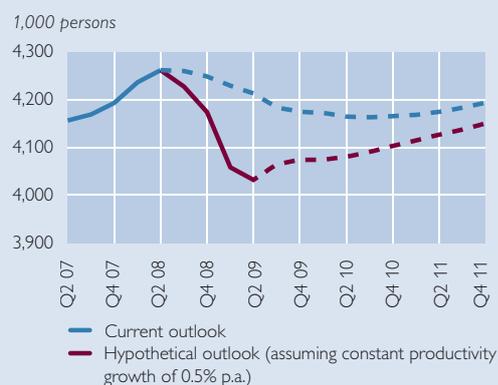
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[1] *The discrepancy between the two employment patterns is certainly overstated initially, as hoarding of labor and the decline in hours worked caused to depress productivity growth when the economy first started to slow down. By the end of 2009 – 1½ years after the onset of the crisis – these typical adjustment lags should, however, have largely run their course.*

the output of the manufacturing sector is unlikely to return to pre-crisis levels by the end of 2011. Consequently, we have taken the effects on value added and employment to be permanent in the manufacturing industry. These effects explain one-third of the discrepancy between the actual and hypothetical changes in employment at the end of 2009, and as much as two-thirds at the end of 2011.
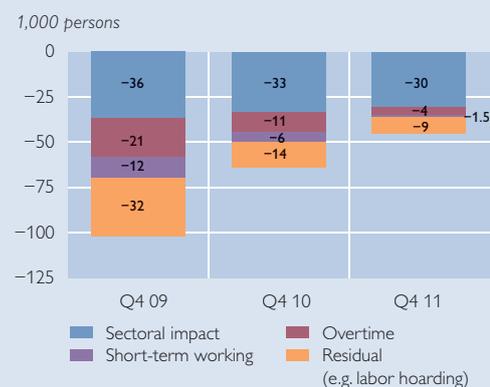
Chart 4

Projected and Hypothetical Employment Dynamics

Current versus Hypothetical Outlook

1,000 persons

Explanation for the Discrepancy between the Current and the Hypothetical Outlook

1,000 persons

Current outlook
Hypothetical outlook (assuming constant productivity growth of 0.5% p.a.)

Sectoral impact
Short-term working

Overtime
Residual
(e.g. labor hoarding)

Source: OeNB, Eurostat.

The other factors reflect a range of instruments used to offset the negative impact of the recession on employment in the short term, which will cease to be relevant in the medium term. For instance, in the current crisis, overtime levels have been reduced disproportionately strongly (e.g. by working less overtime, using vacation leave credits or applying averaging clauses). This effect is estimated to correspond to about 0.5% of total hours worked, or to about 21,000 employees up to the end of 2009. Similarly, the effect of short-term working arrangements will be temporary, even though the time limits for those schemes have been extended. The number of persons working short-term (i.e. on average 70% of standard working hours) is estimated to lie at 40,000 at the end of 2009, and should drop to 5,000 until the end of 2011. The residual of the discrepancy between actual and hypothetical changes in total employment basically includes hoarding of labor or other undocumented factors.

6 Inflation Remains Low in View of the Crisis

In 2008, the surge in energy prices drove up inflation rates, causing the HICP to climb by 3.2% against 2007 levels. In contrast, developments in 2009 have been characterized by marked disinflation. After peaking in June 2008 at 4.0%, inflation rates have been going down continually. June and July 2009 even saw a decline in prices (by −0.3% and −0.4%, respectively). Since then, consumer prices have stagnated year on year. Inflation develop-

ments have basically been shaped by two effects. First, decreasing energy prices have dampened the impact of the energy component on the HICP. Second, food prices, which were a key driver of inflation in 2008, ceased to contribute significantly to overall inflation in 2009. The current crisis has affected above all wholesale prices, which decreased by 8.4% in the first ten months of 2009 compared with the same period 2008.
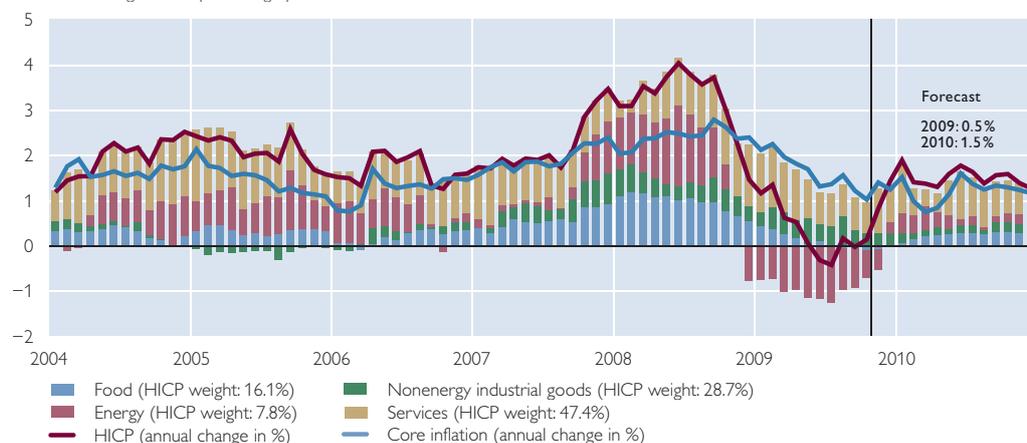
For the full year of 2009, we expect HICP inflation to reach 0.5%. As the

Chart 5

HICP Inflation and Contributions from Subcomponents

Contribution to growth in percentage points   *Latest observation: October 2009*

Food (HICP weight: 16.1%)   Nonenergy industrial goods (HICP weight: 28.7%)
Energy (HICP weight: 7.8%)   Services (HICP weight: 47.4%)
HICP (annual change in %)   Core inflation (annual change in %)

Source: OeNB, Statistics Austria.

dampening effects of declining energy prices will disappear at the end of 2009, inflation should accelerate to 1.5% in 2010. For 2011, we forecast a rate of 1.6%.

As the decline in employment has been very moderate in relation to the extent of the economic setback, unit labor costs have risen sharply in 2009. Yet in view of the continued bleak eco- nomic outlook, businesses will most likely not be able to pass on their higher costs through higher prices; thus their profit margins will sink in 2009. In 2010 and 2011 this trend will be slightly reversed. Compensation per employee is expected to have increased by 2.4% in 2009, thus remaining markedly be- low the growth in negotiated wages (+3.4%). This negative wage drift

Table 9

Selected Price and Cost Indicators for Austria

	2008	2009	2010	2011
	Annual change in %			
Harmonised Index of Consumer Prices (HICP)	+3.2	+0.5	+1.5	+1.6
HICP energy	+10.7	−10.5	+3.3	+2.7
HICP excluding energy	+2.5	+1.5	+1.2	+1.5
Private consumption expenditure (PCE) deflator	+2.8	+0.9	+1.4	+1.6
Investment deflator	+1.5	+0.7	+1.2	+1.5
Import deflator	+3.8	−3.0	−0.4	+1.5
Export deflator	+3.8	−3.1	−0.3	+1.3
Terms of trade	+0.0	−0.1	+0.1	−0.2
GDP at factor cost deflator	+2.0	+0.2	+1.2	+1.4
Unit labor costs	+2.8	+4.9	−0.8	+0.5
Compensation per employee	+2.7	+2.4	+1.3	+1.8
Labor productivity	−0.1	−2.4	+2.1	+1.3
Collectively agreed wage settlements	+3.1	+3.4	+1.3	+1.6
Profit margins[1]	−0.8	−4.7	+2.0	+0.8

Source: 2008: Eurostat, Statistics Austria; 2009 to 2011: OeNB December 2009 outlook.

[1] *GDP deflator divided by unit labor costs.*

results from a number of factors. On the one hand, employees worked less overtime, and companies paid fewer bonuses and other incentive compensation. On the other hand, structural effects have also been at play. In the current crisis, job losses were recorded above all in the manufacturing industry. Since this industry pays above-average wages, average wages have gone down as well. In view of the wage settlements negotiated in fall 2009 that were available at the time of writing (metal industry and retail sector: approximately +1½%), we expect negotiated wages to increase by 1.3% in 2010, and by 1.6% in 2011. Given high unemployment levels and the strongly negative output gap, there is little sign of inflation pressures building up during the forecast horizon.

7 Medium-Term Balance of Risks for Growth Is on the Downside

In the short run, the risks surrounding this economic outlook are tilted to the upside. The projections are based on the assumption that the temporary factors that supported growth in the second half of 2009 will rapidly lose effect, and that GDP growth – last measured at 0.9% in the third quarter 2009 (real, seasonally adjusted, against the previous quarter) – will drop to 0.4% in the fourth quarter of 2009 and to 0.1% in the first quarter of 2010. However, there is a chance that the inventory cycle and the economic stimulus packages may in the short run provide a higher contribution to growth than expected. In the medium run, however, risks lie mainly on the downside. The widespread strong need to consolidate public finances and a faster unwinding of fiscal and monetary stimulus programs might dampen economic growth. Other downside risks include the unexpected emergence of renewed

tensions in financial markets. A further appreciation of the euro would hurt the European export industry. Last but not least, a continued rise in commodity prices also constitutes a risk for cyclical developments.

With regard to inflation, the main upside risk stems from a renewed surge in commodity prices. In addition, measures to consolidate the budget through revenue increases by raising fees and taxes would also stoke inflation. At the same time, a further appreciation of the euro and weaker medium-term output growth would dampen inflation. In general, rising unemployment figures and persisting excess capacities would also imply lower levels of wage and price inflation.

8 Economic Outlook Much Brighter on Account of more Favorable External Conditions

The underlying assumptions on global growth have been revised upward since the OeNB's June 2009 economic outlook. For 2010, we raised our growth expectations for Austria's export markets by another 3½ percentage points. In view of the rise in oil prices in recent months, the price of oil futures expiring at the end of 2011 increased by around USD 15 per barrel (Brent). The euro has appreciated against the U.S. dollar and it has also strengthened on the basis of nominal effective exchange rates. Since interest rates have decreased since June 2009, long-term interest rates have been revised downward by about ½ percentage point throughout the forecast horizon.

The effects of these new external assumptions were simulated using the OeNB's macroeconomic model. The brighter external conditions were found to support GDP growth by 1.3 percentage points in 2010. Austria will benefit above all from stronger

Table 10

Change in the External Economic Conditions since the OeNB June 2009 Outlook

	December 2009			June 2009			Difference		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
	Annual change in %								
Growth of Austria's export markets	−12.3	+3.4	+3.8	−12.4	+0.1	+3.6	+0.1	+3.3	+0.2
Competitor prices in Austria's export markets	−3.4	−0.1	+1.1	−2.5	−0.1	+0.7	−0.9	+0.0	+0.4
Competitor prices in Austria's import markets	−3.1	+0.1	+1.1	−2.5	−0.1	+0.7	−0.6	+0.2	+0.4
	USD								
Oil price per barrel (Brent)	62.2	81.4	85.9	54.5	65.5	70.3	+7.7	+15.9	+15.6
	Annual change in %								
Nominal effective exchange rate (exports)	−0.7	−0.4	+0.0	−0.4	+0.1	+0.0	−0.3	−0.5	+0.0
Nominal effective exchange rate (imports)	−0.8	−0.1	+0.0	−0.7	+0.1	+0.0	−0.1	−0.2	+0.0
	%								
Three-month interest rate	1.2	1.2	2.4	1.4	1.6	2.5	−0.2	−0.4	−0.1
Long-term interest rate	3.9	3.9	4.4	4.2	4.6	5.0	−0.3	−0.7	−0.6
	Annual change in %								
U.S. GDP (real)	−2.5	+1.9	+2.3	−3.3	+0.3	+1.6	+0.8	+1.6	+0.7
	USD/EUR								
USD/EUR exchange rate	1.40	1.49	1.49	1.33	1.34	1.34	+0.07	+0.15	+0.15

Source: Eurosystem.

Table 11

Breakdown of Forecast Revisions

	GDP			HICP		
	2009	2010	2011	2009	2010	2011
	Annual change in %					
December 2009 outlook	−3.5	+1.2	+1.6	+0.5	+1.5	+1.6
June 2009 outlook	−4.2	−0.4	+1.2	+0.4	+1.1	+1.2
Difference	+0.7	+1.6	+0.4	+0.1	+0.4	+0.4
	Percentage points					
Due to:						
External assumptions	+0.1	+1.3	+0.5	+0.3	+0.5	+0.4
New data	+0.5	+0.9	×	+0.0	+0.0	×
of which: Revision of historical data until Q1 09	−0.7	×	×	×	×	×
Projection errors for Q2 09 and Q3 09	+1.3	+0.9	×	+0.0	×	×
Other[1]	+0.0	−0.6	−0.1	−0.2	−0.1	+0.0

Source: OeNB June 2009 and December 2009 outlooks.

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

growth in its export markets. In addition, the low level of interest rates is also beneficial for growth.

Table 11 lists in detail the reasons that motivated the latest forecast revisions, differentiating between effects of changed external assumptions, effects of new data and other effects. The influence of new data includes the effects of the revisions of both the historical data already available at the time of the previous economic outlook (i.e. data up to the first quarter of 2009) and the forecasting errors of the previous out-

look for the periods now published for the first time (i.e. data for the second and third quarters of 2009). This exercise shows that economic activity developed more favorably than forecast both in the second quarter (–0.5% rather than –1.4%) and in the third quarter of 2009 (+0.9% rather than –0.5%). This forecasting error was, however, partly offset by a marked downward revision of GDP growth in the second half of 2008. For the forecast for 2010, these historical data revisions were not relevant. The upward revision of the inflation forecast basically reflects the assumption of higher energy prices. The exchange rate assumptions, in contrast, had a dampening effect in comparison with the June 2009 outlook.

Box 3

OeNB-BOFIT Outlook for CESEE Countries[1]
The Region is Reaching the Trough, a Gradual Recovery, Mainly Driven by External Demand, to Be Seen from 2010 Onward[2]

This box presents GDP projections for an aggregate of eight CEE countries (the CEE-8, covering Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania) as well as for five individual CEE countries (Bulgaria, the Czech Republic, Hungary, Poland, Romania) and Russia for the years 2009 to 2011. In 2009, GDP in the CEE-8 will contract by close to 4%, even though Poland, the largest economy in the region, will post positive growth. In 2010, growth in the CEE-8 will turn slightly positive (+0.5%) and recover further by a moderate 2.6% in 2011. The Russian economy, following a deep contraction of 8% in 2009, will grow by 3% in both 2010 and 2011.

Table 1

CEE-8 GDP Outcomes 2008 and Projections for 2009–2011

	Eurostat	OeNB		
	2008	2009	2010	2011
	Annual growth in %			
CEE-8	**3.7**	**−3.8**	**0.5**	**2.6**
Bulgaria	6.0	−5.2	−0.1	1.6
Czech Republic	3.2	−5.2	0.6	2.6
Hungary	0.6	−6.7	−1.1	3.3
Poland	4.8	1.0	1.9	3.1
Romania	7.1	−7.7	0.3	3.1

Source: OeNB September 2009 forecast, Eurostat.

Measured in average annual terms, the extent of the decline in growth in 2009 will be very similar in the CEE-8 and the euro area. Thus, the positive growth differential of the past years will not be visible in 2009. However, the performance in most countries will actually be far below the average, and the projected growth rate of −3.8% is significantly influenced by the strong performance of Poland. On the back of strong domestic demand, the Polish economy is expected to grow by +1%. Hence, the country is leading in terms of performance not only within the region but also within the EU as a whole. For 2010, a slight recovery of +0.5% is projected for the CEE-8 aggregate. In 2011, all countries will experience positive, albeit still relatively low growth rates, and the economy of the CEE-8 region as a whole will expand by 2.6%.

[1] *Compiled by Julia Wörz (Julia.Woerz@oenb.at).*

[2] *The OeNB and the Bank of Finland Institute for Economies in Transition (BOFIT) compile semiannual forecasts of economic developments in Bulgaria, the Czech Republic, Hungary, Poland, Romania, Russia, and Croatia, with the OeNB being in charge of the projections for the EU Member States and Croatia and BOFIT for the forecast regarding Russia. The cutoff date for all projections is September 28, 2009. The projections rest on preliminary global growth projections and technical assumptions about euro area import growth, oil prices and USD/EUR exchange rates, which are prepared by the ECB for the Eurosystem in the context of broad macroeconomic projection exercises. Imports of the euro area are expected to shrink substantially in 2009 and to recover moderately thereafter. The price of oil will recover steadily up until 2011, but will stay well below its pre-crisis level. The USD/EUR exchange rate is assumed to rise moderately in 2009 and to remain unchanged over the remaining projection horizon.*

1 Outlook for CEE-5: Poland Performs Best in 2009, Gradual Recovery in the Region Expected for 2010 and 2011

*The global financial crisis hit the CEE-5 countries later but in most cases more severely than Western Europe, as already laid out in the March OeNB-BOFIT[3] projections. The significant downturn in the **first half of 2009** was mainly driven by a slump in exports triggered by a lack of external demand (this decline was less pronounced in Poland, possibly helped by the comparatively strong currency depreciation in late 2008 and early 2009), a strong decrease in gross fixed capital formation and substantial destocking related to faltering export demand and worsening economic sentiment. Private consumption delivered a substantial negative contribution to growth in all countries as labor market conditions started to deteriorate, wage growth decelerated in real terms and credit growth declined substantially. Imports contracted more sharply than exports in almost all countries. Thus, net exports developed into the most important GDP-sustaining component in all countries apart from the Czech Republic.*

*Just as the crisis hit the region with a time lag, recovery will take place with some delay, too. In the **second half of 2009,** domestic demand will not pick up compared to the first half, and the positive contribution of net exports will continue to rely on the slump in imports (which will, however, lose momentum in all countries).[4] Exports are expected to remain weak for the rest of 2009 due to lackluster import growth in the euro area, partly due to the end of Western European car scrappage schemes. These schemes were particularly important for the Czech Republic and Hungary in the first half of 2009. The inventory cycle will help support GDP dynamics during the second half of 2009, as destocking came to an end by mid-2009. The positive contribution of net exports to growth observed in most countries (ranging between 19 percentage points in Romania and 2½ percentage points in Poland for the whole year of 2009) will partly be temporary and is particularly strong in those countries where domestic demand declined the most. Export-oriented Czech Republic is the only country show-ing a negative contribution of net exports in 2009 because of the country's high dependance on the car industry, one of the industries hit hardest by the current crisis at the global level.*

*The moderate growth projected for the CEE-5 for **2010** is expected to stem from external demand. We expect mostly positive though very small contributions from net exports to GDP, ranging between 0.1 percentage points in the Czech Republic to 1.7 percentage points in Hungary. Again, Poland is the only exception, with a projected small negative contribution (−0.5 percentage points) in 2010.*

In most countries, current account imbalances have been reduced significantly during the crisis, while the turmoil seen in financial markets in late 2008 and early 2009 has abated. Hence, we expect investment activity to stabilize in 2010 and exports to rise as a consequence of an improved global environment (imports will also pick up somewhat from their depressed 2009 levels). For the region as a whole, the external growth impetus will, however, be too weak to bring the CEE countries back on a robust growth track as early as in 2010, given that domestic demand continues to be weak. As the effects of the crisis on the real economy materialize only with a certain time lag (through rising unemployment, precautionary savings and weak confidence), private consumption will remain subdued. All countries will continue to have little room for anticyclical fiscal measures. In a few countries, there might even be a (moderately) negative impact on GDP dynamics coming from (continued) fiscal tightening.

*In **2011,** improving external demand conditions and the continued process of restocking is expected to lead to a positive growth performance in all countries. The strong growth of both exports and imports will be partly due to base effects arising from previously low levels.*

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[3] *See Box 4 of the "Economic Outlook for Austria" in Monetary Policy & the Economy Q2/09.*

[4] *The unprecedented collapse of international trade in late 2008 and early 2009 is reflected in major downward revisions in the projections of import growth compared to our last forecast. However, with exports falling substantially as well, the net effect on our revisions for GDP growth is rather moderate.*

Compared to pre-crisis levels, growth will remain subdued and the contribution of domestic demand will continue to be weaker due to lagged real economy effects. Hungary, where domestic demand has already been sluggish for several years, will be an exception and show some recovery in investments.

The forecasts for 2010 and 2011 are still subject to considerable uncertainty, mainly related to developments in Western Europe. External demand and external financing conditions for the CEE-8 may be affected negatively if the gradual recovery of the global and the euro area economy that we assume in our baseline scenario does not materialize (risk of a double dip). Another risk factor would be a renewed increase in risk aversion vis-à-vis emerging economies. Moreover, domestic demand may also be weaker than expected, in particular if the real economy impact of the financial crisis in the CEE-5 countries turns out to be stronger than anticipated.

2 BOFIT-OeNB Forecast for Russia: Deep Contraction in 2009, Global Crisis probably Prelude to Lower Trend Growth

The world economic crisis hit Russia hard through the sharp decline in oil prices and the drying up of international financial markets, which triggered a credit crunch in the country. In the first half of 2009, Russia's total output fell 10.4% year on year, although the second-quarter performance showed signs of stabilization. The drop in GDP was primarily due to a decline in fixed investments (estimated at 19% in the first eight months over the same period in 2008) and a substantial drawdown of inventories. A drop in economic activity and the strong devaluation of the ruble in early 2009 also triggered a sharp contraction of imports. Month-on-month and quarter-on-quarter data point to a bottoming out of GDP growth in the summer of 2009. Monthly estimates of real GDP reached their lowest point in early 2009 and have been rising again since May. Unemployment rates (International Labour Organization's methodology) leveled off over spring and summer.

*In the **second half of 2009,** private consumption is likely to be boosted by trickle-down effects of recovering oil and staple revenues, by the stabilization of the job market and by wage recovery. Moreover, growth in government consumption should kick in, since the revised federal budget for 2009 provides for a sizable fiscal stimulus: It foresees higher expenditure (+7% of GDP) despite falling revenues, leading to an expected budget deficit of over 8% of GDP (2008: surplus of 4.1%). The turnaround in the second half of 2009 will be supported by modest growth in export demand. Import growth will likely remain subdued, given its sharp decrease in the first half of the year and the continuing impact of the ruble devaluation of early 2009. However, persisting elevated (double digit) inflation has been eroding competitiveness gains sparked by devaluation, and recovering consumer demand may contribute to a gradual pick-up of imports toward the end of the year. Still, net exports will probably deliver a positive contribution to GDP growth for the first time in years. Given the weak economic performance in the earlier part of the year, total output in 2009 will register a substantial contraction, which we project at 8.0%.*

Owing to considerable lingering uncertainty and limited credit availability, investment – hit by a severe credit crunch – is not expected to pick up until 2010. At that point, investment will join private and government consumption, buoyed by a stabilization of the global recovery, as the driving forces of Russian economic expansion. The continuing, though smaller fiscal stimulus in 2010 will include an expansion of social policy measures. Budget shortfalls in both 2009 and 2010 are to be covered mostly by money from reserve and welfare funds. While exports will continue to grow modestly, the recovery of domestic demand and the likely return of the ruble's real effective exchange rate to almost the level posted one year earlier will revive imports – to the point that the contribution of net exports to growth will revert to negative territory. GDP growth will be relatively moderate in 2010 and 2011 (+3% in both years).

Table 2

Russia GDP Outcome 2008 and Projections for 2009–2011

	Rosstat	BOFIT-OeNB		
	2008	2009	2010	2011
	Annual growth in %			
Russia	5.6	−8.0	3.0	3.0

Source: Rosstat 2008, BOFIT forecast 2009–2011.

The risks to these projections are mainly on the downside. As in the past, Russia's economic performance in the coming years will largely depend on the oil price, and therefore on the strength of the world economy's recovery, which is expected to remain fragile for some time. Another risk factor relates to nonperforming loans, which have already reached a high level. Their further expansion would perpetuate the credit squeeze and act as a major drag on the economy's recovery. Inflation also gives rise to concern: If it does not subside in the remaining months of 2009, the Russian currency could get under renewed downward pressure, which might even again destabilize the financial system. Finally, the world economic crisis may dampen Russian investment growth and hence the economy's medium- to long-term growth trajectory if the banking sector (or capital market) fails to make up at least partly for the breakdown of foreign investment finance.

Annex: Detailed Result Tables

Demand Components (Real Prices)

Chained volume data (reference year = 2000)

	2008	2009	2010	2011	2008	2009	2010	2011
	EUR million				Annual change in %			
Private consumption	137,953	138,531	139,412	140,649	+0.5	+0.4	+0.6	+0.9
Government consumption	48,619	48,892	49,250	49,724	+3.0	+0.6	+0.7	+1.0
Gross fixed capital formation	56,152	53,564	54,184	55,236	+0.5	−4.6	+1.2	+1.9
of which: Investment in plant and equipment	21,421	18,774	18,838	19,346	−1.4	−12.4	+0.3	+2.7
Residential construction investment	12,174	11,900	11,999	12,193	+1.9	−2.3	+0.8	+1.6
Investment in other construction	22,557	22,890	23,347	23,697	+1.6	+1.5	+2.0	+1.5
Changes in inventories (including statistical discrepancy)	4,781	2,009	2,333	2,221	×	×	×	×
Domestic demand	247,505	242,997	245,179	247,830	+1.5	−1.8	+0.9	+1.1
Exports of goods and services	153,726	133,930	137,695	143,120	−0.4	−12.9	+2.8	+3.9
Imports of goods and services	135,631	120,740	123,504	127,402	−1.6	−11.0	+2.3	+3.2
Net exports	18,095	13,190	14,191	15,719	×	×	×	×
Gross domestic product	265,600	256,187	259,370	263,549	+2.0	−3.5	+1.2	+1.6

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

Demand Components (Current Prices)

	2008	2009	2010	2011	2008	2009	2010	2011
	EUR million				Annual change in %			
Private consumption	148,512	150,496	153,570	157,435	+3.3	+1.3	+2.0	+2.5
Government consumption	52,030	53,892	55,101	56,466	+5.9	+3.6	+2.2	+2.5
Gross fixed capital formation	60,218	57,867	59,239	61,295	+2.0	−3.9	+2.4	+3.5
Changes in inventories (including statistical discrepancy)	2,192	−2,299	−2,336	−2,781	×	×	×	×
Domestic demand	262,952	259,956	265,573	272,415	+3.4	−1.1	+2.2	+2.6
Exports of goods and services	167,310	141,233	144,775	152,396	+3.3	−15.6	+2.5	+5.3
Imports of goods and services	148,447	128,167	130,574	136,673	+2.2	−13.7	+1.9	+4.7
Net exports	18,863	13,066	14,201	15,723	×	×	×	×
Gross domestic product	281,815	273,022	279,774	288,138	+4.0	−3.1	+2.5	+3.0

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

Table 14

Deflators of Demand Components

	2008	2009	2010	2011	2008	2009	2010	2011
	2000 = 100				*Annual change in %*			
Private consumption	107.7	108.6	110.2	111.9	+2.8	+0.9	+1.4	+1.6
Government consumption	107.0	110.2	111.9	113.6	+2.9	+3.0	+1.5	+1.5
Gross fixed capital formation	107.3	108.0	109.3	111.0	+1.5	+0.7	+1.2	+1.5
Domestic demand (excluding changes in inventories)	107.4	108.8	110.3	112.0	+2.5	+1.3	+1.4	+1.6
Exports of goods and services	108.9	105.5	105.1	106.5	+3.8	−3.1	−0.3	+1.3
Imports of goods and services	109.4	106.2	105.7	107.3	+3.8	−3.0	−0.4	+1.5
Terms of trade	99.5	99.3	99.4	99.3	+0.0	−0.1	+0.1	−0.2
Gross domestic product	106.1	106.6	107.9	109.3	+2.0	+0.4	+1.2	+1.4

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

Table 15

Labor Market

	2008	2009	2010	2011	2008	2009	2010	2011
	Thousands				*Annual change in %*			
Total employment	4,251.6	4,200.0	4,166.1	4,179.6	+2.1	−1.2	−0.8	+0.3
of which: Private sector employment	*3,719.9*	*3,667.6*	*3,633.7*	*3,647.5*	*+2.1*	*−1.4*	*−0.9*	*+0.4*
Payroll employment (national accounts definition)	3,570.1	3,522.4	3,499.8	3,515.8	+2.5	−1.3	−0.6	+0.5
	% of labor supply							
Unemployment rate (Eurostat definition)	3.9	4.7	5.3	5.4	×	×	×	×
	EUR per real output unit x 100							
Unit labor costs (whole economy)[1]	62.1	65.1	64.6	65.0	+2.8	+4.9	−0.8	+0.5
	EUR thousand per employee							
Labor productivity (whole economy)[2]	62.5	61.0	62.3	63.1	−0.1	−2.4	+2.1	+1.3
	EUR thousand							
Real compensation per employee[3]	36.0	36.6	36.5	36.6	−0.1	+1.5	−0.1	+0.2
	At current prices, EUR thousand							
Gross compensation per employee	38.8	39.7	40.2	41.0	+2.7	+2.4	+1.3	+1.8
	At current prices, EUR million							
Total gross compensation of employees	138,531	139,967	140,854	144,064	+5.3	+1.0	+0.6	+2.3

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

[1] *Gross wages divided by real GDP.*
[2] *Real GDP divided by total employment.*
[3] *Gross wages per employee divided by the private consumption expenditure (PCE) deflator.*

Table 16

Current Account

	2008	2009	2010	2011	2008	2009	2010	2011
	EUR million				*% of nominal GDP*			
Balance of trade	12,619.0	9,729.3	10,688.9	11,853.4	4.5	3.6	3.8	4.1
Balance on goods	−556.0	−2,145.3	−1,238.8	−1,136.5	−0.2	−0.8	−0.4	−0.4
Balance on services	13,175.0	11,874.6	11,927.7	12,989.9	4.7	4.3	4.3	4.5
Euro area	−437.0	143.1	399.3	1,255.7	−0.2	0.1	0.1	0.4
Non-euro area countries	13,056.0	9,586.2	10,289.6	10,597.7	4.6	3.5	3.7	3.7
Balance on income	−1,866.0	−2,508.4	−2,689.4	−2,759.6	−0.7	−0.9	−1.0	−1.0
Balance on transfers	−1,714.0	−2,307.7	−1,938.2	−2,075.2	−0.6	−0.8	−0.7	−0.7
Current account	9,039.0	4,913.2	6,061.3	7,018.6	3.2	1.8	2.2	2.4

Source: 2008: Eurostat; 2009 to 2011: OeNB December 2009 outlook.

Table 17

Quarterly Outlook Results

	2009	2010	2011	2009				2010				2011			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Prices, wages and costs	*Annual change in %*														
HICP	+0.5	+1.5	+1.6	+1.0	+0.1	−0.1	+0.8	+1.6	+1.6	+1.5	+1.4	+1.5	+1.6	+1.6	+1.6
HICP (excluding energy)	+1.5	+1.2	+1.5	+2.2	+1.6	+1.3	+1.1	+1.1	+1.3	+1.4	+1.3	+1.4	+1.5	+1.5	+1.5
Private consumption expenditure (PCE) deflator	+0.9	+1.4	+1.6	+0.9	+0.9	+0.9	+1.0	+1.3	+1.4	+1.4	+1.5	+1.6	+1.6	+1.6	+1.6
Gross fixed capital formation deflator	+0.7	+1.2	+1.5	+0.9	+0.7	+0.6	+0.7	+0.9	+1.1	+1.4	+1.4	+1.4	+1.5	+1.6	+1.6
GDP deflator	+0.4	+1.2	+1.4	+0.4	+0.2	−0.1	+1.2	+1.1	+1.1	+1.3	+1.3	+1.3	+1.4	+1.4	+1.4
Unit labor costs	+4.9	−0.8	+0.5	+7.0	+7.5	+3.6	+1.5	−1.3	−2.2	+0.0	+0.4	+0.1	+0.3	+0.7	+1.0
Nominal wages per employee	+2.4	+1.3	+1.8	+3.0	+3.4	+1.9	+1.3	+1.0	+0.6	+1.7	+1.9	+1.7	+1.7	+1.9	+2.0
Productivity	−2.4	+2.1	+1.3	−3.8	−3.8	−1.6	−0.2	+2.3	+2.9	+1.6	+1.4	+1.6	+1.4	+1.2	+1.0
Real wages per employee	+1.5	−0.1	+0.2	+2.0	+2.6	+1.0	+0.3	−0.3	−0.7	+0.3	+0.3	+0.1	+0.1	+0.2	+0.3
Import deflator	−3.0	−0.4	+1.5	−2.1	−1.8	−5.7	−2.3	−1.1	−1.9	+0.7	+0.8	+1.1	+1.4	+1.6	+1.7
Export deflator	−3.1	−0.3	+1.3	−0.9	−2.6	−4.8	−4.2	−1.4	−1.0	+0.5	+0.7	+1.0	+1.2	+1.4	+1.5
Terms of trade	−0.1	+0.1	−0.2	+1.2	−0.8	+1.0	−1.9	−0.2	+1.0	−0.2	−0.1	−0.2	−0.2	−0.2	−0.2
Economic activity	*Annual and/or quarterly changes in % (real)*														
GDP	−3.5	+1.2	+1.6	−2.6	−0.5	+0.9	+0.4	+0.1	+0.3	+0.4	+0.4	+0.4	+0.4	+0.4	+0.4
Private consumption	+0.4	+0.6	+0.9	+0.1	+0.1	+0.1	+0.0	+0.2	+0.2	+0.2	+0.2	+0.2	+0.2	+0.2	+0.3
Government consumption	+0.6	+0.7	+1.0	−1.6	+0.2	+1.2	−0.1	−0.1	+0.1	+0.2	+0.3	+0.3	+0.2	+0.2	+0.2
Gross fixed capital formation	−4.6	+1.2	+1.9	−2.5	+0.1	+1.3	−0.3	+0.2	+0.3	+0.4	+0.4	+0.5	+0.5	+0.5	+0.6
of which: Investment in plant and equipment	−12.4	+0.3	+2.7	−4.7	−2.6	+0.0	+0.2	+0.1	+0.4	+0.6	+0.7	+0.7	+0.7	+0.7	+0.8
Residential construction investment[1]	−2.3	+0.8	+1.6	−1.1	−0.6	−0.1	+0.2	+0.4	+0.4	+0.4	+0.3	+0.4	+0.5	+0.4	+0.5
Exports	−12.9	+2.8	+3.9	−5.7	−2.8	+1.4	+1.1	+0.6	+0.9	+0.9	+0.9	+0.9	+1.0	+1.1	+1.1
Imports	−11.0	+2.3	+3.2	−5.6	−2.3	+0.9	+1.2	+0.6	+0.5	+0.6	+0.7	+0.8	+0.8	+0.9	+0.9
	Contribution to real GDP growth in percentage points														
Domestic demand	−0.7	+0.7	+1.1	−0.8	+0.1	+0.6	−0.1	+0.1	+0.2	+0.2	+0.3	+0.3	+0.3	+0.3	+0.3
Net exports	−1.8	+0.4	+0.6	−0.4	−0.4	+0.3	+0.0	+0.0	+0.2	+0.2	+0.2	+0.1	+0.1	+0.1	+0.1
Changes in inventories	−1.0	+0.1	+0.0	−1.5	−0.3	+0.1	+0.4	+0.0	−0.1	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Labor market	*% of labor supply*														
Unemployment rate (Eurostat definition)	4.7	5.3	5.4	4.4	4.8	4.7	4.9	5.1	5.3	5.4	5.4	5.4	5.4	5.4	5.3
	Annual and/or quarterly changes in %														
Total employment	−1.2	−0.8	+0.3	−0.5	−0.4	−0.7	−0.2	−0.1	−0.2	+0.0	+0.0	+0.1	+0.2	+0.2	+0.3
of which: Private sector employment	−1.4	−0.9	+0.4	−0.5	−0.4	−0.8	−0.2	−0.1	−0.2	+0.0	+0.1	+0.1	+0.2	+0.2	+0.3
Payroll employment	−1.3	−0.6	+0.5	−0.6	−0.6	−0.7	−0.1	+0.0	−0.1	+0.0	+0.1	+0.1	+0.2	+0.3	+0.3
Additional variables	*Annual and/or quarterly changes in % (real)*														
Disposable household income	+0.4	+0.6	+0.6	+0.2	+1.2	+1.4	−0.1	+0.0	−0.4	+0.0	−0.1	+0.2	+0.3	+0.5	+0.3
	% of real disposable household income (saving ratio) and % of real GDP (output gap)														
Household saving ratio	11.9	11.8	11.6	10.7	11.6	12.8	12.6	12.4	11.9	11.7	11.4	11.4	11.5	11.7	11.8
Output gap	−2.0	−2.0	−1.9	−2.1	−2.5	−1.8	−1.7	−1.9	−2.0	−2.0	−1.9	−1.9	−1.9	−1.9	−1.8

Source: OeNB December 2009 outlook (based on seasonally and working-day adjusted data).

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

Table 18

Comparison of Current Economic Forecasts for Austria

Indicator	OeNB			WIFO		IAS		OECD			IMF		European Commission		
	December 2009			September 2009		September 2009		November 2009			October 2009		November 2009		
	2009	2010	2011	2009	2010	2009	2010	2009	2010	2011	2009	2010	2009	2010	2011
Key results	*Annual change in %*														
GDP (real)	−3.5	+1.2	+1.6	−3.4	+1.0	−3.8	+1.0	−3.8	+0.9	+2.2	−3.8	+0.3	−3.7	+1.1	+1.5
Private consumption (real)	+0.4	+0.6	+0.9	+0.2	+0.5	+0.3	+0.5	+0.7	+0.8	+1.7	×	×	+0.5	+0.5	+0.6
Government consumption (real)	+0.6	+0.7	+1.0	+0.8	+1.5	+1.0	+0.8	+0.9	+1.7	+1.3	×	×	+1.0	+1.4	+1.1
Gross fixed capital formation (real)[1]	−4.6	+1.2	+1.9	−6.1	−0.4	−10.8	−0.2	−6.5	+0.1	+3.7	×	×	−6.6	−0.3	+3.0
Exports (real)	−12.9	+2.8	+3.9	−12.0	+2.2	−13.5	+3.8	−14.1	+4.5	+7.5	×	×	−13.7	+2.1	+3.5
Imports (real)	−11.0	+2.3	+3.2	−10.1	+1.6	−12.1	+2.9	−9.6	+5.1	+7.8	×	×	−9.8	+1.6	+3.1
GDP per employee	−2.4	+2.1	+1.3	−2.3	+1.5	−2.4	+1.8	×	×	×	×	×	−2.3	+1.8	+1.2
GDP deflator	+0.4	+1.2	+1.4	+1.9	+0.9	+1.5	+1.0	+0.7	+1.0	+1.1	×	×	+1.6	+0.9	+1.7
CPI	×	×	×	+0.5	+1.3	+0.6	+1.4	×	×	×	+0.5	+1.0	×	×	×
HICP	+0.5	+1.5	+1.6	+0.5	+1.3	×	×	+0.3	+0.6	+1.0	×	×	+0.5	+1.3	+1.6
Unit labor costs	+4.9	−0.8	+0.5	+5.1	−0.3	×	×	×	×	×	×	×	+5.4	+0.2	+1.3
Payroll employment	−1.2	−0.8	+0.3	−1.5	−0.9	−1.5	−0.8	×	×	×	×	×	−1.5	−0.7	+0.3
	% of labor supply														
Unemployment rate[2]	4.7	5.3	5.4	5.3	5.8	5.0	5.8	5.8	7.1	7.3	5.3	6.4	5.5	6.0	5.7
	% of nominal GDP														
Current account	1.8	2.2	2.4	1.9	1.9	×	×	1.9	2.2	2.6	2.1	2.0	1.5	1.4	1.8
Government surplus/deficit	−4.2	−5.6	−5.4	−4.5	−5.7	−4.4	−5.4	−4.3	−5.5	−5.8	−4.2	−5.6	−4.3	−5.5	−5.3
External assumptions															
Oil price in USD/barrel (Brent)	62.2	81.4	85.9	60.0	75.0	61.0	80.0	77.0	77.0	77.0	61.5	76.5	61.3	76.5	80.5
Short-term interest rate in %	1.2	1.2	2.4	1.3	1.5	1.2	1.2	1.2	0.8	1.9	1.2	1.6	1.3	1.5	2.5
USD/EUR exchange rate	1.40	1.49	1.49	1.40	1.50	1.39	1.35	1.49	1.49	1.49	1.37	1.41	1.39	1.48	1.48
	Annual change in %														
Euro area GDP (real)	−4.1 to −3.9	+0.1 to +1.5	+0.2 to +2.2	−4.0	+0.8	−3.9	+1.0	−4.0	+0.9	+1.7	−4.2	+0.3	−4.0	+0.7	+1.5
U.S. GDP (real)	−2.5	+1.9	+2.3	−2.7	+1.0	−2.7	+1.7	−2.5	+2.5	+2.8	−2.7	+1.5	−2.5	+2.2	+2.0
World GDP (real)	−1.1	+3.0	+3.5	−1.2	+2.0	×	×	×	×	×	−1.1	+3.1	−1.2	+3.1	+3.5
World trade	−11.7	+4.3	+4.7	−12.0	+2.0	−14.5	+6.0	−12.5	+6.0	+7.7	−11.9	+2.5	−14.0	+3.6	+4.6

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

[1] For IAS: Gross investment.

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

Fiscal and Structural Policy Challenges Created by the Economic Crisis of 2008–2009

The economic crisis of 2008–2009 has greatly compounded the challenge of economic policy-making at the EU level and at the national level. This study focuses on the related real economy aspects, namely on fiscal and structural policies.

Judging from current trends, Austria will most probably not be able to reduce its high deficits of 2009 and 2010 via economic growth alone. Furthermore, the repercussions of the crisis on public finances are going to be exacerbated in the medium term by the implications of demographic change. These developments result in a considerable need for consolidation, which will go significantly beyond the need to finance the economic stimulus packages ex post – but by how much cannot be estimated precisely as yet. At any rate, it will be important to coordinate the necessary consolidation measures internationally, not to undertake consolidation before the economic recovery becomes self-sustained, and to avoid conflicts with other economic policy goals.

Having analyzed the medium- to long-term structural growth potential which may support fiscal consolidation, we find Austria to have got some catching-up potential in terms of labor supply and productivity compared with typical comparison countries. This catching-up potential is good news, as this means that Austria should find it easier than other countries to revive growth. With a view to offsetting the crisis-related loss in potential growth in the medium term, which would materially support consolidation efforts, policymakers could leverage growth above all by raising employment, improving the education system, enhancing competition policies and reforming innovation funding. Economic policymakers in Austria and elsewhere have indeed got the power to influence the growth path after the crisis.

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Jürgen Janger,
Lukas Reiss[1]

The economic crisis of 2008–2009 has greatly compounded the challenge of economic policymaking both at the EU level and at the national level by causing a permanent loss in potential output – which may reach between 4% and 6% in the case of Austria (Gaggl and Janger, 2009) – and by sharply driving up public deficit and debt ratios.

This study highlights the implications these developments are likely to have for fiscal and structural policymaking in Austria. Section 1 outlines how the economic crisis of 2008–2009 and upcoming demographic changes would cause public finances to deteriorate significantly and permanently in the absence of consolidation. Section 2 discusses the timing and composition of consolidation strategies: When should policymakers act, and on which areas should they focus? Section 3 describes structural policy areas in which policymakers in Austria could mobilize as yet untapped growth reserves, judging from a comparison with top European performers. Section 4 offers conclusions.

1 High Consolidation Needs due to Crisis (and Aging Societies)

The global financial and economic crisis has not only caused GDP, and thus real income, to contract in 2009 compared with 2008; it has also caused public finances to deteriorate sharply. An analysis of historical economic crises, especially those associated with a crisis of the banking sector, shows that public deficits – and even more so public debt ratios – may become unsustainable in the medium to long term in the aftermath of a crisis.

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Recent data on, and forecasts of, deficit and debt levels world-wide have confirmed these patterns for European countries and, with some qualifications, also for Austria (see the article by Fenz and Schneider in this issue). Thus, the economic crisis jeopardizes the long-term sustainability of public finances, as economic recovery alone will not suffice to lower debt and deficit levels – it will take further consolidation measures to achieve that. In addition to the medium- to long-term impact of the global financial and economic crisis and its budgetary implications, the impact of Europe's aging societies constitutes a further risk to the long-term sustainability of public finances, also for Austria.

In the following we discuss the impact of these two aspects on the sustainability of public finances. The notion of sustainability is based on the idea of ensuring intergenerational fairness and is aimed at securing fiscal policy leeway in the long run. In this context the aging-related public expenditures play a key role, as they typically increase the budgetary burden. Box 1 explains how sustainability is defined and measured.

Box 1

Definition and Measurement of Fiscal Sustainability

Economists have developed a number of theories for assessing the long-term sustainability of public finances. These theories are all based on Domar's model of government debt dynamics (1944), and they typically start with the following (current) government budget equation:

(1) $D_t - D_{t-1} = E_t - T_t + SF_t + r_t D_{t-1}$, *where:* D_t = *public debt,* E_t = *public expenditure (excluding interest payments),* T_t = *public revenues,* SF_t = *stock-flow adjustment (which captures transactions that increase the outstanding debt stock but not the deficit), and* $r_t D_{t-1}$ = *interest payments on outstanding government debt.*

Expressing equation (1) as ratios of GDP yields:

$$(2)\ \frac{D_t}{Y_t} = \frac{E_t}{Y_t} - \frac{T_t}{Y_t} + \frac{SF_t}{Y_t} + \frac{1+r_t}{1+g_t} * \frac{D_{t-1}}{Y_{t-1}},\ \text{where } g_t\ (Y_t=(1+g_t)Y_{t-1})\ \text{denotes nominal GDP growth.}$$

Equation (2) shows that changes in the public debt ratio depend on the primary balance (government net borrowing or net lending excluding interest payments), the stock-flow adjustment as well as the accumulated debt burden (debt ratio multiplied by the interest rate-growth differential). If the interest rate-growth differential is positive, it takes a primary surplus to keep the debt ratio constant.

Intuitively speaking, fiscal policies will be sustainable as long as governments do not default[1] (Balassone and Franco, 2000). The **notions of long-term sustainability** *of public finances found in the literature fall into three broad families:*

- *According to Domar (1944) the public debt ratio should converge to a finite value in order to avoid a continual rise of the tax burden.*
- *Sustainability as defined in Buiter (1985), Blanchard (1990) and Blanchard et al. (1990) requires that the debt ratio converges back to its initial level (in order to prevent the debt ratio from exploding).*
- *Taking this idea one step further, Blanchard (1990) and Blanchard et al. (1990) define a fiscal rule that will ensure the convergence of the debt ratio to its initial level – and thus sustainability. According to this rule, the discounted value of all future primary surpluses equals the current level of public debt.*

[1] *A government would be considered to have defaulted on its debt if it is no longer in a position to refinance itself, i.e. to place debt securities in the market.*

Even though there is no agreed definition of what constitutes a sustainable position of public finances (Balassone and Franco, 2000), analyses of fiscal sustainability tend to concentrate on the public debt ratio, as a continually growing debt ratio and fiscal sustainability are considered to be a contradiction in terms.

Fiscal sustainability may be measured either ex ante or ex post. **Forward-looking methods** *for evaluating fiscal sustainability (e.g. debt ratio projections; synthetic indicators as published by the European Commission) combine information available on the future development of public finances with assumptions on the macroeconomic and demographic framework conditions. The quality of these methods is constrained by the input of projection values, which are highly dependent on the underlying assumptions (e.g. on the interest rate-growth differential). Moreover, the sustainability assessment is biased by the budgetary conditions of the basis year (e.g. size of the primary balance), as those conditions have a significant impact on the projected development of the debt ratio. For those reasons, the ability to derive robust evidence on the timing and extent of budgetary action (Giammarioli et al., 2007) very much depends on a meaningful interpretation of the size and sign of the indicators (Knell et al., 2006).*

Ex post analyses with **backward-looking methods** *essentially evaluate fiscal sustainability by assessing past compliance with intertemporal budget constraints. A major shortcoming of such analyses is the fact that a "clean bill of health" for a given review period does not provide meaningful information about the future solvency of a government. Moreover, numerous industrial countries whose fiscal policies have been found to be unsustainable in ex post analyses never actually experienced insolvency problems.*

Sustainability analyses are, as a rule, based on partial equilibrium models, which do not allow for any interaction between fiscal variables and macroeconomic variables. In other words, these methods ignore the impact that alternative fiscal policies may have on macroeconomic developments (such as the upward pressure that higher debt ratios exert on the interest rate level).

The **European Commission** *assesses the fiscal burden of demographic aging with two synthetic indicators named "S1" and "S2" (European Commission, 2005). These two sustainability gap indicators show the size of the budget adjustment that is required to ensure that a given (future) target debt ratio is reached. These indicators are based on the sustainability concept of Blanchard et al. (1990), with the exception that the underlying target is not the original debt ratio but the upper limit for the debt ratio prescribed by the Treaty of Maastricht (60% of GDP), which is the European Commission's yardstick for sustainability. S1 shows the budget adjustment required to reach the target debt ratio in 2060, S2 show the sustainability gap for an infinite time horizon.*

The specification of the **indicator S1** *of the European Commission yields, subject to the projections of age-related expenditure, the difference between the current tax ratio and the tax ratio that is required to reach a debt ratio of 60% of GDP in 2060. The important thing is that the (tax) gap thus quantified needs to be closed immediately, as the indicator signifies the permanent adjustment that is necessary to ensure sustainability. Moreover, the need for adjustment quantified by S1 is limited to the observation period (Langenus, 2006).*

The **indicator S2** *is based on the government's intertemporal budget constraint over an infinite horizon and shows the difference between the current tax ratio and the tax ratio that is required to adjust the current debt ratio to the discounted value of all future primary balances.*

In its **2009 Sustainability Report**, *the European Commission (2009e) finds Austria to have a sustainability gap (S1) of 3.8% of GDP, based on the budgetary position of 2009, the European Commission's spring forecast and the projected increases in age-related expenditure (European Commission, 2009c); in the "lost decade" crisis scenario, which assumes below-average growth until 2020, the sustainability gap would be even 5.3% of GDP. Measured in terms of S2, Austria is found to have a sustainability gap of 4.7% of GDP (or 6.1% of GDP in the "lost decade" crisis scenario).*

The following comments are not based on a specific notion of sustainability, as the prevailing big uncertainty about macroeconomic developments in the future (and thus about estimates for the output gap or the structural budget balance of the basis year) would not allow for an exact and reliable quantification of the need for consolidation (or of the sustainability gaps). Much rather, the paper shows that it will take fundamental consolidation measures and structural reforms, even under relatively optimistic macroeconomic assumptions, to reach a trend primary deficit that is small enough to reduce the public debt ratio to a level of or below 60% of GDP.

1.1 Structural Deterioration of Public Finances Caused by a Combination of Factors

Part of the crisis-related deterioration in public finances will have long-term implications, thus creating a need for consolidation in the post-crisis period. The burden on public households has been increased by a range of direct (1) and above all indirect factors (2, 3 and 4):

1. fiscal cost of financial market intervention (= direct fiscal cost of financial crises);
2. additional debited interest resulting from the sharp rise in debt ratios;
3. discretionary fiscal policy stabilization measures (especially if permanent);
4. permanent effect of automatic stabilizers following a loss in potential output.

The fiscal effects of financial market interventions include above all the potential cost of guarantees, in case the underlying risks should materialize, and overvalued purchases of problem banks or their toxic assets. These costs loom large in the public mind; yet how big an effect these measures are actually going to have on public finances in Austria, or in other EU Member States or worldwide, is difficult to say at the current juncture. At any rate, these direct costs can be expected to be a mere fraction of the associated indirect costs. According to Cottarelli and Viñals (2009b), even in the current crisis, only a relatively small portion of the expected debt surge is due to official financial support operations. This has been the rule also in past financial crises, as is evidenced by historical analyses provided by Reinhart and Rogoff (2009) or by the European Commission (2009e, Part III).

The public debt ratio is expected to shoot up quickly also in Austria. At present, the OeNB projects the debt ratio to climb by more than 14 percentage points from end-2008 to end-2011 (see Fenz and Schneider in this issue on the OeNB's December 2009 economic outlook). The measures taken to stabilize the banking sector actually account for a relatively small share of this increase. The key drivers behind the budget deterioration are the free operation of automatic stabilizers and the discretionary fiscal policy stabilization measures. Even if output growth were to return to its old path and even if all stabilization measures were to be of a temporary nature, the surge in debt would still have effects into the future through higher interest payments. Given that average interest rates on public debt currently exceed average nominal output growth in Austria, as in most other euro area countries, and given that this negative interest rate-growth differential is likely to persist in the next decade, the government will need to achieve a higher primary balance to stabilize the debt ratio.

While there is a case for economic stimulus packages in the current situation,[2] it must also be clear that such packages create the need for even further adjustments when the crisis is over. These adjustment needs may go beyond the afore-mentioned higher interest burden if, as is the case in Austria, the bulk of measures is of a permanent nature (tax reform including family package; most of the measures adopted by parliament on September 24, 2008).[3]

At the time of writing it is too early to say whether and, if so, how deeply the economic crisis of 2008–2009 may affect the long-term potential growth rates of the individual economies (Gaggl and Janger, 2009). Yet even if

the economies were to return to their pre-crisis potential growth rates when the crisis is over, they would appear to be unlikely to recoup all of the output losses incurred in 2009 and 2010 in the foreseeable future. Subject to the free operation of automatic stabilizers, this fact constitutes an additional challenge for fiscal policy, as lower output will go hand in hand with lower tax revenues, and as a potentially higher trend unemployment rate will push up social transfers. This means that the cyclically adjusted budget balance is going to deteriorate.

Chart 1 shows how these effects add up, comparing the European Commission's spring 2008 forecast for Austria's cyclically adjusted general gov-

Chart 1

Change in the European Commission's Forecast for Austria

Cyclically Adjusted Budget Balance
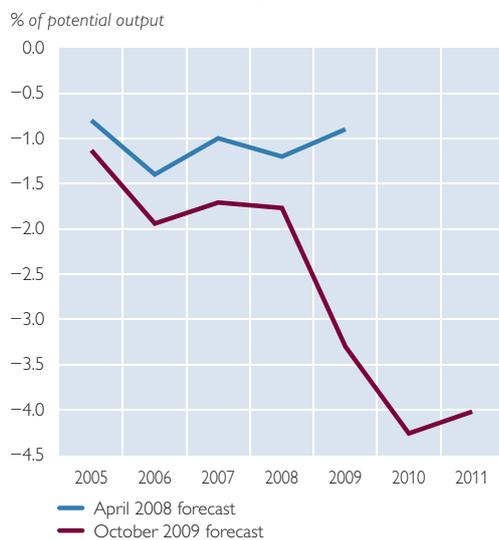
Output Gap
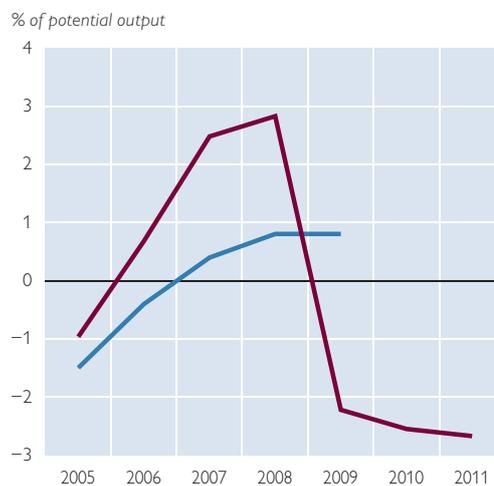
Source: European Commission.

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[2] See Almunia et al. (2009) for evidence on the relatively high multipliers with which discretionary fiscal policies come attached in times of crisis, as well as Köhler-Töglhofer and Reiss (2009) for the merits of using stimulus packages in the current situation.

[3] Subject to a very narrow interpretation of "permanent fiscal measures," even the tax reform and increases in some transfers would not qualify as such, as income tax brackets as well as the size of some of the transfers in case (e.g. family allowance) are not indexed. In other words, any additional negative fiscal impact of such measures will be automatically reduced by any bracket creep that may occur in the future, or by any real depreciation of such transfers.

ernment budget balance[4] and its output gap[5] (which was still based on the assumption that the economic downturn would be limited) with the Commission's autumn 2009 forecast. The latter brought a downward ex post revision of the cyclically adjusted balance for 2006 by 0.5 percentage points and for 2007 by 0.7 percentage points. The European Commission considered a comparatively larger part of the tax revenues of those years to be of a cyclical nature in its autumn 2009 forecast – which means that it has become more pessimistic in its assessment of the underlying structural developments. This change in the assessment of Austria's cyclical position is also evident from the sharp downward revision of the output gaps for those years.

Furthermore, the comparison of the successive forecasts for 2009 highlights the effect of the comprehensive discretionary fiscal measures that were adopted after the spring of 2008. Together with the very low growth of potential output estimated for 2010, those measures are a key driver behind the further deterioration in 2010.[6]

1.2 Without Consolidation, Public Finances Would Deteriorate Further until 2020

1.2.1 Even Comparatively Optimistic Assumptions …

The following scenario is meant to show how Austria's debt ratio and deficit ratio are likely to change, even under optimistic macroeconomic assumptions, should policymakers fail to un-

dertake fiscal consolidation until 2020. This scenario is based on the following assumptions:

— The starting point for our scenario is the OeNB's economic outlook from 2009 to 2011 (see Fenz and Schneider in this issue). According to these projections, the OeNB expects Austria to have a deficit ratio of 5.4% of GDP, a debt ratio of 76.9% of GDP, and a negative output gap of 1.9% of potential output in 2011. We assume this gap to close in a linear fashion from 2012 to 2014. Over the years, the loss in potential output would thus add up to slightly more than 5% of GDP compared with a baseline scenario without a crisis.

— We assume that the temporary measures adopted until 2011 will indeed be phased out thereafter. Moreover, we expect the revenues from profit-related taxes, which declined more sharply in 2009 than historical elasticities would have suggested, to return to the old trend path by 2014 (so that the GDP share of these revenues will rebound to the 2006 level in 2014). This would allow the government to recoup some of the revenue shortfall that occurred in 2009.

— The trend growth of real GDP and the rise in age-related expenditure for education, long-term care, health care and pensions as a share of real GDP from 2020 onward are based on the latest Ageing Report of the European Commission

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[4] *General government budget balance as adjusted for the estimated effect that the business cycle may have through the play of automatic stabilizers.*

[5] *Difference between current output and potential output in percent (for an extensive discussion of the concepts of potential output and output gap, see Gaggl and Janger, 2009).*

[6] *The autumn 2008 forecast was completed shortly before the economic crisis broke out (i.e. before the stimulus packages were adopted). At the time, the European Commission expected Austria's cyclically adjusted budget deficit to reach 1.2% of potential output in 2010. This forecast has since been revised upward by around 3 percentage points.*

(2009c).[7] The GDP share of age-related expenditure is projected to rise by roughly ½ percentage point from 2011 to 2020.

— All other revenues and other categories of primary expenditure are assumed to grow at a trend rate of 2%, which corresponds to the average rate of GDP growth (2012 to 2020) and implies constant structural ratios.[8] Like the European Commission (2007) we also assume the primary balance to have a semi-elasticity of 0.47[9] relative to real GDP.

— For the period from 2016, we expect real interest rates on public debt to be 2.5% per annum, with interest rates gradually rising to this level from 2012 to 2016. A level of 2.5% roughly matches the average since 1999 and is below the 3% level assumed by the European Commission in its Ageing Report (2009c).

— We have not specifically taken into consideration the government's banking package, as the amounts budgeted so far have negligible effects on the debt ratio (less than 1.5% of GDP in 2020) and on the deficit ratio (roughly neutral).

Our scenario runs until 2020, as this is roughly the point when the effects of aging on the Austrian economy in general and on public finances in particular are going to increase sharply (see below).

1.2.2 … Imply a Further Rise in the Debt Ratio in the Absence of Fiscal Consolidation

Even under this fairly optimistic macroeconomic scenario would the public debt ratio rise to about 92% of GDP until 2020 (see chart 2 for an overview). While the budget balance improves until 2014 as the negative output gap is closed, the fact that the debt ratio will have breached the 80% mark by then means that the primary balance would still be roughly 1.5 percentage points below the level that would be necessary, under the underlying interest rate and growth assumptions, to stabilize the debt ratio at this very high level.

Yet given the growing share in GDP of interest payments on government debt (from 2.5% of GDP in 2008 to 3.5% of GDP in 2014, to 4.1% of GDP in 2020)[10] and given the slight rise in age-related costs we will see even in this period and the assumed economic slowdown, both the budget deficit and the debt ratio stand to deteriorate further. As noted in section 1.1, the higher interest rate burden exacerbates the need for consolidation.

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[7] We wish to thank Caroline Haberfellner for having made the underlying data available to us. While these data are based on a different macroeconomic scenario (the assumptions were made before the fall of 2008; see below), the dampening effect of comparatively weaker employment growth and of lower real wages on pension benefits (reflecting lower pensionable earnings and shorter contribution periods of newly retiring workers) will remain limited on pensions in Austria until the medium term, because unlike in other countries, pension benefits are indexed to consumer prices in Austria.

[8] In other words, we assume that quantity taxes (such as the petroleum tax), fees, nominally fixed transfers and wage and income tax brackets will be adjusted regularly, or that these factors will offset each other.

[9] An increase in output growth by 1 percentage point changes the budget balance by 0.47 percentage points (through the automatic stabilizers).

[10] In calculating the budget deficit, we furthermore assumed that the GDP deflator would grow by 2% (thus implicitly using the change in the GDP deflator to calculate real interest rates). The results for the debt ratio and for the primary balance would be the same even if we used different assumptions for the inflation rate (see e.g. Blanchard and Illing, 2009, chapter 27).

Chart 2

Scenario: Development of Public Finances until 2020 without Consolidation
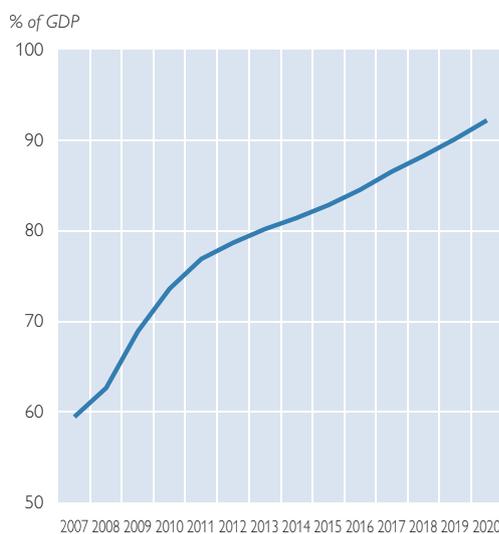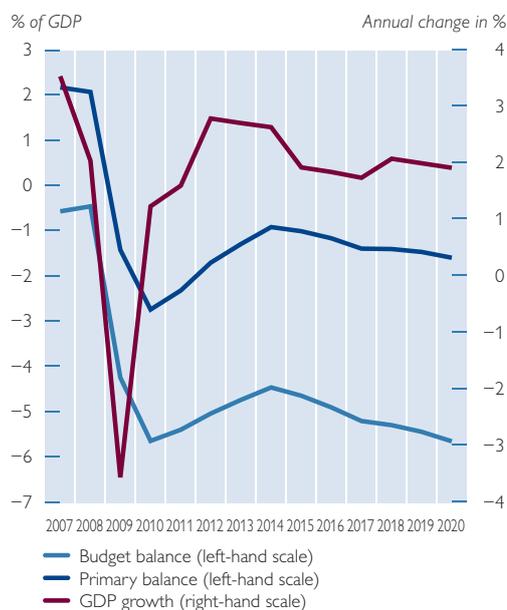
Source: OeNB, Statistics Austria.

The scenario outlined here is somewhat more pessimistic about the development of the debt ratio until 2020 than the baseline scenario that the European Commission used in its latest Sustainability Report (2009f); it does, however, broadly match the mechanical projections without consolidation that the European Commission published in its autumn 2009 forecast (2009g, Part I, chapter 3).

The diverging underlying assumptions make the projections of the individual scenarios hard to compare, though. For instance, the scenarios of the European Commission are implicitly based on a spending elasticity of close to 1 relative to real GDP (with the exception of pension payments). A spending elasticity of close to 1 means

that the shares of spending aggregates in GDP will remain broadly constant as long as the demographic development remains constant. If we assume GDP to have dropped by a cumulative 10% over x years, this would mean that, say, health-care expenditure will likewise have gone down by a cumulative 10% over the same period.[11]

In our scenario, we have expressly refrained from making such an assumption, even though real spending growth will have to go down by necessity during an economic setback in order to avoid an explosion of spending. Yet such measures are in fact already consolidation measures. Moreover, this assumption would imply that, in a short- to medium-term perspective, automatic stabilization would be limited to cycli-

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[11] *This assumption is controversial. It does, however, explain why, in the lost-decade scenarios of the European Commission's Ageing Reports and Sustainability Reports, the additional cost of aging in % of GDP is shown to be largely driven by pensions for Austria but also for the EU average, whereas the share of health-care expenditure in GDP remains basically unchanged when compared with the baseline scenario.*

cally sensitive spending categories (typically passive labor market policies, such as unemployment benefits, or possibly short-time working arrangements).[12]

The minimum structural adjustment need highlighted by our scenario exceeds the 1.5% of GDP that would be necessary in the short run to stabilize the debt ratio (as outlined above) at the level of 2014. After all, the demographic changes start to affect public households already in the second half of the next decade, by raising costs for pensions, health care and long-term care, and above all by reducing trend growth. Lower output growth, in turn, increases the primary balance required to stabilize debt, while at the same time causing the actual primary balance to shrink through the effect of the automatic stabilizers. The automatic stabilizers affect the primary balance only through weaker tax revenue growth, however, as the slowdown in output growth reflects a smaller supply of labor rather than a rise in the unemployment rate.

1.3 Developments from 2020 Shaped by Demographic Change

From roughly 2020 onward, the budgetary pressures of demographic change will increasingly add to the repercussions of the economic crisis. This shift in the weight of the driving factors

makes 2020 an ideal end point for our scenario.

The Ageing Report of the European Commission (2009c) projects the working-age population in Austria to keep increasing until 2020, but to decline thereafter (see table 1 for an overview of key demographic metrics and projected age-related costs for Austria for the period from 2007 to 2060).[13] While the overall population will keep growing beyond 2020, partly through migration, the share of the population aged 65+ will increase by a disproportionately large extent.[14] The reduction in the working-age population will cause potential output growth to drop relatively sharply,[15] which will in turn hurt growth of tax revenues and social security contributions.

At the same time, these projected dynamics – growth of total population, reduction of working-age population – imply that in the absence of offsetting measures the growth rate of public spending will exceed that of revenues or GDP. This is especially true for spending on health care and on long-term care. The pension reforms that Austria adopted between 2001 and 2005[16] actually keep the rise in pension expenditure relatively low compared with other EU countries. Due to these measures, Austria boasts the fourth-lowest real increase in average pensions in the period from 2007 to 2060 within

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[12] In reality, though, the public sector automatically creates stabilization effects for the real economy by continuing to pay public pensions, retaining public employees etc.

[13] The macroeconomic assumptions for the baseline scenario were taken before the summer of 2008, i.e. before the economic crisis hit Europe with full force. This is why the results in table 1 on employment and potential output growth in 2010 and the figures on age-related expenditure as a percentage of GDP are not directly comparable with the scenario until 2020 in section 1.2.

[14] This causes the dependency ratio to rise sharply.

[15] The baseline scenario projection reflects the assumption that the labor market participation of the working age population (15–64) will rise, that the unemployment rate will drop slightly, and that productivity growth will remain broadly constant in Austria over the period from 2007 to 2060.

[16] Among other things, the reforms provided for longer averaging periods and lower accrual rates. However, some reforms were subsequently diluted somewhat, e.g. through the extension of the early retirement scheme for workers with long employment histories.

Table 1

Key Results of the Ageing Report for Austria

	2007	2010	2020	2030	2040	2050	2060
million							
Total population	8.3	8.4	8.7	9.0	9.1	9.1	9.0
Share in total population in %							
65 years and above	16.9	17.6	19.4	23.7	27.2	28.2	29.0
below 15 years	15.6	14.9	14.3	14.1	13.6	13.5	13.8
Annual change in %							
Working-age population (from 15 to 64 years)	+0.2	+0.4	+0.1	−0.6	−0.1	−0.2	−0.3
Employment	+0.7	+0.6	+0.2	−0.2	−0.2	−0.2	−0.2
Potential GDP	+2.2	+2.2	+1.9	+1.5	+1.5	+1.5	+1.5
% of GDP							
Age-related expenditure	26.0	25.7	26.2	27.7	28.6	29.3	29.0
of which: Pensions	12.8	12.7	13.0	13.8	13.9	14.0	13.6
Health care	6.5	6.6	7.0	7.4	7.8	8.1	8.0
Long-term care	1.3	1.3	1.4	1.7	2.0	2.4	2.5
Unemployment	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Education	4.8	4.5	4.1	4.2	4.2	4.2	4.3

Source: European Commission (2009c, 2009d).

the EU; and within the euro area Austria is outperformed only by Italy (European Commission, 2009d, table A66).

Until roughly 2020, the projected rise in the spending ratios for health care, pensions and long-term care is broadly offset by a considerable decline in the share of spending on education in GDP. The number of students is expected to bottom out in absolute terms around 2020 (European Commission, 2009d, table A111). From 2020 onward, the share of age-related expenditure in GDP is projected to rise by 3 percentage points until 2050, and to shrink somewhat until 2060.

In the baseline scenario of the Ageing Report the rise in spending is driven not only by purely demographic factors, but also by rising demand (especially for public health care). Given the

assumptions underlying the Ageing Report for the long-term projections for Austria, it does not come as a surprise that those assumptions may be found to be controversial.[17]

Looking ahead, based on current knowledge, the additional costs arising from demographic aging would appear to be higher than the additional costs created by the global economic crisis.

2 When and How to Consolidate?

The following section essentially deals with the action required to offset the rise in the deficit and debt ratios in the aftermath of the economic crisis of 2008–2009. Economic policy measures that may be taken to counter the problem of demographic change are also touched upon in section 2 but discussed in greater detail in section 3.

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[17] *See e.g. Kramer (2009), who challenges the optimistic assumptions regarding the development of early retirements.*

2.1 Fundamental Considerations

Given the sharp global contraction, the expansionary fiscal measures that policymakers adopted by concerted international action to dampen the setback and stabilize the real economy have driven up public deficits. Exceptionally high public deficits are an economic necessity in times of recession, but they are not sustainable. In order to restore and secure the long-term sustainability of fiscal policies it is imperative to permanently reduce the current high level of deficits so as to keep the debt ratio from exploding.

If the consolidation drive of the coming years is to be a success, it will have to go beyond a mere stabilization of the debt ratio once the crisis is over. There are three reasons for this: First, Austria will have to meet the requirements of the European fiscal framework (see below). Second, the challenges that result from aging populations, as outlined in section 1.3, will have to be tackled. These challenges alone imply that the medium-term need for consolidation and reform will go far beyond the short-term requirements under the corrective arm of the Stability and Growth Pact (reducing the deficit ratio to below 3%). Third, the government will have to create scope for the operation of the automatic stabilizers and for discretionary measures that may have to be taken in future crises[18] – in other words, the government will have to strengthen Austria's resilience to shocks. As evidenced by Nowotny (2009), the stabilizing function of fiscal policy had been limited since the 1980s because of insuffi-cient action to reduce structural deficits.

2.1.1 The Dampening Effect of Consolidation on the Real Economy Requires …

While the principle necessity of post-crisis consolidation is undisputed, there is a lack of agreement about WHEN the crisis would be considered to be over in order to be able to actually launch consolidation measures. When making the start of consolidation contingent on a "self-sustained economic revival" one forces the same problem. According to the OeNB's latest economic outlook, the contraction has bottomed out. At the same time, the recovery continues to be based on numerous special factors, including comprehensive expansionary monetary and fiscal policy measures. Unwinding those expansionary fiscal measures too soon would jeopardize the as yet fragile recovery and would thus prolong the recession and increase unemployment (and hence undo previous improvements of the fiscal situation to a certain extent); there is no unambiguous empirical evidence for the existence of non-Keynesian effects in this context.[19]

2.1.2 … Coordinated Action within the European Fiscal Framework …

Given the high degree of international economic integration, national consolidation measures have dampening effects on trading partners' economies. These spillover effects essentially call for consolidation strategies to be coordinated internationally similar to the way support measures have been coordinated.

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[18] According to an IMF analysis of the packages adopted by India, China and the G-7 countries, countries with originally lower debt ratios have tended to put together bigger packages (Horton and Ivanova, 2009).

[19] See Prammer (2004) for an overview of non-Keynesian effects, a description of the conceptual frameworks and an assessment of their empirical relevance.

For the EU Member States, the Treaty establishing the European Community and the Stability and Growth Pact, which are binding for Member States, constitute an operational framework for coordinating the timing and extent of consolidation. Under the provisions of the excessive deficit procedures under Article 104 (7) of the Treaty, the earliest possible start of consolidation as well as the year until which the deficit must have been brought back below 3% of GDP have been laid down for the countries concerned. Moreover, the minimum structural consolidation that is to be achieved per year during the respective period has been specified. The recommendations and requirements of the European Commission or of the European Council are guided by the principle of taking adequate account of national conditions and particularities, such as the size of the economic or fiscal contraction, or the size of the debt.

Based on the recommendations of the European Council (2009) made at the end of November 2009, Austria should continue implementing the fiscal measures under the stimulus package in the first half of 2010. At the same time, Austria is expected to develop a detailed consolidation strategy until June 2010, which it should start implementing in 2011, so as to remove the excessive deficit by 2013. Consolidation should moreover be designed to reverse the trend in the government debt ratio, so as to ensure a gradual reduction to the reference value of 60% of GDP in the foreseeable future.

2.1.3 … and A Credible Long-Term Strategy that is Communicated as Soon as Possible

Box 2 summarizes the principles for fiscal consolidation recommended by the OECD and the IMF. These princi-ples essentially relate to the design of the exit and consolidation strategies (i.e. type and composition of measures) and underline the necessity of communicating clearly that these strategies will be implemented in the medium term.

The OECD considers the question of "when" to wind down measures to be of secondary importance. What is of primary importance is how to proceed – in the sense that "getting the exit process right will be more important than doing it quickly" (OECD, 2009f). In this respect, the focus should be on both reaching fiscal sustainability and raising potential output (section 3). According to the OECD, it would be important to target a smooth transition between phasing out temporary support measures stimulating the economy and strengthening financial market stability, and phasing in structural measures with a medium- to long-term horizon. When unwinding temporary stimulus and stabilization measures too late, policymakers run the risk of destabilizing expectations, thus undermining the effect of the implemented measures and raising the actual need for consolidation (through rising interest payments on public debt).

As argued by Giavazzi (2009) structural reform measures promising medium-term savings – such as the introduction of fiscal rules or medium-term finance plans; raising the regular retirement age – should have priority, in order to convince investors that policymakers really mean to resume sound fiscal policies and in order to prevent investors from demanding risk yields on sovereign bonds. While such measures do dampen spending in the medium term, they do not imply any short-term setback in demand.

Box 2

OECD and IMF Principles for Fiscal Consolidation

OECD (2009e)
- *Economic stimulus measures that have been adopted should be implemented in full as planned.*
- *Stimulation measures should be phased out and consolidation measures should be phased in once the economic recovery gains momentum. Measures need to be aligned with the overall macroeconomic conditions and with monetary policy measures.*
- *Credible, medium-term consolidation strategies need to be coordinated and communicated quickly in order to prevent expectations of continued high or rising debt ratios, which would increase the pressure on long-term market interest rate levels and dampen private consumption.*

IMF (2009b, G-20 Meeting on November 6 and 7, 2009)
- *The timing of exits should depend on the state of the economy and the stability of the financial system.*
- *Fiscal exit measures should be transparent, comprehensive and communicated clearly now, with the goal of lowering public debt to prudent levels within a clearly specified time frame.*
- *Fiscal adjustment should be achieved through measures that strengthen the primary balance (rather than through fiscal transactions with which governments would "sell the family silver").*
- *The temporary nature of fiscal stimulus measures must be beyond any doubt.*

2.2 Where to Start with Consolidation?

The potentially most controversial issue is the question of which taxes to increase, and which spending items to cut.

2.2.1 Increasing the Structural Primary Balance through Spending Cuts and, If Need Be, by Raising "Growth-Friendly" Taxes

Public interventions in time of crisis and exit policies may have highly divergent effects on macroeconomic developments, depending on the design of the measures and the starting conditions. Those are the findings of, for instance, Kehoe and Prescott (2007), who examined in their analysis of great depressions why Chile managed to achieve dynamic productivity growth whereas Mexico witnessed stagnation after the crises in the 1980s (see also the example of Japan versus Sweden and Finland in this study or in Gaggl and Janger, 2009).

Sweden and Finland, too, suffered strong economic contractions as a result of banking crises or the disappearance of key trading partners following the collapse of the Soviet Union in the early 1990s. Based on Handler (2008) we describe the fiscal policies of those two countries in the 1990s in box 3. Sweden and Finland also represent important benchmarks for structural policy recommendations in section 3.

Box 3

Consolidation Success of Finland and Sweden after Economic Crises in the 1990s

In Finland, a deep economic crisis breaking out in the early 1990s – triggered by the bursting of a financial bubble in the late 1980s and the collapse of trade with the Soviet Union – caused the budget balance to change from a surplus of 5.4% of GDP (1990) to a deficit that peaked at 8.3% in 1993. Finland consolidated its public finances from 1994 onward above all by cutting spending (reduction of transfers to households and of subsidies to businesses, cuts of public consumption expenditure) and through institutional reform (multi-year budget process with spending ceilings, facilitation of spending cuts through a lowering of decision-making ratios in parliament, replacement of margin calls on the central government with intergovernmental appropriations based on budget forecasts). The fiscal measures were supplemented with monetary policy measures and macroeconomic structural reforms (e.g. of the banking system, the labor market and the pension system). In actually implementing the announced measures, the Finish government successfully stabilized expectations, which contributed significantly to the real success of the measures.

In Sweden, a financial crisis emerging in the late 1980s and a heavy recession hitting in the early 1990s caused the budget surplus to turn into a massive deficit, which peaked at 11.2% of GDP in 1993. Sweden launched a comprehensive consolidation program in 1994: Guided by the goal of unconditionally eliminating the budget deficit until 1998, Sweden put the main emphasis on spending cuts (e.g. reduction of transfers, subsidies, public wage bill; limits for intergovernmental appropriations and for the debt capacity of regional and local governments). These measures were supplemented with specific revenue measures (e.g. increase of social contributions). The consolidation process was moreover accompanied by institutional measures (e.g. expansion of parliamentary control, introduction of spending caps).

Both Sweden and Finland appear to have benefited from their central consolidation strategies, i.e. from including all levels of government, also the local governments; from reforming the institutional budget process, such as changing over to a multi-year budget plan; from giving priority to spending cuts over revenue increases; and above all from the credibility of their political consolidation strategy (by acting on announcements) as well as from favorable monetary policy framework conditions. The rapid recovery of the economy and the increase of trend output growth were proof of the strategy's effectiveness.

The lessons from Sweden and Finland are, of course, not fully transferable to the case at hand. Both Sweden and Finland had suffered from a regional crisis, and they both benefited from strong export growth in the recovery stage. In the case at hand, we are dealing with a global crisis, as is well known, and the global setback in demand has hit small, open economies, such as Finland, Sweden and Austria, across the board. Yet Finland and Sweden this time had a better starting position thanks to the consolidation measures they had taken before the global crisis, which has given them more leeway for discretionary measures and for letting the automatic stabilizers work and which facilitates consolidation after the crisis.

To reduce the general government debt ratio, policymakers must use the very channels through which the fiscal position was affected in the first place. In other words, economic policymakers should strive to increase real GDP growth in a sustainable manner and to raise the structural primary balance (section 1.1). To be successful, the consolidation strategy must also include measures that would improve the quality of the public finances.

Sustainable consolidation strategies go beyond improving budgetary conditions by effectively contributing to raising the growth path in the medium run. A comparatively higher growth path will, in turn, create leeway for fiscal policy. Economic policymakers could leverage growth by enhancing

quality, quantity and productivity of production factors. We are dealing with these issues in section 3. Some of the potential structural reforms discussed there may even have direct, and not only indirect, fiscal implications, such as measures that would raise the effective retirement age.[20]

Yet a (sustainable) consolidation strategy hinges above all on an adjustment of the primary balance, which may a priori be achieved through spending cuts or revenue increases. Empirical evidence suggests that consolidation measures tend to be more successful (i.e. more sustainable) when they are based on spending cuts (e.g. Ardagna, 2004; European Commission, 2007, part IV). What is also crucial is that revenue increases or spending cuts do not conflict with other economic policy goals, as would, for instance, spending cuts for research, education and childcare projects (section 3).

Spending cuts should, as far as possible, be achieved through an increased output orientation and measures that raise efficiency. In this respect, the second part of Austria's budget law reform, which takes effect in 2013, may create a positive momentum, as may efforts to improve the quality of the public finances in general (e.g. Haberfellner and Part, 2009). Measures to improve the incentive structures of the fiscal sharing scheme (Schratzenstaller, 2006)[21] as well as measures to enhance the efficiency of public administration at all levels of government and in the area of health care and education have typically been cited as ways to achieve this goal (e.g. during the current IMF article IV consultations with Austria, 2009a).

On the revenue side, policymakers would be well advised to consider redistribution effects as well as the "growth friendliness" or the allocative effect of different options. Based on an empirical study by Johansson et al. (2008), the OECD (2009e) has formulated the general recommendation of raising taxes on immovable property and consumption (above all the consumption of goods with negative externalities such as alcohol, tobacco and fuel).

Likewise, the IMF (2009a) advised Austria against increasing the tax burden on labor, recommending petroleum tax and land tax increases instead.[22] The IMF's recommendations match the recommendations identified by WIFO, the Austrian Institute of Economic Research, with regard to offsetting measures that would allow the government to reduce the tax burden on labor (Aiginger et al., 2008).

Payroll and wage taxes as well as relatively high social security contributions push the average and marginal tax burden of Austrian workers with low or medium wages far beyond the corresponding OECD and EU-15 averages (OECD, 2009d). This is why policymakers would be well advised not to increase taxes on labor any further (Haberfellner and Part, 2009). We also wish to point out that – from an incentive perspective – the tax burden on labor needs to be assessed together with the transfer system, as upper income limits or progressive adjustments of transfers raise effective marginal tax rates.

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[20] Raising the retirement age is imperative for securing the long-term sustainability of the public pension systems, as well as for preventing too sharp an economic contraction as a result of demographic change.

[21] For instance, it has often been criticized that compulsory school teachers are regional civil servants but paid by the central government (see also Government Debt Committee, 2009).

[22] The IMF estimates that those measures might contribute up to ¾% of GDP to consolidating the budget.

2.2.2 Temporarily Higher Inflation is No Viable Option

In the literature, allowing higher inflation rates is also discussed as a possible solution, as an unexpected rise in inflation would lead to a real devaluation of the nonindexed part of outstanding public debt. Moreover a rise in inflation – be it expected or unexpected – would increase seigniorage income. Cottarelli and Viñals (2009a) estimate an annual inflation rate of 6% from 2009 to 2014 in the highly developed economies to depress the debt ratio by 8 to 9 percentage points by 2014. Likewise, a rise in the inflation rate by 1 percentage point in the G-7 economies would increase seigniorage income by roughly 0.1% of GDP, given the low levels of base money.

The current situation differs somewhat from past episodes of high public debt ratios, which have typically been the result of warfare. While wars may sharply drive up national debt levels, the primary balance will, as a rule, improve automatically once the war is over (as military expenditure goes down again).

At the current juncture, a real devaluation of outstanding public debt would indeed reduce the effect of additional interest payments by lowering the debt ratio, yet it would have no direct impact on the primary balance, which has deteriorated permanently given a loss in output and lasting economic stimulus measures. Higher inflation rates would affect the primary balance only through a real reduction of nominally fixed transfer payments (such as the family allowance) and through the effect of bracket creep. In fact, even lower inflation rates may have such effects (in a weaker form) – which goes to show that inflation may also have undesirable effects on redistribution and growth.

Moreover, public refinancing costs might rise despite disinflation if inflation expectations and thus market interest rates were to remain high (at least temporarily).

3 Economic Policy Options for Raising the Medium-Term Growth Path

Gaggl and Janger (2009) as well as section 1 of this study have highlighted the potential economic and fiscal effects that the current crisis may have under an unchanged-policy assumption. Section 3 discusses how higher output growth would support fiscal consolidation. Given that trend growth had started to decline even before the crisis hit the Austrian economy, in early 2008, the question arises as to how an optimistic growth scenario might be achieved. Economic policies aimed at raising the medium-term growth path in times of crisis may be guided by three big goals or guidelines: First, avoid past mistakes; second, raise the quality and quantity of labor and capital; third, raise the productivity of labor and capital. Concrete economic policy measures derived from those guidelines will have to take adequate account of today's big challenges: climate change, increasing competition in the wake of globalization as well as demographic aging. Accelerating growth must also be compatible with budget consolidation (sections 1 and 2). As a rule, priority should go to reforms that cost but little (such as changes to competition legislation or university organization legislation) or to a reshuffling of budgets (e.g. reform of secondary schooling). These strategic guidelines are basically identical with the policy recommendations of the European Commission (e.g. Koopman and Székely, 2009). The specific policy measures aimed at raising output are,

however, very different across countries. The following three sections discuss the above-mentioned guidelines in greater detail.

3.1 Avoiding Past Mistakes

This time, economic policymakers have, by and large, avoided the mistakes made in previous crises, but some mistakes might yet be repeated, depending on the length of crisis.[23] The biggest mistakes can be classified in four categories: i) procylical fiscal and monetary policies, ii) domestic competition and external trade restrictions, iii) reduction of labor supply and iv) hesitant tackling of financial market problems. The massive use of monetary and fiscal tools to stabilize the economy prevented a full-fledged meltdown: In the first months of the economic crisis of 2008–2009, in the fall of 2008, GDP, industrial production and exports contracted almost as fast as during the Great Depression of the 1930s. By now, however, the current recession differs significantly from the Great Depression, in the early stages of which policymakers had attempted to balance public finances through tax increases and spending cuts, at a time when real interest rates were extraordinarily high as a result of deflation and monetary policymakers' failure to adjust nominal interest rates (Aiginger, 2009a).[24]

Despite some signs of preferential treatment of domestic products in national economic stimulus programs, markets have remained very open in comparison with the Great Depression, when a number of countries moved to increase their import tariffs, including the United States (Smoot-Hawley Act, 1930); European countries raised their import tariffs by as much as 12.7% on average at the time (Aiginger, 2009a). Unlike in the 1970s, which saw early retirement waves in many European countries, there has also been a distinct lack of broad-based programs to reduce the supply of labor.

Hesitation to solve financial market problems may lead to years of slow growth. This will be the case if banks shy back from capital-reducing credit write-downs, thus keeping inefficient firms alive, while at the same time making fewer funds available to efficient firms, as happened in Japan (e.g. Caballero et al., 2008). It will take a new regulatory model that will give the financial institutions medium-term planning security and reopen traditional financing channels for the real sector. In both areas, policymakers undertook efforts in the fall of 2009 which will hopefully result in the implementation of effective measures (e.g. G-20, 2009). In September 2009 a number of draft regulations were presented, including a proposal for the establishment of European supervisory agencies. This complex issue will not be discussed here in order to limit the scope of this paper (for an analysis of the difficulties involved in EU banking packages, such as target conflicts between short-term microeconomic objectives and long-term financial stability, readers are referred to Posch et al., 2009).

Structural change and the concomitant process of resource allocation can be slowed down through deliberate waiving of competition rules and subsidies to firms which go beyond crisis intervention and lead to permanent com-

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[23] In reviewing the national emergency measures, the European Commission (2009a) concluded that no big mistakes had been made.

[24] As discussed by Gaggl and Janger (2009), short-term stabilization policies may, indeed, be relevant for medium-term growth trends.

petitive distortions. In 1933, the National Industrial Recovery Act weakened U.S. anti-trust legislation and thus prolonged the depression; Japan authorized so-called depression or rationalization cartels in the 1950s and 1960s in order to reduce excess capacities in a coordinated manner. These crisis cartels were subsequently outlawed because of the negative repercussions they had in the medium term (OECD, 2009a).

Furthermore, a successful normalization of monetary and fiscal policies as well as exit strategies for unwinding structural policy emergency measures will also foster growth in the medium run (section 2). The following part of the paper focuses on policy areas in which Austrian policymakers could leverage growth. Numerous national and

international institutions have published on this issue;[25] we are therefore going to single out just a few areas that we consider to be priority areas. As the Austrian economy was doing well in a European comparison before the crisis broke out, we provide comparisons not only against the EU average but also against other highly developed, small, open economies – namely Denmark, Finland, Sweden and Switzerland, which typically top innovation and performance rankings, in order to highlight unexploited growth potential for Austria.

3.2 Raising the Quality and Quantity of Capital and Labor Supply

Principally, there are four groups in which the quality and quantity of labor supply can be raised: older workers

Chart 3

Difference in Employment Rates: Austria versus EU-15, OECD and Selected Comparison Countries
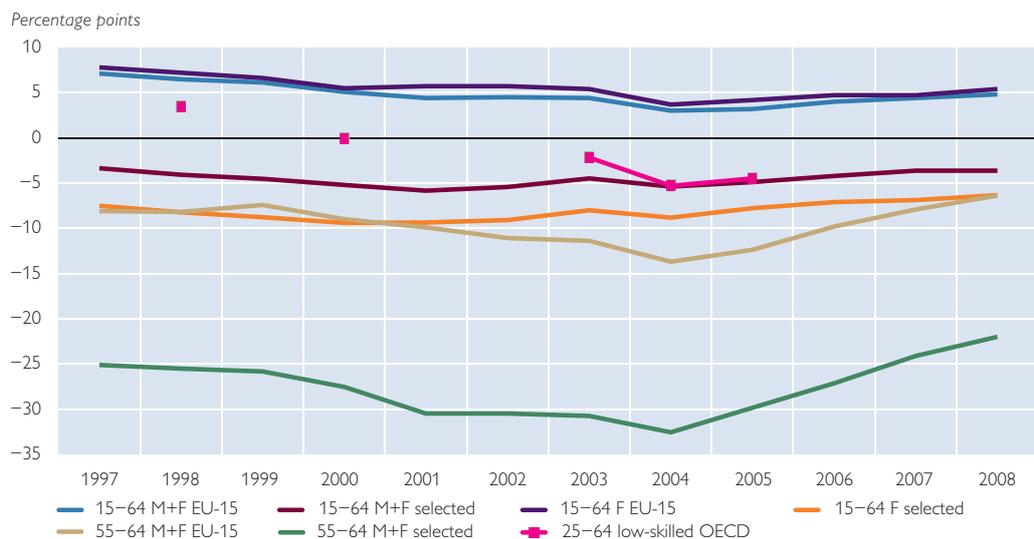
Source: Eurostat, OECD.

Note: The "selected" countries are Denmark, Finland, Sweden and Switzerland; their employment rates are shown as unweighted averages. The chart compares the employment rates of men and women aged between 15 and 64 (15–64 M+F), older men and women (55–64 M+F), women (15–64 F) as well as low-skilled workers (25–64 low-skilled). The employment rates of the comparison countries are deducted from Austria's employment rates, so that negative values imply the catching-up potential.

[25] See e.g. the OECD's economic surveys for 2005, 2007, 2009b; the WIFO White Paper (Aiginger et al., 2006) as well as the results of the evaluation of the Austrian research promotion system (Aiginger et al., 2009).

(55- to 64-year olds); workers with lower skills; women; and migrants (or their descendents) in low-skilled jobs or jobs below their qualifications. Chart 3 shows the employment rates of these groups (excluding migrants) in an international comparison.

Even though the employment rate of older workers has risen sharply in recent years from approximately 32% in 2005 to 41% in 2008, it continues to lie significantly below the EU-15 average of 47.5% and below the average of the comparison countries (close to 63%). The retirement age declined by about three years since 1970 for both men and women (Sozialversicherung, 2009),[26] while the life expectancy of 60-year olds rose by about six years in the same period.

Basic measures for raising employment levels of the 55- to 64-year olds identified by the OECD (2007), among others, include the limitation of invalidity pensions as well as of other possibilities for retirement before the statutory age such as for instance discounts for early retirement that are not justified by actuarial methods (as granted under the early retirement scheme for workers with long employment histories).

Yet it will take accompanying measures to prevent a higher participation of older workers in the labor force from pushing up unemployment rates. Necessary measures include measures to flatten the seniority wage curve, which continues to be steep in Austria; measures to increase mobility between the public and the private sector; and mea-

sures to enhance the acquisition of transferable skills, which can be useful in a variety of jobs and which constitute lifelong learning[27] and may thus enhance job flexibility and the chance of employment in old age. Bock-Schappelwein et al. (2006) put forth numerous other proposals for raising participation in lifelong learning, including financing models, collective agreement frameworks, etc.

At 65%, the employment rate of women was close to 5 percentage points above the EU-15 average in Austria in 2008, but 6 percentage points below the average of the comparison countries. This high employment rate masks the continued high share of women in part-time jobs. While payroll employment of women has increased by 18% since 1995, the number of part-time female workers has increased by 70% as opposed to 4% for full-time jobs. The part-time rate thus jumped from 21% in 1995 to 31% in 2008, which means that it has become aligned with the EU-15 level. Without the Swiss outlier (19%), the comparison countries have a part-time rate of 25%. The share of women working part-time not out of their own will is actually no higher in Austria than in other countries; yet the framework conditions for reconciling work and family life raise the question of whether there is still room for raising the full-time employment rate of women.

In Austria the share of children below 3 years or between 3 and 6 years who are in formal childcare[28] for more than 30 hours continues to be very low.

[26] In 2008, the effective retirement age for old age pensions was 62.7 years for men and 59.5 years for women, compared with 53.7 years or 50.3 years for invalidity pensions. Invalidity pensions have been sharply on the rise compared with old-age pensions since 2003, accounting for roughly one-third of the annual number of new pensions (Sozialversicherung, 2009).

[27] At the time of writing, 13% of Austrians participate in lifelong learning activities. This is somewhat above the EU average but significantly below the average of the selected comparison countries (28%).

[28] Formal childcare relates to institutional childcare by qualified teachers.

Chart 4

Formal Childcare versus Part-Time Employment Rate of Women by Age Groups
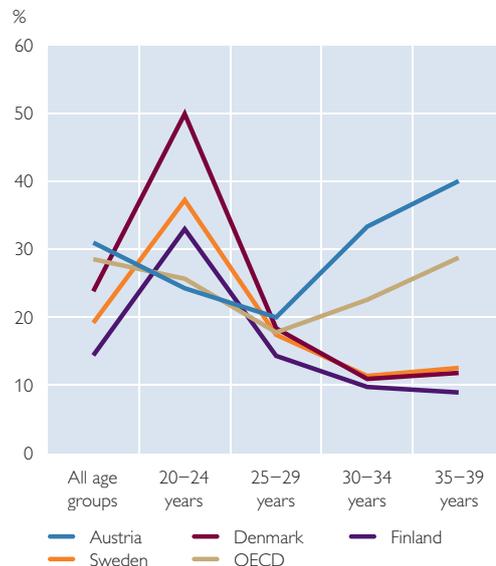
Use of Formal Childcare by Age of Children

Children in childcare in % of total children

Part-Time Employment Rate by Age of Women

%
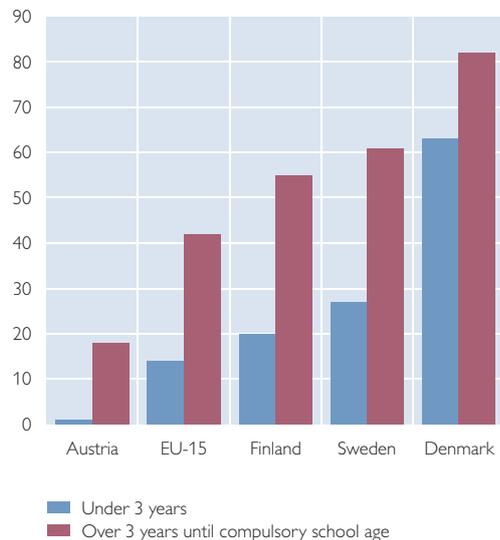
Source: Eurostat, OECD.

Note: Childcare of more than 30 hours per week.

This and the system of half-day schooling might explain part-time employment patterns by age groups (chart 4): Whereas younger women (20- to 24-year olds) often work part-time both in Austria and in other countries because they have yet to complete education, and whereas 25- to 29-year old women have low part-time rates, part-time employment rises drastically from the age of 30. Compared with the Nordic countries, a gap of almost 30 percentage points opens up.

The low use of childcare may be due to a combination of factors, including the availability of kindergarten facilities and the cost and quality of kindergarten childcare:[29] The OECD (2009b) has criticized the lack of uniform national pedagogical standards, insufficient training of kindergarten teachers and problems resulting from shared federal and regional government competences. The overall low average part-time rate suggests the large potential that exists in the Austrian labor market and that might be tapped under different framework conditions.

The problem areas childcare and half-day schooling are relevant not only for the employment rate of women, but also for the quality of education of educationally disadvantaged children, including children with a migration background. This is where the seed is sown for the employment problems both migrants and low-skilled workers have at later stages (chart 3). The downward variation of students' performance is high at Austrian schools; moreover, the second generation of migrants tends to do no better in school than the first generation (this performance gap is however, not limited to children of mi-

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[29] *The latest reforms, such as compulsory (half-day) kindergarten childcare in the final pre-school year, or for instance cost reductions in Vienna are going to improve the situation, but can only be seen as a first step.*

grants; see e.g. Haider and Schreiner, 2006).

A better integration of migrants into the labor market hinges on many different points. Together with experts, the Austrian Red Cross has designed an agenda of nine points on which the government could act (Austrian Red Cross, 2009), including controlled immigration, language acquisition, better access to work permits, enhanced credit system for foreign qualifications, better representation of migrants in the media, etc.

Childcare reform and the better integration of migrants are going to require additional public monies. In the medium run, however, the positive effects of such measures, such as higher employment rates, lower unemployment rates and higher productivity, should turn the erstwhile burden on the budget into an asset.

Investment Promotion

In the equilibrium growth path, capital grows at a rate that keeps the capital ratio constant.[30] Thus, the trend growth rate hinges on the growth of labor input and productivity. Even so, investments may deviate from the long-term trend at times: As a case in point, during the Great Moderation, i.e. the period of low inflation and growth fluctuations from 1990 to about 2005, the capital ratio increased as capital costs went down. Austria has a long tradition of investment promotion, for instance through investment subsidies, which have pushed up investment rates together with stable macroeconomic conditions, wage negotiators' focus on em-

ployment, apprenticeship schemes and other factors.

More recently, the international economic policy debate has shifted from subsidizing tangible investment to subsidizing intangible investment, such as research and development. Investment promotion is being seen more and more under the aspect of infrastructure development, not only in the area of road and rail transport, but increasingly also with regard to the telecommunication and energy networks of the future. The development of broadband networks and of smart grids in electricity supply just like the challenges of climate change is going to create important momentum for investment. In this respect it is not necessarily important for public authorities to invest themselves; much rather it is important for them to ensure a long-term planning horizon and to provide for competent regulatory frameworks; at the same time, climate policy regulations might be used to create pressure for investment.[31] At any rate, sinking capital costs are unlikely to create rising growth contributions of capital; much rather capital costs are likely to rise (Gaggl and Janger, 2009). This makes it even more important to solve financial market problems in order to minimize the permanent increase of the user cost of capital.

3.3 Raising Productivity

Innovation activities are among the key drivers of productivity increases. Spending on research and development as an (input-oriented) measure of innovation activity sharply increased to

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[30] This ratio is hard to calculate, not least because of the difficulties of pinning down the equilibrium growth path (Gaggl and Janger, 2009).

[31] A group of 500 large international firms have called upon policymakers to commit themselves to ambitious goals in combating climate change. Everything else would lead to a loss of confidence and crowd out investment in climate-friendly technologies (Corporate Leaders Group on Climate Change, 2009).
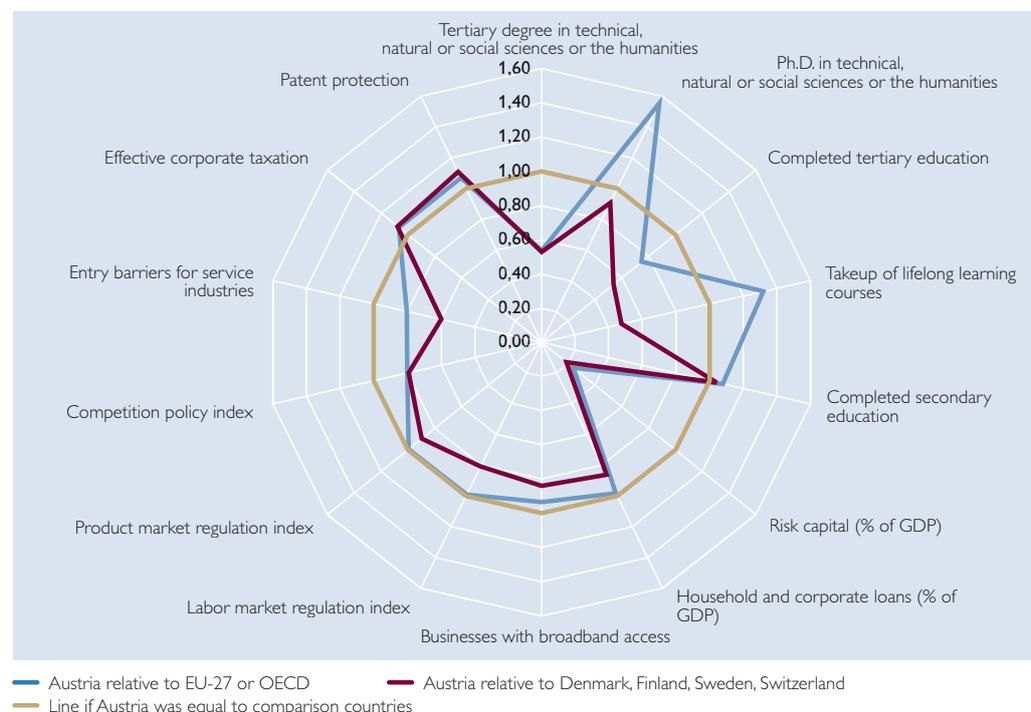
2.6% of GDP in the 1990s, thus outperforming the EU-15 average by 0.7 percentage points, but falling 0.5 percentage points short of the average of Denmark, Finland, Sweden and Switzerland. A number of other innovation indicators confirm this impression that Austria has completed the technological catching-up process and is now moving to a state where growth is driven by output as well as by demand for science, technology and innovation (Janger and Reinstaller, 2009). Two output measures for innovation in the wider sense – productivity growth and structural change – show further potential for growth. Despite a sharp rise in R&D spending, productivity growth has failed to accelerate; while the diagnosed structure-performance paradox has dissolved (Peneder, 2008),[32] and while the gap of the innovation-intensive industries has narrowed, the education-intensive sectors continue to show a significant gap to the EU-15 and the above-mentioned comparison countries despite high growth rates.

Apart from innovation-related reforms,[33] improved incentive patterns and improved input factors for innovation activities beyond innovation policies proper (framework conditions for

Chart 5

Framework Conditions for Innovation: Austria and Selected Comparison Countries

— Austria relative to EU-27 or OECD   — Austria relative to Denmark, Finland, Sweden, Switzerland
— Line if Austria was equal to comparison countries

Source: Janger and Reinstaller (2009).

Note: Values below 1 for Austria indicate that framework conditions are more favorable in Austria than in the comparison countries, and vice versa. Data refer to 2008 or to the latest year for which data were available.

[32] High output growth with a traditional economic structure but a lack of innovation activities.

[33] See Aiginger et al. (2009) for a summary of the results of the evaluation of the Austrian research promotion and financing system.

innovation) might serve to accelerate structural change and productivity growth. An analysis of these framework conditions shows deficits with regard to competition, innovation financing and above all education, which may be seen as the weak points of the Austrian innovation system (Janger and Reinstaller, 2009; but also other papers such as the WIFO White Paper (Aiginger et al., 2006) and the OECD's economic survey (2007).

Chart 5 summarizes Austria's international position vis-à-vis the EU-27 or OECD averages, depending on the indicator, as well as the above-mentioned comparison countries. Values above 1 indicate that conditions are more favorable in Austria than in the comparison countries, and vice versa.[34] Compared with the most innovative economies, Austria is found to lack innovation incentives and innovation inputs in most dimensions; exceptions include effective corporate taxation, patent protection and secondary education. Austria's catching-up needs are highest in the areas of education, competition policies/ product market regulation and innovation financing (risk capital intensity). For those three areas, numerous authors have put forth reform blueprints; we are going to limit our analysis — broadly in line with Janger and Reinstaller (2009) — to major reforms.

Education System

In the pre-university education system, valuable progress could be made through the improvement of kindergarten education (as mentioned above), through increasing the autonomy and standards for schools, through a later streaming of students as well as through the introduction of full-day schooling.

The most efficient way to raise the share of tertiary education will be to raise the number of students who qualify for university studies, that is to say by reforming the secondary school system. One way to improve undergraduate university education would be to introduce a place management system, as practiced at the Universities of Applied Sciences, also at universities, with a view to linking capacities with funding.

Academic research is subsumed under the education system in the wider sense in our paper. Numerous empirical studies show that raising the quality of academic research is crucial in many areas for raising productivity growth and for maintaining competitiveness in a knowledge-based economy, among other things through the channels knowledge diffusion, science startups, regional or local spillover effects and through a strengthening of the business environment.[35] Even so, policymakers have yet to fully acknowledge the merits of raising the quality of academic research.

In this respect, too, Austria would be in a position to take relatively simple measures to exploit its high potential, especially through reforming academic research funding and through organizational changes. For detailed recommendations, see e.g. Janger and Reinstaller (2009).

Competition and Product Market Regulation

Regulation indicators as well as measures of actual competition intensity show that Austria has got the potential to intensify competition in a number of services sectors, whereas competition is already high in many manufacturing industries owing to the international tradability of goods. Policy areas for in-

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[34] For a detailed description of all framework conditions and indicators, see Janger (2009).

[35] For a short overview, see Janger (2009).

tensifying competition include a reform of competition regulation (including more and better resources, a reversal of the burden of proof of abuse of a dominant position), the reform of a number of frameworks regulating startups, professionals and contractors, etc. as well as measures to increase price transparency in a number of services industries.

Innovation Financing: Risk Capital Intensity

Risk capital intensity as a measure for the quality of innovation financing in Austria continues to be very low, possibly owing to a mix of supply-side (lack of funds) and demand-side reasons (lack of promising projects). Raising risk capital intensity by providing more funding may take the form of new legal structures for risk capital funds,[36] a fund-of-funds initiative and provisions favoring investment of life insurance and pension fund plans in risk capital funds. Corporate demand for risk capital might be fueled for instance by improving the framework conditions discussed above (for detailed recommendations see Janger and Reinstaller, 2009).

To conclude, Austria has a number of untapped reserves that may be mobilized in order to increase (potential) growth. The gap between Austria and the top performers is even good news, as the comparison countries Sweden, Finland, Denmark and Switzerland have in fact hit a plateau in many areas. Apart from the recommendations made above, Austria's medium-term growth perspectives will also depend on the successful completion of an international climate agreement and global greenhouse gas emission trading under such an agreement. Such a price signal will be crucial for creating incentives for innovation and investment. Moreover, Austria is, of course, an integral part of the world economy, and above all of the EU. Continuing the EU's structural strategy – the Lisbon strategy – was put on the agenda in the fall of 2009 and is also going to influence the Austrian perspectives. Finally, purely conventional growth raising strategies will not suffice in the medium and long term; in view of the crisis, a small, open economy must also consider strategies to increase its shock resilience (Aiginger, 2009b).

4 Conclusions

A permanent loss in potential output following the crisis and the permanent nature of many discretionary stabilization measures have created a need for adjustment that goes significantly beyond the need to finance the economic stimulus packages ex post. The repercussions of the crisis on public finances are going to be exacerbated in the medium term also by the implications of demographic change.

In view of the anticipated negative effects on the real economy, policymakers should coordinate their measures internationally (and are, indeed, obliged to do so within the EU by the Stability and Growth Pact) and should not phase out any measures until the economic recovery has become self-sustaining. At the same time, they would be well advised to develop consolidation programs even now, in order to ensure rapid implementation during the next recovery stage and in order to secure public confidence in the sustainability of public finances. Consolidation should focus on spending cuts, while avoiding conflicts with other economic policy goals (e.g. in the research and

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[36] Such a law was under consultation in the fall of 2009; yet it remains to be seen whether the new regulations may solve the problem effectively.

education areas). Any revenue-side measures should dampen growth as little as possible, which would speak for an increase in taxes on immovable property.

An analysis of the medium-term growth components labor, capital and productivity shows that, notwithstanding its good general performance, Austria has got potential in numerous areas to support fiscal consolidation through an acceleration of growth. This potential might be exploited by adjusting employment, education and competition policies and by reforming innovation funding with a view to improving the medium-term growth perspectives. In this respect, the gap between Austria and the top performers Denmark, Finland, Sweden and Switzerland is actually good news, as those countries have already hit a plateau. History might confirm for Austria what previous crisis episodes have shown, namely that economic policymakers have indeed got the power to significantly influence the medium-term growth scenario after an economic crisis.

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Austrian Households' Equity Capital – Evidence from Microdata

To date, research on household wealth has seldom focused on households' business equity holdings. Such equity stakes represent above all ownership in domestic limited liability companies. This study for the first time provides an empirical analysis of the distribution of Austrian households' equity stakes in limited liability companies. For our analysis, we draw on data from three sources: the Company Register, a commercial database and the OeNB's 2004 Survey on Financial Household Wealth. In 2005, some 3% of Austrian households possessed equity capital worth around EUR 22.3 billion, which equaled about 6% of total financial wealth. These equity investor households are characterized by above-average incomes and wealth. Compared with the other households, they are also much more frequently invested in risky assets, tend to own their principal residence and have considerably higher education levels. Such equity holdings are highly concentrated even within this group of investor households.

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Holdings of (non-publicly traded) equity have rarely been researched even though they are an important component of households' financial wealth. In view of tightened refinancing conditions, a comprehensive grasp on equity financing proves particularly relevant, however. Equity consists above all in ownership in domestic limited liability companies. Some 64% of registered businesses in Austria are limited liability companies[2], which account for about 90% of the equity capital of all Austrian nonfinancial corporations. In Austria, both macro- and microdata are available on household wealth. Macrodata on households stem from the financial accounts for Austria. Annual data on the aggregate household sector (including nonprofit institutions serving households and private foundations) have been available since the reporting year 1980, specifically on households (as a separate item) since 2006. Microdata on Austrian household wealth were for the first time compiled in 2004 by means of a survey. Given the positive skew of the wealth distribution, the probability of randomly sampling a sufficient number of high-income households is rather low. This is problematic since certain financial assets – especially business equity capital – are disproportionately frequently held by very wealthy households. We used microdata on equity stakes in limited liability companies owned by households and private foundations as gleaned from the Company Register to complement this fragmentary picture. This allows us, in particular, to construe more precise estimators for equity stakes in companies.

In this study, we take stock of and analyze Austrian households' business equity holdings. Based on several assumptions, we arrive at additional findings about the overall distribution of financial wealth in Austria. In section 1, we highlight the important role business equity plays in households' and private foundations' overall financial

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wealth. Section 2 contains a description of the data sources for equity stakes in limited liability companies held by households and private foundations. The structure of households' stakes in limited liability companies is spelled out in detail in section 3, and section 4 sheds light on the structure of such stakes owned by private foundations. Section 5 compares the business equity data with the results of the OeNB's 2004 Survey on Financial Household Wealth (SFHW) and presents a socio-economic characterization of the investor households; section 6 concludes. The annex provides information on the regional distribution of stakes in limited liability companies and the risk-bearing capacity of such companies in terms of equity ratios.

1 Relevance of Business Equity in Households' and Private Foundations' Overall Financial Wealth

Equity capital represents stakes in a company's equity (nominal capital including reserves), which in the case of listed stock are valuated on a marked-to-market basis. All other stakes are valuated at the book value of the respective company. The financial accounts for Austria comprise data on the financial wealth of both households and nonprofit institutions serving households (NPISHs). Financial wealth includes cash, deposits, debt securities, mutual fund shares, loans, ownership of shares and other equity[3], net equity in life insurance and pension fund reserves as well as other financial assets. Its computation and definitions are based on the European System of Ac-

counts (ESA) 1995. In the financial accounts, households comprise both producer households (including sole proprietorships and self-employed persons) and consumer households whose place of residence is Austria. NPISHs refer primarily to nonmarket producers that serve households and are resident in Austria, i.e. above all churches, trade unions, associations and especially foundations, including private foundations under the Austrian Private Foundation Act[4]. In 2005, NPISHs held around 5% of the household sector's total financial assets. Private foundations account for the largest portion (in value terms) of NPISH holdings of equity capital, and they are considered in this analysis given that they are generally owned by households.

Chart 1

Equity Holdings as Part of Financial Wealth
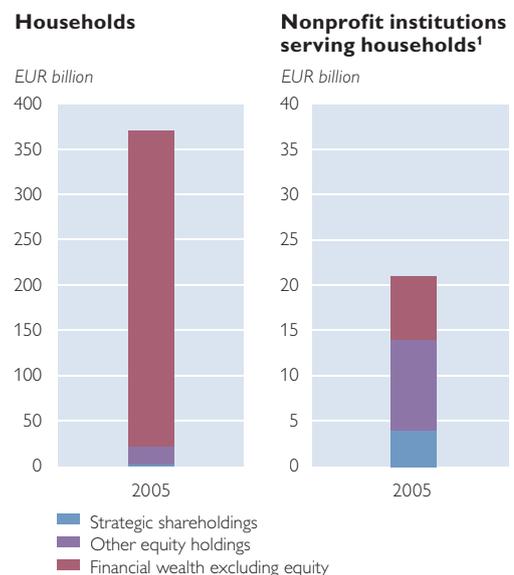
Source: OeNB.

[1] Including private foundations under the Austrian Private Foundation Act (Privatstiftungsgesetz).

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[3] In the financial accounts, residents' ownership of foreign land is treated as an investment in a foreign quasi-corporation. In our analysis, we do not consider such investments.

[4] Excluding private foundations with close economic links to financial institutions such as banks (e.g. ERSTE Foundation).

Our analysis focuses on equity stakes in domestic limited liability companies.

The volume of households' strategic equity holdings (other equity and strategic shareholdings)[5] totaled EUR 22.3 billion at end-2005, of which EUR 20.2 billion were non-publicly traded investments in domestic nonfinancial enterprises. This volume rose to EUR 24.3 billion by 2008[6] and equaled some 6% of households' total financial wealth. NPISHs possessed stakes worth EUR 13.6 billion, EUR 9.3 billion of which were non-share investments. At a share of 65%, equity holdings play a much more important role in NPISHs' total financial wealth than they do in households' total financial wealth. According to the Association of Austrian Private Foundations, in 2005, equity accounted for some 55% of the financial wealth of private foundations, other financial assets for around 24% and real estate holdings for about 21%. As reported by the private foundations themselves, the share of equity in total financial assets thus equals approximately 70%.

Strategic equity holdings (unlisted stocks and other equity of the Austrian household sector) made up around 9.6% of total financial wealth in 2005, which – by European standards – is in the same league as Belgium and Germany.

In contrast to other financial wealth components, data on strategic equity holdings are compiled at the individual level. It is therefore possible to identify individual investors according to socio-economic characteristics, such as age and place of residence, and to compare the data with the 2004 SFHW results. The latter allow for an analysis of a larger number of socioeconomic properties as well as by other financial asset categories and by household income.

As mentioned before, some 64% of all registered businesses in Austria are limited liability companies[7], which account for about 90% of the equity capital of all nonfinancial corporations in Austria.

The following stock taking includes individuals' equity stakes in limited liability companies, even if such investments take a negative value. This does not imply, however, that negative values may be interpreted as individuals' liabilities. The same goes for the financial account aggregates.

2 Data Sources for Equity Stakes in Domestic Companies as Compiled for the Financial Accounts

Data on equity capital held by households and NPISHs in the form of stocks:

1. Our calculations are based on banks' reports on securities holdings and, depending on the amount involved, shareholders' direct reports, provided the securities are not parked in domestic banks' custody accounts (and thus covered by the banks' reports).
2. In addition, data on unlisted stocks were drawn from the joint stock companies statistics compiled by Statistics Austria.

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[5] Other equity comprises ownership in limited liability companies, partnerships and quasi-corporations (real estate abroad). Strategic shareholding refers to a shareholder owning 5% or more in a company.

[6] The increase is based on an extrapolation of the 2005 holdings and the sum of changes in the nominal capital values as taken from the Company Register, which were converted into equity capital values.

[7] A Gesellschaft mit beschränkter Haftung (GmbH) is a corporation with separate legal personality. It is the most common form of business organization in Austria. The owners of this type of limited liability company are liable merely to the amount of their initial contribution of at least EUR 36,000, while sole proprietors are liable with all their assets.

Data on domestic households' and NPISHs' equity holdings in Austrian limited liability companies were sourced from:

1. Company Register information on all enterprises organized as a limited liability company (GmbH). For such companies, figures on the nominal capital are available. The Company Register sheds light on a) the domicile and industry of the company and b) the ownership structure based on the nominal capital, including the number (and age and domicile) of its owners. On December 31, 2005, the Company Register listed some 70,000 limited liability companies[8] with around 130,000 equity capital relations.

2. A commercial database: The OeNB uses the SABINA database, a special subset of the AMADEUS database, which is maintained by Creditreform. This database contains data on individual equity capital components, nominal capital and various types of reserves. The data are derived from the balance sheets recorded – not necessarily in electronic format – in the Company Register. Usually, it takes about 14 months until the data for a specific balance sheet reporting date are available in a format that may be analyzed electronically; the database is updated on a monthly basis. At present, the database contains 91,000[9] companies domiciled in Austria.

We link these two data sources via the Company Register number and determine the overall number of companies and the distribution of equity capital across its owners, using the composition of the nominal capital shares recorded in the Company Register. We calculate for each company the relation of nominal to equity capital from data of the SABINA database. Given the lack of detailed information that could be analyzed electronically, this relation is unweighted, i.e. we assume that the (positive or negative) reserves of a company are equally distributed among all parties. In the case of negative reserves (especially from loss carryovers) that impact on the equity capital, we calculate the respective negative shares for individual households. For equity stakes that are recorded in the Company Register, but not in the SABINA database, we consider all investors' shares in the nominal capital only. The threshold value of EUR 36,000 comes into play relatively frequently. Equity that is recorded only in the SABINA database is not considered in our analysis, as we cannot identify the owners.

3 Stakes in Limited Liability Companies Held by Individuals

We use the above-mentioned data from the Company Register and the SABINA database to describe households' equity capital in limited liability companies at the micro level.

In all, the data set comprises 128,353 equity stakes traceable to individuals. As some individuals own several equity stakes, the number of persons in the data set equals 105,471. Furthermore, it is safe to assume that not all stakes in limited liability companies are captured in the data set, which is why any of the following figures should be regarded as estimates of such stakes held by individuals in Austria.

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[8] I.e. about 70% of all limited liability companies in Austria.

[9] This number comprises all limited liability companies in the database and not just the 69,632 owned by households. (The remainder is made up of limited liability companies owned e.g. by other companies, the government, banks and nonresidents.)

Coverage nevertheless probably amounts to over 95% so that statistical uncertainty is very low. As we cannot determine a finite population correction factor given the lack of the overall number, we do not state confidence intervals.

On the assumption that all of these individual investors live in different households, around 3% of Austrian households own equity stakes in limited liability companies. In line with this assumption, this figure represents the upper limit. In the 2004 SFHW, about 2.6% (95% confidence interval: 1.74% to 3.42%) of households reported business equity holdings.

Table 1 shows the structure of equity holdings. Some 86% of these investors hold stakes in one limited liability company, and less than 1% hold stakes in five or more. The highest number of equity stakes per person is 22. The total worth of the equity stakes in limited liability companies comes to EUR 18.6 billion[10]. These stakes are therefore by far the most important component of other equity (and strategic shareholdings, 2005: EUR 22.3 billion) shown in the financial accounts.

Table 1

Households' Equity Stakes in Limited Liability Companies

Number of			Share in %
equity stakes	equity relations	investors	
1	90,193	90,193	85.51
2	22,222	11,111	10.53
3	7,584	2,528	2.40
4	3,564	891	0.84
5 and more	4,790	748	0.72
Total	128,353	105,471	100.00

Source: OeNB.

Table 2

Breakdown of Limited Liability Companies by Number of Equity Investors

Number of		%
investors	companies	
1	36.435	52.32
2	20.722	29.76
3	6.901	9.91
4	3.646	5.24
5 or more	1.928	2.77
Total	69.632	100.00

Source: OeNB.

Moreover, several individuals can hold stakes of the same limited liability company. Table 2 presents a breakdown of limited liability companies by the number of individual equity investors.

To illustrate the distribution of stakes in limited liability companies among the owners, the values of the individual holdings are added up for each investor. Averaged out, an individual's equity stakes are worth some EUR 176,000, while the median equals around EUR 19,000.

Chart 2 shows the total value of equity holdings broken down by investor age bands. It is evident that the value rises continuously with age, and the increase is particularly strong for older investors. Especially in the higher age bands, we see that the mean value nearly doubles between the 50 to 59 and the 60 to 69 bands as well as between the 60 to 69 and the over 69 bands. This result is not driven by outliers. If we consider the median values, the increases are even more pronounced, especially again in the higher age bands. One reason for this could be that successful limited liability compa-

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[10] The total value of stakes in domestic companies (excluding strategic holdings in stock corporations) ran to EUR 20.5 billion at year-end 2005 according to the financial accounts data. The difference is essentially traceable to a differing valuation assessment of individual holdings with negative equity capital and other forms of business organization which do not fall into the limited liability category.

Chart 2

Breakdown of Stakes in Limited Liability Companies by Investor Age Bands

EUR

Age band (years)

Mean ■ Median ■
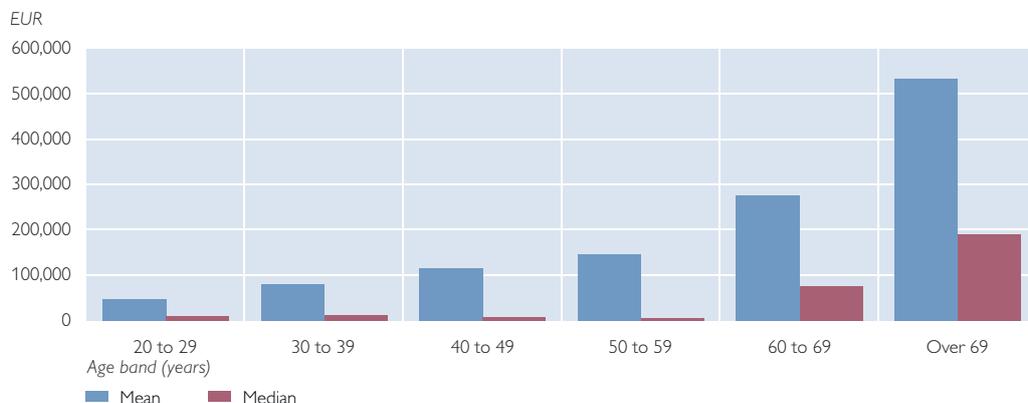
Source: OeNB.

nies stay in the market longer and grow accordingly, while less successful ones come and go. Older owners of limited liability companies thus may look back on very positive track records of the companies they are invested in, while younger owners are more frequently involved in startups and new investments. Businesses may also be converted into limited liability companies once they have reached a certain size. At any rate, disinvestment from limited

liability companies is obviously rare among the higher age bands.

Strong Concentration of Equity Stakes in Limited Liability Companies

Chart 3 shows the distribution of the total value of all equity stakes held per person by means of a Pen's parade. We find that for around 14% of investors, the total value of equity stakes is negative, and around 40% of investors have

Chart 3

Pen's Parade Illustrating the Distribution of the Total Value of Equity Stakes per Person
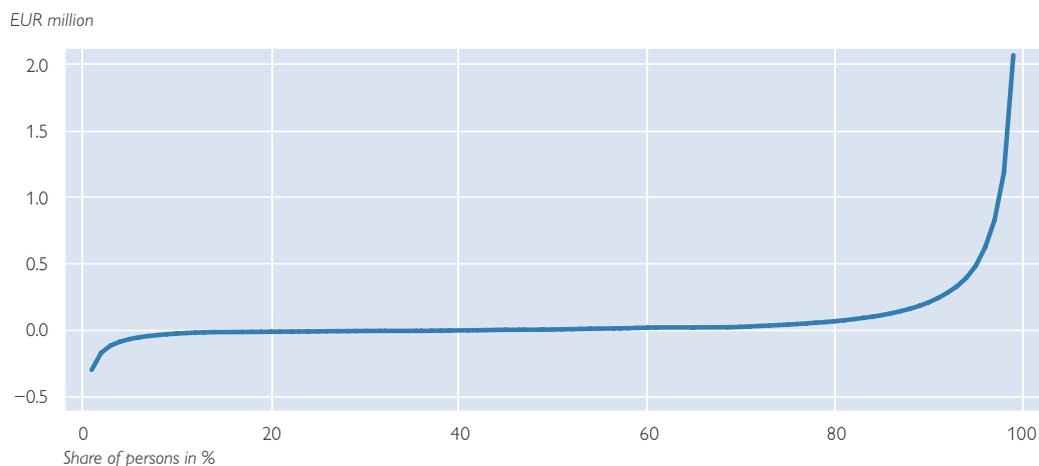
EUR million

Share of persons in %

Source: OeNB.

Note: For reasons of display, the chart was cut off at the upper and lower tail of the distribution.

equity stakes worth less than EUR 10,000. Less than 20% own stakes of more than EUR 100,000, and about 5% hold equity stakes worth over EUR 500,000. In the chart, both the lower and upper tails of the distribution were cut off for reasons of display. However, individuals' equity stakes range from less than –EUR 20 million[11] to over EUR 1.4 billion.

Another way of illustrating the concentration of holdings of limited liability capital is presented in table 3. Of the total value of said stakes, the top 10% of owners hold around 92% (EUR 17.1 billion), the top one-thousandth own about 39% and the top ten-thousandth hold about one-quarter. The Gini index of the distribution equals 0.88. A Gini index of around 0.88 is reached e.g. when nine out of ten persons own EUR 1 and the tenth person owns EUR 500. One has to bear in mind, however, that all values refer to the distribution of stakes in limited liability companies among those 3% of households only that own such stakes, and not to the entire population. Furthermore, the analysis may consider only the first level of equity capital, but not stakes that lim-ited liability companies hold themselves and potential other multi-tier partici-pating stakes.

4 Stakes in Limited Liability Companies Held by Private Foundations

To capture at the micro level the equity stakes private foundations hold in lim-ited liability companies, we likewise rely on data from the Company Regis-ter and the SABINA database. In these databases, it is possible to distinguish private foundations from individuals. The former are normally classified un-der NPISHs. Within the household sec-tor, private foundations are the group holding the on average highest-value company stakes.

All in all, the data set covers 2,347 stakes in limited liability companies that are held by private foundations or, vice versa, 1,421 private foundations that hold one or more equity stakes (i.e. about 50% of all private foundations that existed in 2005). In addition to their limited liability stakes, private foundations own further financial and housing wealth (section 1). Some 64% of private foundations that own such stakes hold stakes in just one limited

Table 3

Shares of Top Groups in Households' Total Equity Holdings

	Value of all equity stakes per person	Share in total value of equity stakes
	EUR billion	*%*
Top 10%	17.1	91.94
Top 5%	15.3	82.26
Top 1%	11.3	60.75
Top one-thousandth	7.2	38.66
Top ten-thousandth	4.7	25.11
Total	18.6	100.00

Source: OeNB.

Table 4

Private Foundations' Equity Stakes in Limited Liability Companies

Number of			Share in %
equity stakes	equity rela-tions	foundations	
1	914	914	64.32
2	632	316	22.24
3	291	97	6.83
4	148	37	2.60
5 and more	362	57	4.01
Total	2,347	1,421	100,00

Source: OeNB.

[11] *Negative values should by no means be interpreted as owners' liabilities (section 1).*

Chart 4

Pen's Parade Illustrating the Distribution of the Total Value of Equity Stakes Owned per Private Foundation

EUR million
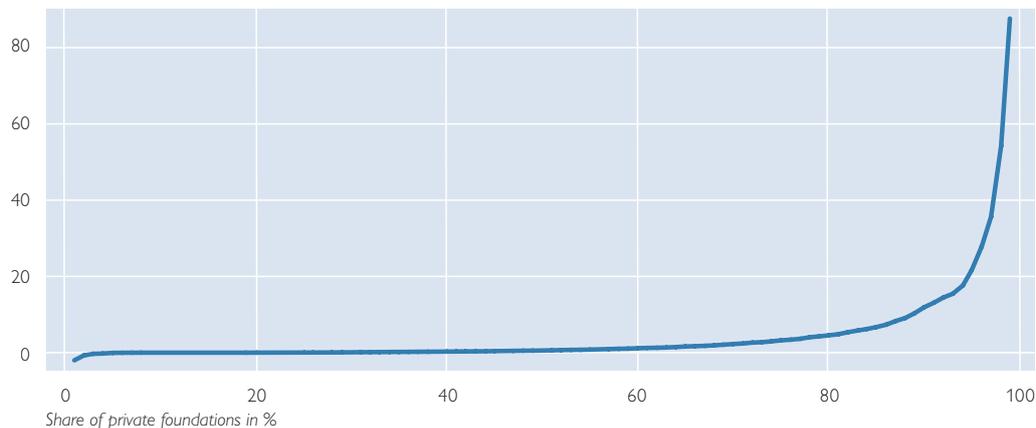
Share of private foundations in %

Source: OeNB.

Note: For reasons of display, the chart was cut off at the upper and lower tail of the distribution.

liability company, while about 4% are invested in five or more companies. The maximum number of limited liability stakes held by a single private foundation equals 16.

Averaged out, the limited liability stakes of a private foundation are worth some EUR 6.4 million, while the median equals around EUR 570,000. At a Gini index of 0.84, the equity stakes of private foundations are somewhat more equally distributed than those of individuals. The value of the stakes held by private foundations is, however, signifi-

cantly higher: Summed over the 1,421 private foundations, the total comes to EUR 9.2 billion. This figure is approximately half the total value of the stakes in limited liability companies held by 105,471 households (EUR 18.6 billion). Chart 4 shows the Pen's parade of all equity stakes held by private foundations in value terms. About 20% of private foundations record a negative total value. Around 70% have stakes worth more than EUR 100,000, over 40% hold equity of more than EUR 1 million, and around 20% hold stakes worth more than EUR 5 million.

Table 5 provides a breakdown of private foundations' equity stakes by the shares of the top percentage groups. The top 10% hold around 80%, the top 1% still some 41% of the total value.

5 Comparison with the Microdata of the OeNB's 2004 Survey on Financial Household Wealth

In the following, we use the data compiled during the OeNB's 2004 SFHW to achieve two things. First, we analyze their plausibility in terms of equity cap-

Table 5

Shares of Top Groups in Private Foundations' Total Equity Stakes

	Total equity stakes per private foundation	Share in total equity stakes
	EUR billion	%
Top 10%	7.4	80.35
Top 5%	6.3	68.34
Top 1%	3.8	41.05
Total	9.2	100.00

Source: OeNB.

ital, and second, we describe the socio-economic characteristics of the investor households and examine the impact of a potential underreporting and under-representation of equity capital on the distribution of financial wealth.

Multistage stratified clustered ad-dress random sampling was used for the OeNB's 2004 survey and produced a total of 2,556 analyzable observa-tions. Within Austria, households were stratified at the province level, and in Vienna, households were stratified by the 23 political districts. Within the districts, the prospective respondents were selected at random. To make the sample more representative, the house-holds were weighted within the sample. The age, occupation and education of the household head and the size of the household, the presence of children up to 14 years of age and the district were factored into the weighting.

On balance, the sample was con-structed such that it should capture Austria's household population rather well. However, above all the tails of the distribution are problematic, as such surveys generally have what is called a middle class bias, i.e. both very wealthy and very poor households tend to be underrepresented. This could pose a problem in the capture of business eq-uity holdings, as the latter are usually traceable to especially wealthy house-holds. For a comprehensive discussion of the survey, see Beer et al. (2006).

5.1 Plausibility Analysis

According to the OeNB's 2004 SFHW, around 2.6% of Austrian households own equity stakes.[12] The 2.6% are backed up by 59 observations. Since only few households possess such eq-

Table 6

Popularity and Distribution of Various Types of Financial Assets

	Share of households owning such finan-cial assets	Gini index
	%	
Deposits (savings and current accounts)	99.2	0.608
Savings (building loan contracts and other saving instruments[1])	96.7	0.631
Building loan contracts	70.6	0.622
Life insurance contracts	53.1	0.752
Stocks	15.7	0.947
Mutual fund shares	11.4	0.958
Bonds	10.6	0.959
Business equity interests	2.6	0.995

Source: OeNB, Survey on Financial Household Wealth 2004.

[1] Passbook savings accounts, savings accounts, savings plans with bonus interest, capital savings accounts.

uity and, by extension, only few such households are captured in the sample, plus equity stakes are especially un-equally distributed compared with other financial assets (table 6), esti-mates for this group have low precision. This is particularly problematic given that households holding such equity tend to be very wealthy. We see a simi-lar problem with other less common as-sets, such as stocks, bonds and mutual fund shares (Fessler and Schürz, 2008).

The households that own business equity account for a disproportionately high share of around 16% of the entire gross financial wealth in Austria. More-over, household surveys insufficiently cover the upper tail of the wealth dis-tribution, as wealthier households tend not to participate, or if they do so, tend to provide incomplete information on, or understate, their wealth. It is there-fore safe to assume that owing to data

[12] In the survey, equity stakes in unlisted companies are distinguished from stakes in listed companies and in self-employed businesses. It is, however, not possible to draw a clear line between stakes in limited liability companies versus stakes in other forms of non-publicly traded businesses. The majority of business equity stakes may be unequivocally identified as stakes in limited liability companies.

coverage and compilation, the distribution based on individual level data and its moments are closer to the actual values.

To compare the 2004 SFHW data on equity stakes held by households (n = 59) with the individual level data (n = 105,471), we sort individuals' equity stakes (as derived from the Company Register and SABINA databases) in ascending order and produce 59 percentiles and the respective mean values. We take this approach because ideally, the (albeit only few) observations of equity stakes in the SFHW were sampled at random. This implies that their mean value should equal the mean value of actual equity stakes. On the other hand, this may also accidentally be the case, while the other moments of the distribution are not well captured. To pinpoint as precisely as possible to what extent the entire distribution may be captured, we include in the comparison any variation in equity stakes resulting from the 2004 SFHW, i.e. all of the 59 individual observations. If the 59 equity stake values of the 2004 SFHW match

the actual distribution, they should be rather close to the expected (mean) values of the 59 percentiles construed from the individual level data. The SFHW considered only equity stakes with a positive value. After all, equity stakes carrying a positive sign are part of households' financial assets and households therefore consider them relevant for their budget. By contrast, stakes with a negative sign do not represent liabilities for the owners but indicate that the equity capital of the limited liability company is in negative territory. For this reason, in our comparison, we exclude the negative values (some 14%) of the individual level data in a first step of our plausibility analysis. Furthermore, bear in mind that the comparison rests on the assumption that only one person per household holds such equity. As is evident from chart 5, the OeNB's 2004 SFHW effectively captures the distribution of stakes in limited liability companies despite the low number of observations. As was to be expected, the upper tails of the distribution cannot be

Chart 5

Comparison of Equity Stakes: 2004 SFHW versus 2005 Individual Level Data
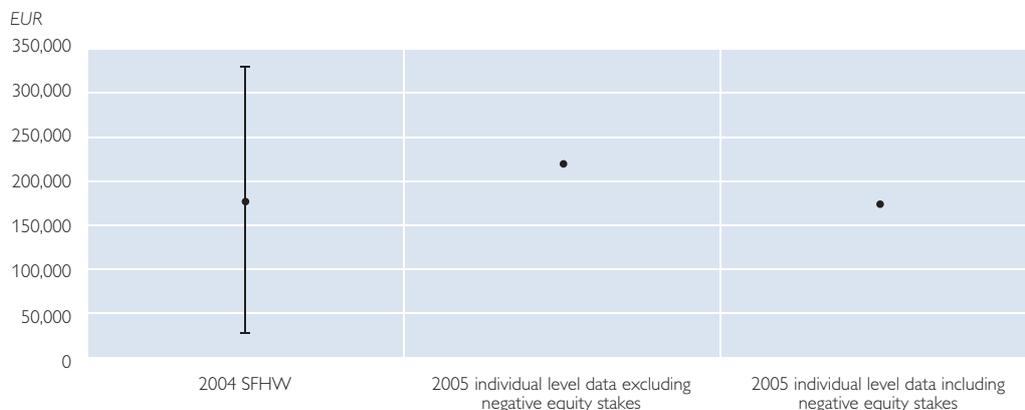
EUR (log)

● Log of equity capital, 2004 SFHW
● Log of expected values of the 59 percentiles of equity capital, 2005 individual level data

Source: OeNB.

Chart 6

Comparison of the Estimates for the Value of Equity Stakes

EUR

Source: OeNB.

Note: Mean values (including the 95% confidence interval for the 2004 SFHW).

represented, and the lower tails are presented only in an insufficient manner.

Chart 6 juxtaposes the mean value estimates as derived from the OeNB's 2004 SFHW and those based on the individual level data excluding and including stakes with negative signs. Naturally, the estimates derived from the individual level data (n = 105,471, coverage of over 95%) are much more precise than those derived from the OeNB's 2004 SFHW (n = 59). The mean values do not deviate much from each other, which proves the validity of the OeNB survey data. The mean value based on the individual level data excluding stakes with a negative sign (as mentioned above) is the relevant benchmark here. It lies, quite expectedly (given the middle class bias of such surveys), above the mean value derived from the 2004 SFHW data.

The comparison also confirms the correlation with age. When we break down households holding equity stakes into three age bands (based on the household head's age),[13] we arrive at an average equity stake of around EUR 100,000 for the 20- to 39-year-olds, of about EUR 190,000 for the 40- to 59-year-olds and some EUR 420,000 for those aged 60 and more. While these estimates are imprecise given the small number of observations, they confirm that the SFHW data also capture the actual positive correlation between age and the increasing value of equity stakes (chart 3).

5.2 Socioeconomic Characteristics of Equity Investor Households

Owners of equity stakes are high-income, wealthy households. Their financial wealth (excluding business equity) is on average twice as high as that posted by households without business equity holdings. The median value of their financial wealth is almost three times as high as that of the rest of households. About 2.6% of households are equity investors who own some 16% of the overall gross financial wealth. In addition, compared with other households, they are much more frequently invested in risky assets (stocks, bonds

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[13] *This comparison is based on the assumption that the household head is the owner of the equity stake. Given the extremely small sample size, we aggregated the age bands used in chart 3 once more.*

Table 7

Socioeconomic Characteristics of Equity Investor Households

	Households	
	without business equity stakes	with business equity stakes
Number of observations	2,497	59
Share in %	97.4	2.6
Average age of household head	50.8	48.1
	EUR	
Mean gross financial wealth (excluding value of business equity)	47,000	120,000
Median gross financial wealth (excluding value of business equity)	22,715	64,200
	%	
Share of households with net income of EUR 3,000 and more	19.4	44.6
Share of households owning stocks and/or mutual fund shares	21.1	42.9
Share of households with university degree	12.1	22.9
Share of households owning principal residence	55.5	63.9

Source: OeNB.

and mutual fund shares), tend to own their primary residence and have considerably higher education levels.

5.3 Distribution of Gross Financial Wealth

Owing to the sample size, the individual level data on business equity holdings may be considered to be closer to the actual values, which is why we replace the 59 SFHW observations of equity stakes in accordance with their rank in terms of the value of the equity stake (chart 5) by the mean values of the 59 percentiles derived from the individual level data. In a first variant, we only use equity stakes with a positive sign. In a second variant, basically as a robustness check, we also include equity stakes carrying a negative sign. Table 8 compares the gross financial

wealth distribution of all variants. As expected, it becomes evident that the OeNB's 2004 SFHW data understate the inequality of the distribution of wealth as the problems with covering wealthy households obviously also apply to equity stakes. The Gini index rises both in the scenario covering only positive imputations and the scenario which also includes negative ones.[14] Apart from the widely used Gini index, we employ additional distributional measures to draw comparisons in our robustness analysis: the Mehran index[15] and the Kakwani index[16], both of which, like the Gini index, are based on the Lorenz curve. The Kakwani index in particular is more sensitive to changes in the tails of the distribution than the Gini index. Another common index is the Theil index[17] used in infor-

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[14] *The share of both the top 10% and the top 5% in total gross financial wealth each increases by some 1 to 2 percentage points.*

[15] $I_{Mehran} = \dfrac{3}{n^3 \overline{y}} \sum_{i=1}^{n} i(2n+1-i)(y_i - \overline{y})$

[16] $I_{Kakwani} = \dfrac{1}{2-\sqrt{2}} \left[\left(\dfrac{1}{n\overline{y}} \sum_{i=1}^{n} \sqrt{y_i^2 + \overline{y}^2} \right) - \sqrt{2} \right]$

[17] $I_{Theil} = \dfrac{1}{n} \sum_{i=1}^{n} \left(\dfrac{y_i}{\overline{y}} \ln \dfrac{y_i}{\overline{y}} \right)$

Table 8

Comparison of Gross Financial Wealth Distributions

Distributional measures	Gross financial wealth		
	OeNB 2004 SFHW[1]	Imputation from individual household equity stakes I[2]	Imputation from individual household equity stakes II[3]
Gini index	0.658	0.670	0.670
Mehran index	0.789	0.797	0.802
Kakwani index	0.347	0.359	0.362
Theil index	0.980	1.126	1.081
Atkinson index (inequality aversion = 0.5)	0.373	0.394	0.386

Source: OeNB.

[1] *OeNB 2004 SFHW (business equity stakes surveyed).*
[2] *OeNB 2004 SFHW (imputation from business equity based on individual level data; only positive equity stakes).*
[3] *OeNB 2004 SFHW (imputation from business equity based on individual level data; positive and negative equity stakes).*

mation theory. Yet another index, the Atkinson index[18], is based on a welfare function. All approaches show that the data using imputations from the individual level data entail greater inequality in the wealth distribution.

Including the stakes in limited liability companies held by private foundations would considerably amplify this result given the average value of these equity stakes. It is, however, not possible to map these stakes to individual households for the lack of information on the structure of private foundations. Moreover, we would have to formulate additional assumptions about the concurrent (pro rata) holding of a private foundation and business equity holdings at the individual level. Another reason to interpret the calculated indices as a lower limit for the actual inequality of the distribution of gross financial wealth is the positive correlation between the values of equity stakes and other financial assets, which we could not consider in our comparisons based on imputations.

6 Summary and Conclusions

Equity capital comprises above all ownership in domestic limited liability companies. In fact, stakes in limited liability companies accounted for EUR 18.6 billion of the total of EUR 22.3 billion recorded under "other equity" and "strategic shareholdings" in the 2005 financial accounts. Only about 3% of households possess stakes in limited liability companies. What is more, even within the group of equity investor households, holdings are highly concentrated. The Gini index for equity stakes held at the individual level equals 0.88. More than 90% of all equity stakes are traceable to the top 10%, and one-quarter of all stakes to the top ten-thousandth households. These figures refer merely to those about 3% of households that are invested in limited liability companies, which further underlines the high concentration. Furthermore, private foundations, which are generally owned by households, also hold another EUR 9.2 billion in limited liability equity. In

[18] $I_{Atkinson}(\varepsilon) = 1 - \left[\frac{1}{n} \sum_{i=1}^{n} \left(\frac{y_i}{\bar{y}} \right)^{(1-\varepsilon)} \right]^{\frac{1}{1-\varepsilon}}$ with parameter ε determining the level of inequality aversion. The higher ε is, the more sensitive this index becomes to changes in the lower end of the distribution.

2005, only about half of the private foundations were invested in limited liability companies. The data from the OeNB's 2004 Survey on Financial Household Wealth attest to the fact that households owning business equity stakes earn disproportionately high incomes and have above-average wealth (even excluding equity stakes). In addition, compared with the other households, such households are much more frequently invested in risky assets, tend to own their principal residence and have considerably higher education levels. The individual level data (gleaned from the Company Register and SABINA databases) lend themselves to a plausibility analysis of the results on equity stakes as derived from household surveys, which will be highly relevant for the Austrian component of the Eurosystem's future Household Finance and Consumption Survey (HFCS). Comparisons show that the distributional measures calculated from the OeNB's 2004 survey may be interpreted as a lower limit for the actual inequality in the distribution of wealth.

The results of the individual level (Company Register) data confirm those of the OeNB's 2004 survey and for the first time allow for a precise characterization of the distribution of stakes in limited liability companies in Austria.

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Annex

In this annex, we examine the regional distribution of equity stakes and the risk-bearing capacity of limited liability companies based on their equity ratios. These ratios are significant measures of companies' risk-bearing capacity; they may differ quite markedly across industries. As a case in point, the tourism industry is traditionally characterized by low equity ratios. By contrast, companies operating in particularly innovative industries frequently seem to require higher equity ratios to allow for riskier investments.

Regional Distribution

Chart 7 illustrates the regional distribution (in value terms) of limited liability stakes as measured by two variants. Since equity stakes worth more than EUR 100 million (n<10) would have had a strong distortive effect on the regional distribution, they were excluded. Variant 1 shows the mean value of an equity stake by the domicile of the limited liability company. Variant 2 shows the mean total value of all equity stakes held by an individual by the latter's place of residence. In the breakdown by company domicile, the Austrian provinces of Tyrol, Vorarlberg, Upper Austria and Salzburg record relatively high values for the average limited liability stake. A different picture emerges in the breakdown by the average total value of all equity stakes held by an individual. Here, above all Styria, Carinthia, Vorarlberg, Burgenland, but also Vienna score the highest values, with investors domiciled in Styria, Carinthia and Burgenland owning equity stakes in particular in Upper Austria. Vorarlberg residents, by contrast, hold equity above all in Lower Austria and Vienna. The equity stakes of Vienna residents are rather equally distributed across all Austrian provinces.

Chart 8 depicts the regional distribution of equity stakes (in value terms)

Chart 7

Breakdown of Stakes in Limited Liability Companies by Austrian Provinces[1]
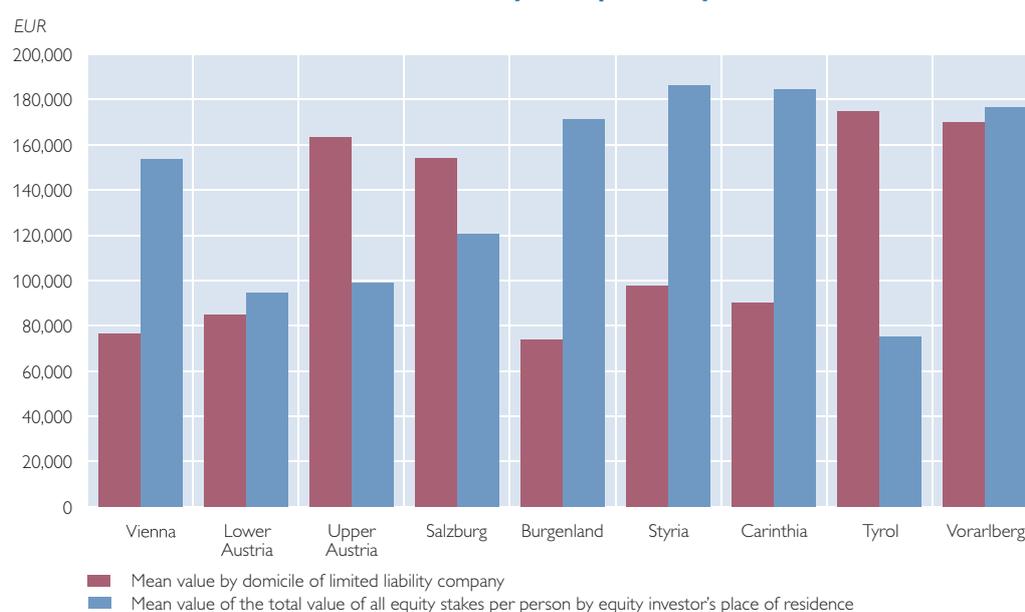
Source: OeNB.

[1] Excluding equity stakes worth more than EUR 100 million (n<10).

Chart 8

Breakdown of Stakes in Limited Liability Companies by Total Value[1]

%

Legend: Vienna · Lower Austria · Upper Austria · Salzburg · Burgenland · Styria · Carinthia · Tyrol · Vorarlberg

X-axis categories: Total value by equity investor's place of residence · Total value by domicile of limited liability company · Number of limited liability companies by company domicile · Share in overall population

Source: OeNB.

[1] Excluding equity stakes worth more than EUR 100 million (n<10).

by the owner's place of residence and the company domicile. The number of limited liability companies in each province and the share of each province in Austria's total population are presented as reference values. We find a disproportionately high share of equity owners in Vienna and Burgenland. This applies both to the comparison with the breakdown of values by company domicile and the number of limited liability companies as well as in relation to the population shares. In terms of company domicile, especially Vorarlberg, Tyrol, Salzburg and Upper Austria weigh in disproportionately heavily with respect to the number of limited liability companies and the population shares. In our analysis, we again excluded equity stakes worth over EUR 100 million (n<10).

Equity Ratios

The equity ratio serves as an important indicator of a company's risk-bearing capacity. This ratio is calculated based on information about the company's equity capital and total assets. For the data set used in this study, we were able to compute the equity ratios of about 43,000 limited liability companies; we had to exclude all companies for which information was available only on the nominal capital, but not on reserves. We nevertheless captured clearly over 55% of all Austrian limited liability companies. Furthermore, as the lack of reserve information does not seem to be systematic, the calculated estimates should have high precision.

Chart 9 shows the equity ratios by company domicile, and the provinces are sorted in descending order by the median equity ratio. Some 20% of limited liability companies, with only slight variations as to the individual provinces, post a negative equity ratio. This may be traceable to loss carryovers. It is, however, very difficult to interpret the size of negative equity ratios.

Chart 9

Breakdown of Equity Ratios by Company Domicile

Limited liability companies sorted by equity ratios

%
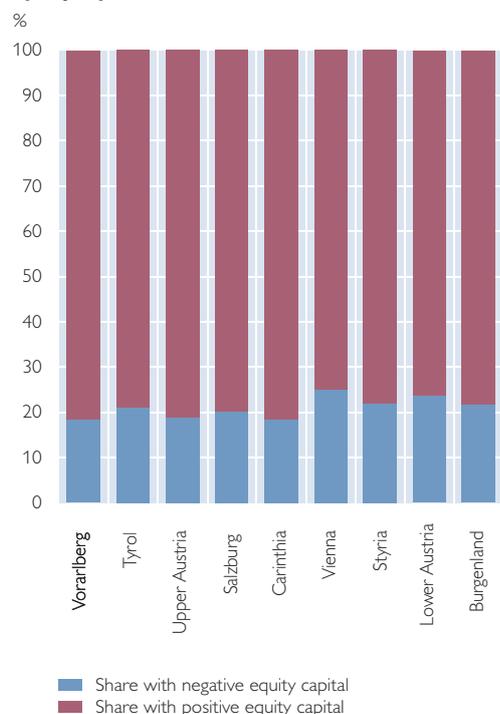
Equity ratios of limited liability companies

%

■ Share with negative equity capital
■ Share with positive equity capital

■ 10th percentile   ● 25th percentile   ● Median
▲ 75th percentile   ● 90th percentile

Source: OeNB.

The right panel of chart 9 shows the percentiles of equity ratios for the individual provinces. Vorarlberg records a median equity ratio of more than 35%. Tyrol, Upper Austria and Salzburg follow with values around 30%, and Carinthia, Vienna, Styria and Lower Austria (in a descending order) register values between 26% and 22%. Only Burgenland has a median equity ratio of less than 20%. Across all provinces, the median equity ratio comes to around 26%.

When we examine the equity ratio by deciles of total assets (chart 10), we see that in all deciles, the 10th percentile records a negative equity ratio. In the lowest three deciles, this holds true also for the 25th percentile. Even in the

highest decile of total assets, more than 10% of limited liability companies have negative equity ratios and more than 25% post an equity ratio of less than 10%. The rather high share of limited liability companies with an especially low risk-bearing capacity is thus not confined to companies whose total assets are low. Chart 10 only presents positive values, as the highly negative values of the lower deciles are difficult to interpret. As to the median, the lower deciles of total assets record disproportionately high and the upper deciles disproportionately low equity ratios. The dispersion of equity ratios tends to decline the higher the total assets figure is.

Chart 10

Limited Liability Companies' Equity Ratios by Total Asset Deciles
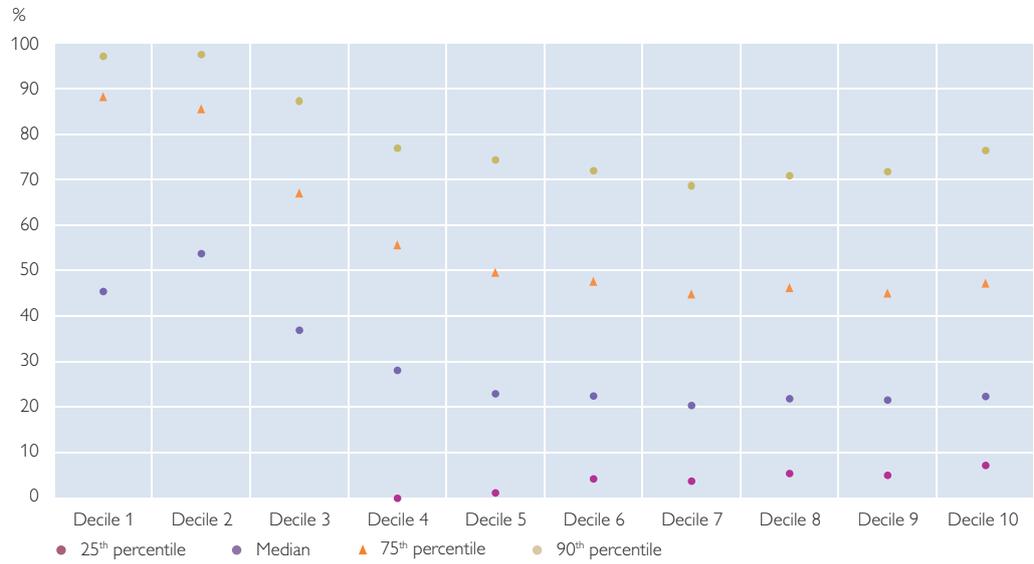
Source: OeNB.

Note: The 10th percentile is negative in all deciles, the 25th percentile is negative in the lowest three deciles.

Wage Staggering and Wage Leadership in Austria – Review and Implications

Markus Knell,
Alfred Stiglbauer[1]

This study examines the importance of wage staggering and wage leadership in the Austrian system of collective bargaining. Collective wage agreements in Austria generally remain valid for one year and are staggered; the highest concentrations of new agreements can be found in the months of January, May and November each year. The relevant literature describes Austrian wage bargaining as a system of wage leadership, with the agreement reached by the metal workers, which usually goes into effect in early November of each year, setting a precedent for wage agreements reached by other sectors in the ensuing months. Through an analysis of detailed individual series from the Index of Agreed Minimum Wages, it is actually possible to provide empirical evidence for the existence of wage leadership. The results also show that the wage-leading metal sector is substantially more sensitive to macroeconomic forecasts than the other sectors are. This phenomenon and the rapid transmission to the sectors that follow are probably key reasons why empirical evidence of high real wage flexibility has been found in Austria.

For a long time now, the institutional features of wage bargaining systems have been a topic of major interest in academic as well as policy-oriented macroeconomic research (e.g. in OECD publications). One particularly relevant question is whether wage bargaining is centralized and/or coordinated. Collective wage bargaining in Austria is often said to be a system of "wage leadership": The first settlement to be reached at the start of the "autumn bargaining round" each year is for the metal sector, and the wage increases negotiated there are believed to provide a signal for the wage negotiations that follow.

Upon closer examination of the results of collective agreements, we can identify clear temporal staggering almost over the entire year, with certain months showing significant concentrations in the number of agreements entering into effect.

Providing empirical evidence of wage leadership is not an easy task. First, wage increases exhibit considerable variance, and other industries do not simply mirror the settlements reached in the metal sector. Second, simple correlations or regressions alone do not represent conclusive evidence either, as macroeconomic variables – such as sectoral wage increases – are highly correlated in any case. In light of these difficulties, Knell and Stiglbauer (2009) use various lines of argumentation and analytical steps in order to verify the existence and significance of wage leadership in Austria.

This study is structured as follows: In section 1, we provide a description of collective wage bargaining in Austria. In section 2, we proceed to a comprehensive discussion of how those negotiations are staggered over time. We then summarize the Austrian debate on the existence of wage leadership as well

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Labour

as the results of empirical studies carried out on this topic (section 3). The characteristics of Austria's wage-setting institutions in an international comparison are discussed in section 4, after which we draw economic policy conclusions in section 5.

1 Collective Bargaining in Austria

1.1 Who is involved?

In a typical year, some 400 collective wage agreements are signed in Austria (ÖGB, 2005). The negotiations are conducted by the unions on the employees' side (the Union of Salaried Private Sector Employees for white collar workers and the various sectoral unions for blue collar workers) and by the relevant trade associations belonging to the Austrian Federal Economic Chamber (WKÖ) on the employers' side. For public sector employees, the Union of Public Services negotiates on behalf of federal employees with the federal government, which is usually represented by a state secretary responsible for public service. The umbrella organizations (i.e. the WKÖ and especially the Austrian Trade Union Federation, ÖGB) do not play a (direct) role in those negotiations.

In formal terms, collective agreements are almost always concluded separately for blue and white collar workers.[2] However, wage negotiations for the two groups are frequently carried out in joint bargaining rounds. Moreover, for blue collar workers, the union mergers observed in recent years have brought about a slightly higher degree of uniformity in wage settlements. Another characteristic feature is the traditional distinction drawn between industry and trades of a given sector,

e.g. in the construction sector or the metal sector. There are in part substantial differences between the two groups in terms of their wage and salary levels as well as the agreed wage increases.

As a rule, collective wage agreements are valid throughout Austria. However, regional distinctions are made in some cases, especially in the food, beverages and tobacco sector or in the public sector (where separate negotiations are held for Vienna and the other federal provinces of Austria).

1.2 Collective Agreements Generally Signed for a One-Year Period

In order to characterize the Austrian system of collective bargaining in quantitative terms over a longer period of time, one would require detailed information on all of the settlements reached as well as the contract lengths. Collecting these data would involve an extremely high level of effort. For this reason, Knell and Stiglbauer (2009) chose a different approach: The authors use detailed series from Statistics Austria's Index of Agreed Minimum Wages (IAMW) for the base years 1986 and 1976 to derive 100 individual series which generally represent key collective wage agreements. Further information on these data can be found in the annex to this study.

Table 1 shows the distribution collective-agreement durations in weighted as well as unweighted form. Measured by their weight in the IAMW 1986, over 89% of collective agreements had a duration of exactly one year, and approximately 95% of agreements had a duration of between 11 and 13 months.[3]

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[2] However, the pay scales in the metal sector have been harmonized for both types of workers.

[3] In some cases, variations in contract duration are used as a means of reaching a compromise in collective wage settlements (e.g. by prolonging the validity of a settlement which the employers consider somewhat inflated).

Table 1

Distribution of Contract Durations of Collective Wage Agreements

Duration	1980 to 2006	
	Unweighted	Weighted (based on the IAMW 1986)
	%	
Up to 10 months	2.3	1.8
11 months	1.8	1.3
12 months	85.1	89.4
13 months	5.3	4.1
14 to 18 months	4.0	2.2
Over 18 months	1.5	1.2
Total	100.0	100.0

Source: Knell and Stiglbauer (2009).

1.3 Collectively Negotiated Wages: A Key Determinant of Growth in Actual Wages

At approximately 95%, the coverage of collective wage agreements is quite high in Austria (Bönisch, 2008). This means that collectively agreed minimum wages[4] and periodic wage increases are binding for the vast majority of employees. Consequently, there can be little doubt as to the fundamental relevance of collective agreements to the general development of wages.

However, one might object that an analysis of collectively negotiated wages is not particularly relevant because many industries in Austria are known to pay higher wages and salaries than the collectively negotiated minimum wages.[5] However, these "excess payments" relate to wage *levels*, whereas this study clearly focuses on wage *growth*, and the agreed annual rates of increase in actual wages and salaries usually follow the pattern of negotiated minimum wages.

The parallel development of these two wage indicators is illustrated in chart 1, which compares the growth of collectively negotiated wages with that of compensation per employee (a measure of the development of actual labor costs from Austria's national accounts). The chart shows that the two grow at similar rates. Wage drift (i.e. the difference in growth between actual and minimum wages) is generally slight and can be attributed primarily to business cycle developments. Since the mid-1990s, however, wage drift has generally been (slightly) negative, which is probably related to a reduction in the level of "excess payments" and to the increase in part-time employment.

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[4] Austrian law does not prescribe a general minimum wage. Still, the social partners have a general agreement on minimum wages (of currently EUR 1,000 per month on a gross basis) to be used in the individual settlements as well as regulatory minimum wages for a few professions.

[5] Moreover, in many cases there are also "real wage" settlements in addition to the collective agreements on sector- and profession-specific minimum wages. However, no comprehensive data basis is available for such wage agreements, unlike for the negotiated minimum wage rate indices, which only capture minimum wages. As a result, this study does not go into further detail on this type of wage agreements. For an analysis of "excess payments" (wage cushion) in Portugal, see Cardoso and Portugal (2005).

Chart 1

Comparing Collectively Agreed Wages and Actual Compensation (1980 to 2006)

Annual growth in %

Collectively negotiated wages   Compensation per employee

Source: Statistics Austria.

2 Wage Staggering

Wages do not change constantly; instead, they follow a clearly recognizable pattern over time: First, wage agreements typically remain in effect for a fixed period of time (mostly one year in Austria), and second, the wages in different industries change in different months of the year. Therefore, wage setting does not follow the simplest neoclassical model, which assumes full wage flexibility, nor does it fit in with the dominant assumption in the current macroeconomics literature, namely that of "Calvo contracts" in which wage changes are stochastic and the probability of a new settlement is constant over time. Instead, the Austrian system is remarkably consistent with the assumption of "staggered wages" as first introduced to macroeconomics by Taylor (1980) – primarily in order to show that monetary policy can have persistent real effects even under the assumption of rational expectations. It is striking how few empirical studies have been conducted on the synchronization and staggering of wage settlements,[6] especially in light of the extensive New Keynesian literature which builds on the assumption of rigid wage contracts.

Collective wage negotiations in Austria generally exhibit the following pattern over time: The "wage bargaining year" starts in November, when settlements in the metal sector and a handful of other industrial sectors go into effect; these settlements are followed by the wholesale and retail trade employees' settlement and many others (most of which belong to the public sector) at the beginning of each year. The collective wage agreement for the banking sector is signed in February, followed by a number of other sectors in May (mainly the restaurant/catering and construction sectors). Almost no (quantitatively) significant collective agreements enter into effect in the summer and early fall. The next bargaining year begins with the

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[6] *Exceptions include Taylor's original work (1980) as well as the studies conducted by Olivei and Tenreyro (2007, 2008).*

metal sector's wage settlement in November.

Table 2 shows the distribution of collective wage agreements over a typical year (2006). The wage bargaining year begins with the wage settlements that go into effect at the beginning of November. In particular, these include the settlements for blue and white collar workers in the metal sector as well as additional agreements in the manufacturing sector. In November 2006, those agreements accounted for a total weight of nearly 14% of the IAMW 1986.

In December 2006, wages did not change in any important collective agreements. A majority of wage settlements (nearly 55% of the total weight in the IAMW 1986) go into effect in

Table 2

Temporal Distribution of Collective Wage Agreements in 2006

Sample series from the IAMW 1986 (in descending order by weight)	Month of entry into effect	Number of series in month	Overall weight of these series %	Cumulative weight
Metal industry blue collar workers (BCWs) and white collar workers (WCWs), mining and iron production industry WCWs and BCWs, stone and ceramics industry WCWs	November	7	13.5	13.5
(none)	December	0	0.0	13.5
Wholesale and retail trade WCWs, WCWs in general trades, federal government employees, BCWs in metal trades, teachers employed by federal provinces, Austrian Federal Railway employees, provincial government employees, BCWs in wholesale and retail trade, Post and Telegraph Administration employees, teachers employed by federal government, Vienna government employees, police, employees of social insurance institutions, municipal employees (10,000 to 50,000 inhabitants), municipal employees (50,000 to 250,000 inhabitants), municipal employees (500 to 10,000 inhabitants), university-level faculty, BCWs in goods transport, teachers employed by the province of Vienna, Vienna public transport employees, Austrian Broadcasting Corporation (ORF) WCWs, employees of bus transport lines, armed forces personnel, forestry BCWs	January	39	54.5	68.0
Bank and private bank WCWs, savings bank WCWs, Raiffeisen-type credit cooperative WCWs, Volksbank credit cooperative WCWs	February	8	5.3	73.3
BCWs in agricultural estate operations, WCWs in agricultural cooperative warehouse associations	March	6	1.3	74.6
Insurance company WCWs, textile industry BCWs, WCWs in printing trades, freight transport WCWs, textile industry WCWs in Vorarlberg province, wood processing industry WCWs	April	13	5.2	79.8
BCWs in restaurant, catering, beverage serving and hospitality businesses, BCWs in construction trades, BCWs in supplementary construction trades, BCWs in wood processing trades, chemical industry BCWs, WCWs in construction trades, construction industry BCWs, wood processing industry BCWs, stone and ceramics industry BCWs, WCWs in restaurant, catering, beverage serving and hospitality businesses, construction industry WCWs, paper industry BCWs, sawmill industry BCWs	May	18	18.1	97.9
BCWs in glass industry	June	2	0.3	98.3
Butchers	July	5	1.1	99.3
(none)	August	0	0.0	99.3
(none)	September	0	0.0	99.3
Bakers	October	2	0.7	100.0

Source: Knell and Stiglbauer (2009).

Note: These series are based on 100 series from the IAMW 1986 with a total weight of 93%. Criteria for inclusion in the table: weight ≥0.25%; the series with the highest weight in each month is included in any case.

Chart 2

Temporal Distribution of Collective Wage Agreements in Austria (1981 to 2006)
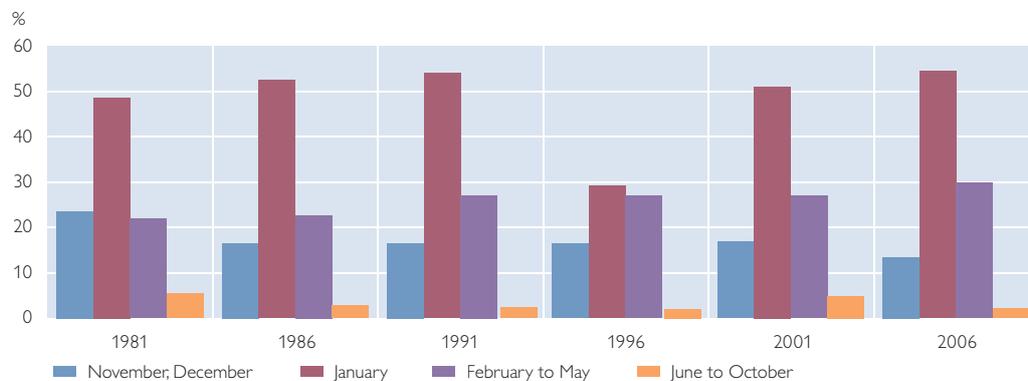
Source: Knell and Stiglbauer (2009).

January each year: These settlements include wholesale and retail trade employees as well as numerous categories of public sector employees (table 2). Regarded over the course of the wage bargaining year (i.e. from November to October), therefore, the bulk (more than two-thirds) of wages and salaries of dependently employed persons in Austria have changed by January.

In the three months that follow, changes are observed in comparatively few industries, most notably credit institutions in February and insurance companies in April. After January, May is the next month in which a large number of new wage and salary settlements take effect (approximately 18% in terms of weight). In particular, collectively negotiated wages in the restaurant/catering and construction sectors usually change in this month, meaning that nearly all changes in collectively negotiated wages (approximately 98% of the overall index weight) occur within six months.

To what extent can this snapshot of the year 2006 be considered typical of a longer time period? Naturally, not every year is the same, but the basic pattern is highly stable. The fact that the wage settlement in the metal sector has taken effect in November every year since 1981 is particularly relevant in this context.[7] The ensuing sequence of staggered wage contracts has also remained relatively constant for many years.

Chart 2 provides support for these statements over the period from 1981 to 2006 (in five-year increments). The chart shows that the share of collective wage agreements taking effect in November and December has dropped slightly, while the share of agreements taking effect in January has increased somewhat, as has the share of agreements in the period from February to May. (The small share observed in January 1996 can be attributed to wage freezes in the public sector that year.)

On the basis of chart 2, it is tempting to draw the conclusion that the temporal pattern described here is just as old as the "social partnership" regime in Austria, but it only came into existence in the early 1980s. In fact, the data for the years prior to 1980 do reveal a different temporal sequence which not only diverges from that

[7] In 1980, the new collective agreement for this sector entered into effect in October.

shown in table 2 and chart 2, but is also relatively unstable. Brandl and Traxler (2008) arrive at a similar conclusion. The transition to the sequence described here is closely related to the establishment of a system of wage leadership in Austria.

3 Wage Leadership

Not only does the Austrian system of collective wage bargaining follow a pattern of staggered wage contracts, it is also widely believed that the Austrian metal sector – which is generally the first to reach a settlement in the wage bargaining year – is the "wage leader" and thus has a decisive influence on the ensuing settlements. In this section, we first briefly describe the origins of this system, after which we proceed to discuss the empirical evidence for wage leadership in Austria.

3.1 Austrian Metal Sector Leading Wage Developments Since the Early 1980s

Since around 1980, the metal workers' union[8] has assumed the role of wage leader in Austria. This development marked a deliberate departure from the previous system of centrally coordinated collective wage bargaining (Traxler, 2005). This change is also closely linked to Austria's transition to a hard currency policy (Nowotny, 2006).

The following statement by the metal workers' union is emblematic of this new direction: "It is in the exposed sectors of the economy that wage policy has some leeway, and the results obtained there must be the guideline for wage policy in the sheltered sectors.

[...] In general, growth and inflation are regarded as the main determinants of wage policy. [...]" (Activity Report of the Austrian Trade Union Federation 1982, cited in Traxler, 2005).

Interestingly, the objective of redistributing wages among different companies (which was apparently considered desirable into the 1970s) is also rejected in this statement: "The possibility of redistribution lies almost exclusively within individual companies. [...] Redistribution among companies which are not connected is not only impossible, but also undesirable. [...] The extreme differences in companies' earnings will necessarily bring about vast discrepancies in wages [...]" (ibid).

3.2 True Wage Leadership?

However, a mere declaration of intent such as the one cited above does not provide insight into the effective influence of the metal workers' wage settlement on the ensuing agreements in other sectors. Empirical evidence is required, but for a long time it has not been possible to provide such evidence due to attendant difficulties, such as the compilation of a suitable data basis and the use of an adequate empirical estimation method. Moreover, it is also necessary to resolve a number of conceptual issues.

3.2.1 Wage Increases Vary Widely

One clear indication of wage leadership would be uniform wage increases in all industries. However, this is not the case. On the contrary, annual wage increases in Austria exhibit considerable variance.

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[8] *Due to recent union mergers, the metal workers' union has now become the union of metal, textile and food workers, GMTN. This union represents workers of enterprises classified in ÖNACE 2008 sections 24 to 33 in the metal sector. These include the manufacture of basic metals, fabricated metal products, machinery and equipment, computers and data processing devices as well as motor vehicles. The Union of Salaried Private Sector Employees handles wage negotiations for white collar workers in the metal sector, which are conducted jointly with the GMTN.*

Chart 3 shows the annual wage increases in the metal sector compared to the median to the first and ninth decile of all settlements. In some years (e.g. 1989/90 and 1990/91), the difference between the first and last decile is larger than two percentage points.[9] The growth rates of collectively negotiated wages in the metal sector are relatively high compared to those in other sectors, as they are nearly always above the ninth decile of all collective wage settlements.

If wage leadership exists in Austria, then it does not bring about uniform wage increases. A look at the institutional circumstances also raises doubts as to the actual effectiveness of wage leadership: After all, collective wage agreements in Austria are concluded on a sectoral basis. While the WKÖ is al-

ways involved on the employers' side (with the exception of the public sector), the employees are represented by a larger number of individual unions. Other unions are not bound in any way by the wage settlement reached in the metal sector, and there is no formula according to which that settlement is to be taken into account in the ensuing negotiations. In addition, the union umbrella organization Austrian Trade Union Federation, ÖGB, has relatively little influence compared with the individual unions.

Several years ago, Pollan (2004) voiced serious doubts as to the existence of wage leadership in Austria and attempted to support those doubts empirically. Pollan's point of departure is the argument that wage leadership would have to bring about a harmoniza-

Annual Growth in Metal Workers' Wages Compared to Other Collective Wage Settlements
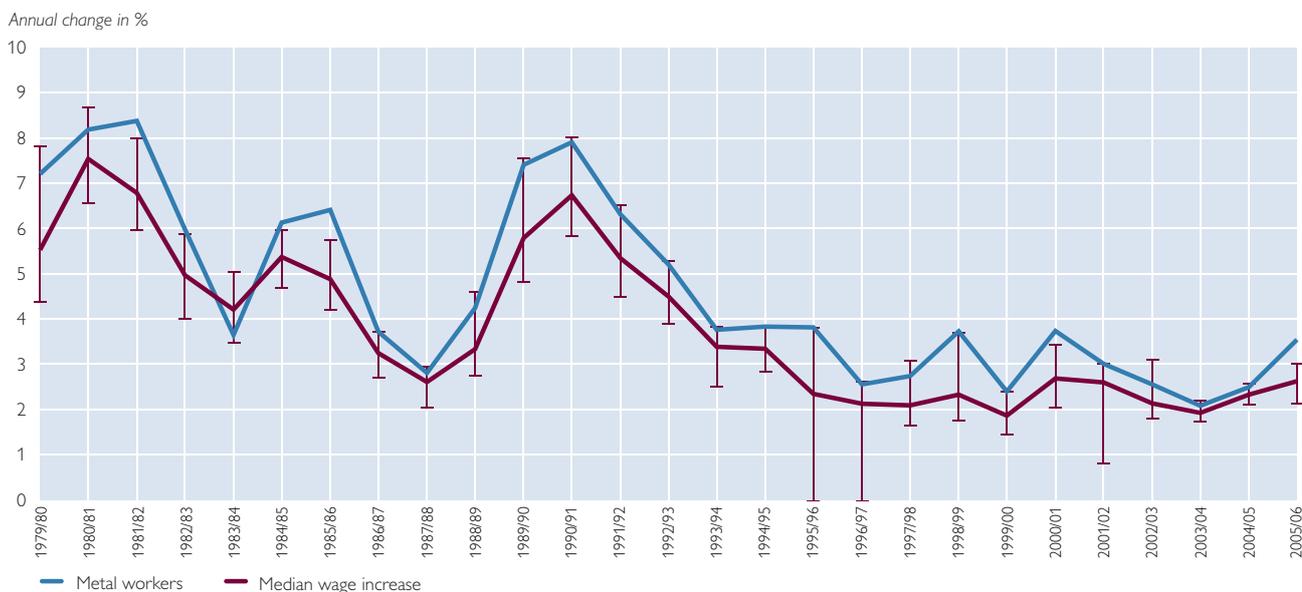
Source: Knell and Stiglbauer (2009).

Note: The vertical lines represent the first and the ninth decile of wage increases in all collective wage settlements.

[9] The interdecile ranges in the years 1995/96 and 1996/97, which are also conspicuously large as the first decile lies at zero in each case, can be attributed to wage freezes in the public sector.

tion of wage levels in the individual industries.[10] This equation of wage leadership with solidarity in wage policy is problematic in light of the quote from the metal workers' union above, which explicitly states that solidarity between industries is not (or no longer) desired.[11] Likewise, Pollan's attempt to refute the existence of wage leadership empirically is not convincing. He first points out that there are large differences in collectively negotiated hourly wages and monthly salaries, after which he uses industry-specific series from the IAMW in an attempt to demonstrate that wages and salaries have drifted apart over time. However, this cannot be accomplished using index series, as they do not contain information on the level of wages and salaries.

In response to Pollan's work, Traxler (2005) argued that the macroeconomic coordination of wage bargaining (e.g. by means of wage leadership) may have two objectives: (1) overall wage moderation or (2) the coordination of wage settlements for the sake of distribution policy goals. These two objectives cannot be reconciled according to Traxler, as wage leadership as pursued in the first objective supports the exposed (export-oriented) sector of an economy, by accounting for the development of unit labor costs compared to those in other countries, as well as serving the national-level objective of paying sufficient wages to deter workers from migrating to other sectors.[12] At that time,

Traxler was unable to present empirical evidence to this effect, but announced that such a study would be published later. This study (Brandl and Traxler, 2008) is discussed in the box entitled "Empirical Evidence of Wage Leadership."

3.2.2 Operationalizing the Concept of Wage Leadership

The discussion up to this point suggests that the wage agreements reached by the wage leader serve as a guideline for wage increases in other sectors, which could also be regarded as an upper limit.

Given the fact that wage increases are not uniform, however, we can assume that sectoral wages are not determined exclusively by the wage leader's settlement. Therefore, the wage leader can only have a *partial* impact on the ensuing collective wage agreements, which are also influenced by sector-specific circumstances and any changes in macroeconomic conditions. As a result, empirical studies on wage leadership rely on wage regressions for possible "following" sectors, with the wage increases of the potential wage leader (among other factors) serving as the explanatory variable (e.g. Smith, 1996, on the UK chemical industry as well as Lindquist and Vilhelmsson, 2006, on the public sector in Sweden).

However, it is important to bear in mind that even if the coefficient for the potential wage leader diverges from zero and is significantly positive, this

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[10] Pollan substantiates this claim with a statement by Heinz Kienzl, a former union official who later became Chief Executive Director of the Oesterreichische Nationalbank. Kienzl noted that the unions in Austria strive for solidarity in wage policy (Kienzl, 1973, cited in Pollan, 2004).

[11] A study based on social security data from the years 1972 to 1991 (Gusenleitner et al., 1998) comes to the conclusion that wage inequality in Austria (measured at the level of the individual employee) declined until 1977, then climbed steadily from that time onward. This conclusion is compatible with the view that solidarity in wage policy was originally pursued but later abandoned.

[12] A certain degree of solidarity – in the sense of cushioning sectoral wage differences – is said to be achieved due to the fact that the wage-leading metal sector bases its wage negotiations not on industry productivity, but on overall economic productivity (which tends to be lower); ÖGB, 2003.

alone does not constitute conclusive evidence of wage leadership. Due to the high correlation of sectoral wage settlements, such a result is probable for many different hypothetical wage leaders. Therefore, further empirical analyses are required. Lindquist and Vilhelmsson (2006), for instance, conduct Granger causality tests in order to determine whether the public sector in Sweden exhibits wage leadership characteristics. Smith (1996) tests the plausibility of wage leadership by running specification tests on various empirical models.

3.2.3 Wage Leadership in Austria is Empirically Verifiable

Knell and Stiglbauer (2009) extend Taylor's model of staggered wage contracts (Taylor, 1980) to include "reference norms" which account for the possibility that wages in other sectors can have a direct impact on wage formation. An estimation equation is derived from the Taylor model and imple-

mented empirically as a panel regression with variable coefficients. The empirical model comprises 100 individual time series from the IAMW spanning a period of 27 years (1980 to 2006).

Among the reference norms tested, the specification which defines the metal workers' wage settlement as a direct explanatory factor ("wage leadership norm") on sectoral collective wage settlements yields the most plausible overall results. In particular, the authors show that the wage-leading metal sector is substantially more sensitive to macroeconomic forecasts than the other sectors are. This finding is based on tests of parameter restrictions arising from the theoretical model and on specification tests such as those applied in Smith (1996), among other things. Additional details on the study are provided in the box "Empirical Evidence of Wage Leadership" below. This result can be regarded as convincing evidence that wage leadership exists in Austria.

Empirical Evidence of Wage Leadership

This box provides a detailed presentation of the method and main results of the study conducted by Knell and Stiglbauer (2009). In addition to individual time series from the IAMW (see annex), the authors use macroeconomic time series for expectations about inflation, unemployment and real economic growth (all of which are based on forecasts published by the Austrian Institute of Economic Research, WIFO).

Theoretical Model
The study's point of departure is the Taylor model, which enables an analysis of inflation persistence (and the persistence of other macroeconomic variables) caused by wage rigidity in a system of staggered wage negotiations with fixed contract durations (Taylor, 1980). The wages in other sectors influence wage formation in a given sector only to the extent that they impact expected inflation (and thus also real wage expectations).

However, surveys of executives, human resource managers and union representatives suggest that the wages in other sectors are often used directly as a benchmark ("reference norm") for wage settlements. Therefore, the Taylor model is extended in order to allow for the influence of such reference norms. Various types of reference norm are taken into consideration. One of the two most important norms is an "external reference norm" in which the average wage increase in all other sectors (since the last change in the given sector's wages) serves as a guideline. Here it is important to note that this assumption implies that all sectors

act in the same manner, with each sector using the average wage development for the rest of the economy as a point of reference for its own negotiations.

The second important reference norm is the "wage leadership norm," which is by definition asymmetrical: The wage leader's settlement serves as the point of reference for the "following" sectors, while the wage leader itself does not have a reference norm (and only considers the real economic outlook and inflation forecasts, as in the original Taylor model). The solution presented in the theoretical model shows that the value of the persistence parameter depends on the specification of the reference norm. In any case, this value is higher in the Taylor model extended to include reference norms than in the original model; however, this additional persistence turns out to be considerably lower in the case of wage leadership than in the case of an external reference norm. This is plausible because the wage-leading sector focuses far more heavily on the future and is not dependent on previous wage settlements. As a result, the collective wage bargaining system is far better able to effect macroeconomic changes (e.g. in response to a shock such as the current economic crisis).

Empirical Model and Econometric Estimates

In the next step, the theoretical model is used to derive an estimation equation in which wage changes in a sector mainly depend on
- *a reference norm,*
- *expected inflation (using current WIFO forecasts for the ensuing year), and*
- *expected real economic development, measured in terms of real economic growth or the change in the overall unemployment rate (also using WIFO forecasts).*

The theoretical model implies a parameter restriction which is important for assessing the validity of regression results: The sum of the coefficients of expected inflation and the reference norm should be equal to one.

In the panel regressions, the authors used a model with variable coefficients, as sectoral responses to the influencing factors mentioned above can be expected to vary in intensity if wage leadership exists.

Results

The regressions yielded plausible results. All three explanatory variables turned out to be key determinants of sectoral wage developments. The coefficient of the reference norms is on average roughly as high as that of expected inflation. Real economic development forecasts also affect wage settlements in the expected manner.

However, this simple comparison of individual regression results still does not indicate which of the various reference norms provides the most apt description of the wage-setting process in Austria. In order to answer this question, three additional steps were taken: (1) The authors performed various specification tests (J-tests, nested tests), and their results permitted the conclusion that the wage leadership norm is clearly preferable to the external reference norm. (2) Additional tests were performed on the parameter restriction, and their results also supported this conclusion, as did (3) an analysis of the temporal pattern of the estimated coefficients over the course of the wage bargaining year. On the basis of the evidence collected, this article concludes that wage leadership is indeed a characteristic of the Austrian wage bargaining system.

Another interesting point is the heterogeneity of the estimated coefficients. The first column in the table below shows the average values of the three main influencing factors across all sectors. One of the most striking results from the regressions with variable coefficients is the fact that the wage-leading sector (shown in the second column) is far more sensitive to expected macroeconomic developments. The coefficient for unemployment forecasts is nearly ten times as high as the average across all sectors (which exhibits only weak statistical significance). The coefficient for inflation forecasts is also substantially higher than the average. This suggests that the macroeconomic outlook hardly has a direct effect on wage settlements in

Estimated Coefficients in the Standard Specification

Explanatory variable	Average across all sectors	Results for the wage-leading metal sector
Reference norm (wage leadership norm)	0.579 (0.017)***	× ×
Inflation (forecast)	0.454 (0.034)***	1.216 (0.094)***
Absolute change in unemployment rate (forecast)	−0.219 (0.100)**	−2.092 (0.331)***

Source: Knell and Stiglbauer (2009).

*Note: Standard deviations in parentheses. *** and ** indicate significance at the 1% and 5% confidence level, respectively. The estimation equation includes a constant as well as period dummies.*

the "following" sectors; instead, its impact is primarily indirect, through the settlement reached by the wage leader.

On Brandl and Traxler (2008)

Brandl and Traxler's empirical study relies on detailed data regarding individual collective wage agreements and compares the period from 1969 to 1979 with the period from 1980 to 2004. Using simple linear regressions, the authors find evidence of wage leadership in the latter period, but not in the former; these findings are consistent with prevailing characterizations of the Austrian wage bargaining system and its development.

However, a number of objections to their empirical method can be raised: (1) The estimation equation was derived ad hoc, not from a theoretical model. (2) No forecast data are used. (3) The estimation equation includes two real economic indicators (economic growth and changes in unemployment). (4) The authors do not consider any alternative reference norms or possible asymmetries. In addition, as discussed above, merely finding a positively significant coefficient for a potential wage-leading sector does not constitute strong empirical evidence of wage leadership. According to our results, this would apply to most sectors.

4 Wage Setting: An International Perspective

4.1 Austrian Collective Wage Agreements Exhibit High Coverage and Short Durations by International Comparison

International publications regularly cite Austria as the country with the highest level of coverage when it comes to collective wage agreements, as the results of collective wage bargaining apply to nearly all Austrian employees (OECD, 2004, table 3.3; Du Caju et al., 2009, table 1).

Nevertheless, collective wage bargaining is also an important determinant of wage development in other countries: A firm survey conducted within the framework of the WDN shows that workers' wages change only relatively seldom and that new collective wage agreements are the main reason behind such changes (Druant et al., 2009). This applies even more to euro area countries, as collective wage bargaining is especially important in those countries compared to the other EU Member States.

The duration of approximately one year for collective wage agreements in Austria is rather short compared to those in the rest of Europe. In other countries (e.g. Belgium, Ireland, Spain and Sweden), contract durations of two to three years are common (Du Caju et al., 2008). This difference reduces the need for wage indexation in Austria. Together with the decentralized coor-

dination instrument of wage leadership, it also enables Austrian wage formation to adapt to economic circumstances comparatively quickly and real wages to be quite flexible (Arpaia and Pichelmann, 2007).

## 4.2 Wages in Other Countries also Adjusted Most Often in January

Research in macroeconomics and labor economics to date has not devoted sufficient attention to the fact that changes in collectively negotiated wages are not distributed evenly over the year, but occur more frequently in certain months. A recent WDN survey (Druant et al., 2009) shows that this pattern is not specific to Austria alone, but is actually a widespread phenomenon. Chart 4 shows the typical months in which wage changes go into effect in Austria compared with a European average based on 15 countries. In contrast to the sources used above, these data are not based on series from an official negotiated wage index, but on company surveys which exclude the public sector. This explains why only 33% of

Austrian companies participating in the survey indicated wage changes in January (compared to almost 55% in table 2). However, if we set that difference aside, the correlation between the two monthly distributions is still very high, with a highly significant Spearman's rank correlation coefficient of 0.9.

It turns out that at the European level, too, a large share (approximately 30%) of new wage settlements take effect in January, with especially high percentages (around 50%) reported in Spain, Portugal, the Netherlands and Hungary. The special importance of the months of May and, even more so, November is a unique characteristic of the Austrian system, however. Wage settlements in other countries are concentrated in July (Belgium, France), March (Portugal), April (Czech Republic, Ireland, Hungary) or August (Slovenia). It is conceivable, though, that a wage leadership system requires a longer time period without any significant new wage settlements (i.e. from May to November in Austria) in order for the leading sector to negotiate a new bench-

Chart 4

Comparison of Wage Adjustment Months in Austria and Europe
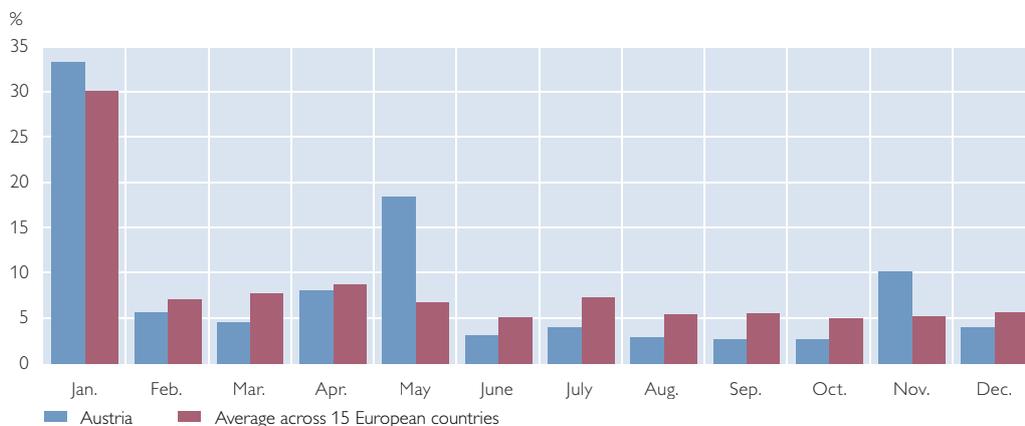
Source: WDN survey, Druant et al. (2009).

Note: The percentages reflect the share of companies surveyed which indicated that they typically adjust wages in the given month. Where companies indicated that wage adjustments do not follow a typical temporal pattern, their wage adjustment distributions over the year was assumed to be similar to those of the other companies. The average (not weighted by country size) is based on the following countries: Belgium, Czech Republic, Estonia, Spain, France, Greece, Hungary, Ireland, Italy, Lithuania, Netherlands, Austria, Poland, Portugal and Slovenia.

mark after the summer break without being encumbered by recent developments.

In any case, accounting for asymmetries in wage staggering appears to be advisable from an economic policy standpoint and from a modeling perspective, as we will discuss further in section 5.

4.3 Wage Leadership Often Serves as a Coordination Mechanism in Sectoral Wage Bargaining

For quite some time now, wage bargaining systems have been a focal point of interest in macroeconomic research, as many believe these systems to be a key determinant of a country's macroeconomic performance (especially with regard to the rates of unemployment and employment). Many economists take a critical view of market power on the workers' side,[13] arguing that such power will lead to excessive wages and higher levels of unemployment compared to competitive markets. However, if we assume that market imperfections (such as information asymmetries, etc.) are widespread, then collective wage bargaining may even improve market results (Schettkat, 2003).

The Calmfors-Driffill hypothesis is very popular in this context (Calmfors and Driffill, 1988): It states that both decentralized and centralized collective wage negotiations lead to lower unemployment than wage bargaining at the sectoral level does. In centralized wage setting systems, the unions would be able to negotiate higher wages due to their market power. At the same time, however, the unions would consider the potential negative macroeconomic consequences of their decisions (e.g. higher unemployment) from the outset and might sacrifice wage increases voluntarily as a result.

The Calmfors-Driffill hypothesis has been criticized for many different reasons. In the context of this article, the criticism voiced by Soskice (1990) is especially relevant: Soskice claims that the formal level at which negotiations take place is less relevant to the results of wage negotiations; instead, what is important here is whether wage bargaining is coordinated throughout the economy. According to Soskice, coordination can be achieved in many ways, be it through formally centralized wage bargaining, through decentralized coordination within umbrella associations on the employers' and the employees' side, or through wage leadership. For this reason, wage bargaining systems are now characterized on the basis of their formal level of centralization as well as the degree to which bargaining is coordinated.

In the OECD's current classification, Austria is considered to exhibit a medium level of centralization (scoring a 3 on a scale of 1 to 5) and a high level of coordination in wage bargaining (scoring a 4 on a scale of 1 to 5); OECD, 2004, table 3.5. According to that classification, the wage bargaining systems e.g. in Belgium, Finland, Germany, Ireland, Italy, Japan and the Netherlands also exhibit a high degree of coordination. Many of those countries rely on a system of wage leadership (Traxler, 2005; Du Caju et al., 2009), while others use a trilateral system of wage setting in which the re-

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[13] *In contrast, hardly any attention has been paid to the employers' side. This can probably be explained by the fact that Anglo-Saxon countries – which dominate the economics literature – largely rely on decentralized wage setting, with wages negotiated either individually or by a labor union and the management of a company. From this perspective, researchers have devoted insufficient attention to the existence and significance of employer associations.*

spective government is also involved. However, we are not aware of any empirical studies which attempt to provide detailed evidence for the significance of wage leadership in any of those countries.

5 Economic Policy Implications

In the New Keynesian literature, which has dominated macroeconomic research in recent decades (Woodford, 2003; Galí, 2008), contractually agreed prices and wages play a key role. In the simplest models developed in this school of thought, prices and wages are the only existing frictions and are thus also exclusively responsible for the real effects of demand shocks and monetary policy. However, the mechanisms and implications of those models depend heavily on the underlying assumptions made with regard to wage setting. It is therefore important to address the finer points associated with existing wage-setting systems more intensively and in greater detail than in the past.

This importance is demonstrated e.g. in a study by Knell (2009), which shows that conclusions as to the degree of real wage flexibility are strongly influenced by assumptions about the institutional details of the wage-setting process. The classification of countries as flexible or rigid also depends on whether asymmetrical wage staggering, the use of indexed wage agreements and the importance of heterogeneous contract durations are taken into account.

In Knell and Stiglbauer (2009), this point is discussed in greater detail for the significant (yet often neglected) features of wage staggering and wage leadership. Here it becomes clear that a system involving staggered wage contracts with certain temporal concentrations (e.g. a system in which the majority of new wage settlements come about in January) is capable of absorbing shocks more quickly than a system in which new wage settlements are distributed evenly over the course of the year. This is also intuitively plausible, as such a concentrated system produces only minor wage changes in the course of the year, but at the same time it allows better-adjusted and coordinated wage setting around the beginning of each year.

Similarly, it is also clear that a system characterized by wage leadership can accelerate necessary adjustment processes. This point is illustrated in chart 5, which shows the idealized reaction of general wage developments in Austria under the simplifying assumption that the wage leader's settlement is emulated completely. The reaction path is based on the temporal weights found in table 2. After relatively high nominal wage growth in periods –6 to –1 (4% in the chart; the actual figures are provided for illustrative purposes only), wage growth declines from period 0 onward, after the wage leader adjusts to changing macroeconomic conditions (e.g. a substantial increase in unemployment forecasts and/or lower inflation) with a wage increase of +1%. In line with the temporal pattern of wage staggering, the general development of wages is adjusted downward in the "following" sectors, with the largest change occurring in month 2 (January). After only six months, nearly the entire adjustment process is completed.

How long it takes for this adjustment mechanism to take effect depends on the time at which changes arise in the macroeconomic environment. For example, despite the massive deterioration in economic forecasts in late 2008 and early 2009, growth in the negotiated minimum wage rates in Austria barely changed until the fall of 2009 because most collective wage agreements had already been concluded.

Chart 5

Idealized Reactions of Wage Growth to a "Change of Course" by the Wage Leader

Nominal growth in %

Month
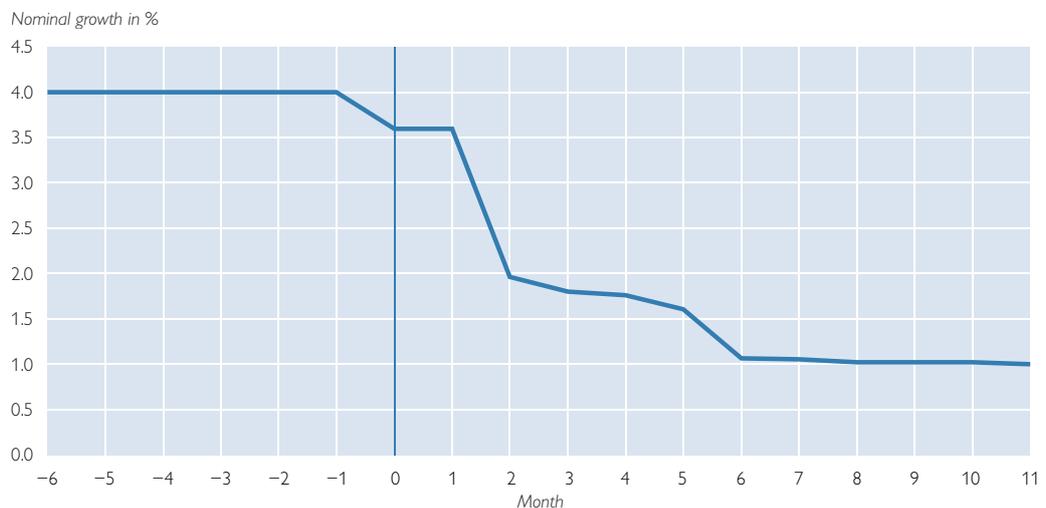
Source: Statistics Austria, OeNB.

Aside from its impact on the speed of response to macroeconomic shocks, the temporal structure of wage bargaining is also significant for monetary policy: Olivei and Tenreyro (2007) show for the U.S.A. that the macroeconomic effects of monetary policy shocks depend on the quarter in which they arise, a fact which they also attribute to an uneven concentration of wage changes over time. In a follow-up article (Olivei and Tenreyro, 2008), the authors broaden their analysis to include Germany, France, the United Kingdom and Japan, once again confirming their main findings.

The institutional details associated with wage-setting processes play a de-cisive role in macroeconomic modeling, in adaptations to unforeseen developments and in monetary and fiscal policy design. Wage leadership is an essential element in this context, because it can be regarded as a decentralized mechanism of macroeconomic coordination.

Another interesting question which goes beyond the scope of our study would be whether or not cross-border wage leadership also exists and the degree to which it is useful. For example, some researchers maintain that the German metal sector plays a wage-leading role of sorts for Austria and the Netherlands.

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Annex:
Notes on the Data Used

Disaggregated Raw Data from the Index of Agreed Minimum Wages

The data on negotiated minimum wages analyzed in Knell and Stiglbauer (2009) were taken from the IAMW (base year: 1986), a Laspeyres index of collectively negotiated minimum wages in Austria. This index was published by Statistics Austria on a monthly basis for the period from January 1986 to December 2006.[14] Values for earlier years were obtained by chaining with series from the IAMW 1976 (up to December 1985).[15] As mentioned above, wage leadership has only prevailed in Austria since the early 1980s; therefore, data on wage increases from the IAMW 1976 were only used from the year 1980 onward.

IAMW data have generally been analyzed only at the aggregate level in Austria. For this study, however, we rely on individual series as published monthly by Statistics Austria for the IAMW 1986. At the lowest level, these data comprise 125 monthly indices in four categories (blue collar workers, white collar workers, public transport employees and public sector employees). Most of these indices (98 out of 125) corresponded to exactly one collective wage agreement, while others represented multiple (i.e. up to ten) agreements. These circumstances created problems in the interpretation of the index series and were in part responsible for the fact that not all of the series could be used for this empirical analysis.

In total, the 125 individual series represent 195 underlying collective wage agreements (Statistics Austria, 1988), which in turn represent all agreements of this kind.

Preparation of IAMW Series

The pattern observed in collective wage settlements in recent years suggests that collectively negotiated wages change approximately once per year in Austria. For each individual series, we checked whether the index value changed in a given year (and if it did, in which month). In some cases, we observed changes in more than one month within the same year, e.g. because an index series represented multiple collective wage settlements[16] or for other reasons.[17] Wherever possible, we determined which index change represented the most relevant change in such cases.

In most cases, we were able to do so, and thus we used 100 of the 125 index series for our empirical analyses of evidence for wage leadership. The resulting sample contains virtually all important collective wage agreements

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[14] A new indicator – the IAMW 2006 – has been developed for the period from 2006 onward.

[15] The IAMW 1976 exhibits a very similar structure. For a more detailed explanation of how we constructed our data set, see Knell and Stiglbauer (2009), Annex C. For a detailed description of IAMW data, please refer to Statistics Austria (1978, 1988) and the abridged version in Statistics Austria's publication Statistische Nachrichten (6/1978 and 1/1988).

[16] It is not only the number of collective agreements underlying an index series that matter, but also whether they are synchronous. For example, the "blue collar workers" ("white collar workers") series in the food, beverages and tobacco industry represent ten (eight) different collective agreements which obviously have asynchronous contract durations. In contrast, the ten collective wage agreements underlying the "wholesale and retail trade workers" index series are perfectly synchronized.

[17] Other reasons include IT problems related to the rounding of figures or problems caused by the changeover to the euro. Moreover, in addition to the "normal" collectively negotiated wage increases in the public sector, there were multiple cases of retroactive compensation for actual inflation during the term of an agreement (as last seen in the summer of 2003).

representing 93.3% of the total weight of the IAMW 1986.[18]

For each index series, we then compiled the following information: (1) the month in which the index changed in a given year, (2) the time period since the previous change, and (3) the relative growth in the index value between the month of the current change and that of the previous change. On that basis, we were able to derive the values for wage increases and the duration of collective wage agreements.

[18] *The most important area we omitted was the food industry (two index series, one for blue and one for white collar workers), as there were too many index changes of approximately equal size over the course of the year. In addition, several series (especially those covering the employees of independent professionals such as attorneys, physicians, etc.) were not included in the sample because they were not represented in the IAMW 1976.*

Actual Implications of the Current Economic Crisis for Austrian Enterprises – Results of a Company Survey

Claudia Kwapil[1]

This article is based on the results of a survey conducted among 731 Austrian companies and supplements the known macroeconomic facts about the current economic crisis with micro data. While a decline in demand was the main challenge companies faced, they also had to cope with financing problems and customers' payment difficulties. 16% of Austrian companies reported major or even severe financing difficulties owing to the crisis, with small enterprises feeling a greater impact than large firms. Furthermore, the survey showed that the crisis caused enterprises to increasingly save on wage costs. Here, companies hit hard by the crisis cut costs primarily through layoffs, followed by a reduction in working hours. Although base wages were cut more frequently than in economically calm times, this measure continued to be the exception rather than the rule even during the crisis, which indicates the existence of nominal wage rigidities in Austria.

News of high losses of IKB Deutsche Industriebank AG in July 2007 marked the beginning of the financial crisis' spreading to Europe. While initially it seemed that the turmoil would essentially be limited to the financial markets, Austria's broader economic sentiment indicators started to decline visibly from mid-2007. In the third quarter of 2008, Austria's GDP growth turned negative, marking the beginning of a four-quarter recession.

The financial crisis became a global economic crisis and affected Austria first of all through a slump in exports, which – just like industrial production – contracted by a total of 18%. Real sales in retail trade (which responded with a lag) dropped by some 6%, and GDP contracted by a total of some 5%. Such sharp declines in an economy's value added have substantial repercussions for the labor market. From mid-2008 to mid-2009, Austria's unemployment rate climbed from 3.5% to 4.8%, with 60,000 persons losing their jobs in this period. Furthermore, the number of hours worked decreased by roughly 5.5%, also due to the introduction of short-time working schemes.

In this article, the macro data on the current economic crisis summarized here will be supplemented with micro data from a company survey carried out in Austria. The information provided by the companies surveyed makes it possible to describe in detail the way the crisis has affected different industries as well as how companies have perceived and responded to the crisis. A similar survey, featuring partly identical questions, had been conducted among Austrian companies in 2007, before the crisis broke out in Europe. To the extent that these two surveys allow a comparison, the responses of 2007 will be contrasted with those of 2009.

This article is structured as follows: Section 1 describes the technical details of the survey. Section 2 analyzes the actual impact the crisis had on companies. Businesses' responses to the crisis are discussed in section 3, and section 4 concludes.

Refereed by:
Rudolf Winter-Ebmer,
Johannes Kepler
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1 Survey Details

The Austrian Institute of Economic Research (WIFO) conducted a survey commissioned by the Oesterreichische Nationalbank (OeNB) among 1,538 Austrian companies in summer 2009. 731 companies provided responses to the survey, which equals a response rate of 48%. The enterprises surveyed cover classes C to N in the Austrian Statistical Classification of Economic Activities (ÖNACE) and are therefore representative of the entire private sector of the Austrian economy.[2] Only agriculture and forestry (ÖNACE class A) as well as mining (B) are not included in the sample.[3]

Chart 1 lists all sectors covered in the survey and shows the number of companies that were asked to participate (gross sample) and the number of companies that provided valid responses (net sample). The response rate differed across sectors, ranging from around 20% in electricity, gas and water supply to 65% in financial intermediation.

We use ex-post weights to correct for sampling deficiencies, i.e. differences in the probability of a respondent receiving a questionnaire and completing it. These weights are applied in a way that the distribution of persons employed in the net sample as closely as possible mirrors the distribution of employment in the entire Austrian economy.

At the time the survey was conducted (i.e. at the beginning of the third quarter of 2009), the recession had already reached its peak, and the economy was starting to bottom out. Confidence indicators started to rise in the second quarter of 2009, and the ATX advanced by some 20% in the first half of 2009. However, uncertainty about future economic developments was still high. The forecasts for 2010

Chart 1

Survey Response Rate by Economic Sectors
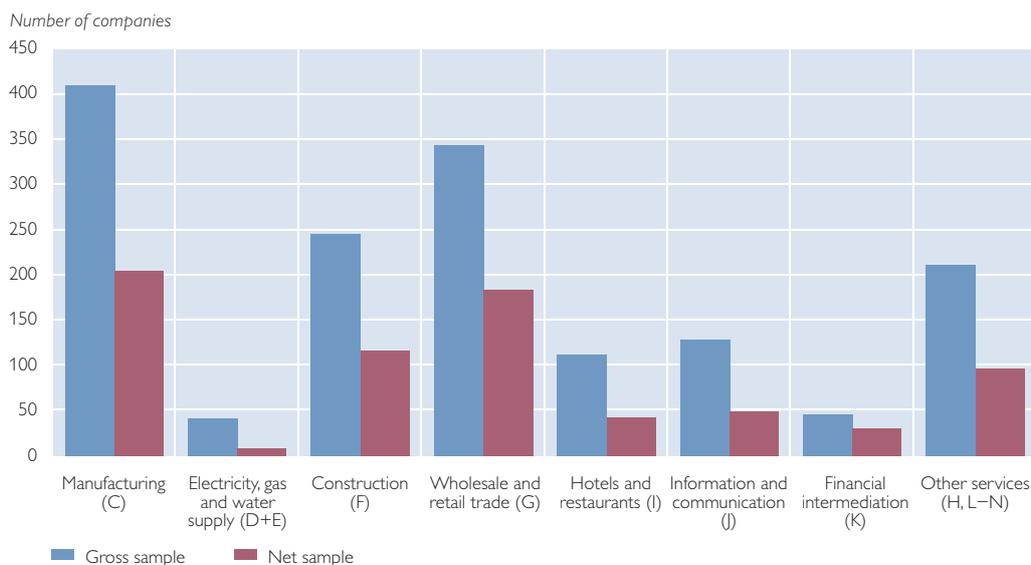
Source: OeNB, author's calculations.

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[2] This classification is based on the definition of 2008.

[3] The sectors covered in the survey contribute more than 99% of the Austrian private sector's gross value added.

predicted a stagnation or further contraction of Austrian GDP; inflation was expected to be around 1% in 2010 and 2011.

2 Implications of the Crisis for Austrian Enterprises

The macro data described above show that the crisis has had a varied impact on the individual areas of the Austrian economy. Manufacturers were hit much harder than retail trade, for instance. Section 2.1 will look into these results in more detail, analyzing the actual repercussions of the crisis for Austrian companies.

2.1 Manufacturing Hit Particularly Hard

The first question of the survey concerned the impact of the current economic crisis on the responding company's sales, providing six possible answer categories: Sales have (1) increased, (2) remained unchanged, (3) declined slightly, (4) declined moderately, (5) declined sharply, and (6) declined very sharply.

Table 1 provides a summary of the replies, showing that around three quarters of Austrian companies re-

ported falling sales in the wake of the economic crisis. Some 20% reported that sales had dropped sharply, some 6% even said that sales had dropped very sharply. Broken down by economic sector, the survey results confirm the trends implied by the macro data. Manufacturing, e.g., saw sales falling significantly more strongly than other industries. Sharp or very sharp declines in sales were reported by some 43% of companies in manufacturing, but only by between 15% and 20% of companies in the other sectors. In construction, by contrast, only some 6% of responding companies indicated that they had been faced with sharply or very sharply falling sales.

The slump in sales in manufacturing can be traced first and foremost to the fact that the sector is highly export oriented. The last line in table 1 shows that more than half of manufacturing sales are generated by exports, which plummeted dramatically during the crisis. This also explains why construction has been fairly mildly affected by the crisis: First, construction does not depend on exports; second, construction projects require very long lead times, which delays this sector's re-

Table 1

Change in Sales during the Current Economic Crisis

	Total	Manufac-turing	Electricity, gas and water supply	Construc-tion	Wholesale and retail trade	Financial inter-mediation	Other services
%							
Increased	5.48	3.70	0.00	1.42	9.92	4.97	5.51
Remained unchanged	21.08	16.78	0.00	32.98	23.18	13.44	22.01
Declined slightly	20.45	14.62	32.22	27.49	22.26	16.24	22.53
Declined moderately	27.51	21.50	50.83	31.81	26.24	51.42	27.67
Declined sharply	19.22	30.72	16.94	3.52	13.99	13.92	18.24
Declined very sharply	6.26	12.68	0.00	2.78	4.41	0.00	4.04
Export-orientedness	31.18	53.84	17.64	1.95	18.55	26.05	22.13

Source: OeNB, author's calculations.

Note: Export-orientedness is defined as the average proportion of a sector's sales generated by exports.

Table 2

Change in Sales by Company Size

	Small	Medium	Large	Very large
	%			
Increased	8.27	7.17	4.43	3.15
Remained unchanged	28.32	25.46	17.71	17.7
Declined slightly	22.98	18.29	24.98	17.68
Declined moderately	27.00	27.72	30.7	24.92
Declined sharply	10.34	17.22	17.91	25.72
Declined very sharply	3.09	4.14	4.28	10.83

Source: OeNB, author's calculations.

sponse to economic developments; and third, construction has benefited from the fiscal and economic stimulus measures, which provided for investment in infrastructure worth roughly EUR 1.5 billion for 2009 (Breuss et al., 2009).

The available data can be analyzed also by company size. We differentiate between small companies (with sales of up to EUR 2 million), medium-sized companies (sales between EUR 2 million and EUR 10 million), large companies (sales between EUR 10 million and EUR 40 million) and very large companies (sales over EUR 40 million). Table 2 shows that large enterprises have felt a much stronger impact of the crisis than small ones. While the share of companies reporting that sales dropped sharply or very sharply is only around 13% among small companies, it increases with company size, coming to some 37% for very large companies.

To some extent these figures mirror the size structure of the relevant sectors, however. Manufacturing, for instance, which has suffered severely from the crisis, has a particularly high share of very large enterprises.

2.2 Falling Demand Was the Biggest Problem

Since an economic crisis can impact individual enterprises in different ways, this section sheds some light on the various implications a recession may have.

It may, e.g., cause demand to plummet (1), and it can also mean that the availability of corporate finance is reduced (2). Furthermore, customers may become insolvent, putting at risk companies' cash flow (3), and suppliers may be faced with difficulties in fulfilling their contracts (4). The survey respondents were asked to indicate whether and to what extent ("very strongly," "strongly," "to some extent", "not at all") they have been affected by these implications.

The responses summarized in table 3 show that falling demand has been companies' biggest problem. Some 30% of Austrian companies said they had been very strongly or strongly affected by a decline in demand. Of all sectors covered, manufacturing felt the largest impact also in this category, with some 45% reporting to have been very strongly or strongly affected by the slump in demand. Construction, by contrast, reported only a moderate decline in demand: No more than some 10% of the companies surveyed said they had been very strongly or strongly affected. All in all, this ties in closely with the decline in sale in these sectors as described above.

While some 60% of Austrian companies said that they had not encountered financing problems caused by the crisis, 16% of respondents claimed that they had faced serious or very serious

Table 3

Implications of the Economic Crisis

	Companies have been affected			
	very strongly	strongly	somewhat	not at all
	%			
Decline in demand	8.49	20.46	45.03	26.02
Financing problems	4.32	12.17	25.30	58.21
Customers' payment difficulties	3.50	15.70	54.34	26.46
Suppliers' difficulties fulfilling contracts	0.40	1.59	23.36	74.65

Source: OeNB, author's calculations.

financing problems. At first glance it seems that this applies to the same degree to companies of all sizes and in all sectors. Chi-square tests of independence between company size and the degree of financing problems do not reject this hypothesis. It must be borne in mind, however, that large enterprises, especially in manufacturing, have been hit by the crisis particularly hard. An analysis not accounting for the degree to which companies have been affected by the crisis therefore yields distorted results.

To address this potential problem, chart 2 displays the extent of financing difficulties separately by company size and the decline in sales. The variable "size" defines small companies (with sales of up to EUR 2 million), medium-sized companies (sales between EUR 2 million and EUR 10 million), large companies (sales between EUR 10 million and EUR 40 million) and very large companies (sales over EUR 40 million). We use the variable "crisis impact" to assign companies' responses about sales developments to three groups: companies whose sales have not fallen, companies that registered a minor decline in sales as well as companies reporting that sales had dropped sharply or very sharply. The vertical axis in chart 2 shows the proportion of companies in each group that has faced serious or very serious financing problems.

Chart 2 illustrates two phenomena: First, it highlights the fact that within each size group, those companies which have suffered sharp sales losses also have a higher probability to face financing problems. Second, the chart reveals some divergence between small and large(r) companies: Small companies, regardless of how strongly they have been affected by the crisis, have been much more likely to face financing problems than large companies. More than 40% of all small enterprises that recorded a significant decline in sales report major financing problems, whereas this share is only half as high among large firms.

In the following the statistical significance of these differences is being analyzed. A logit model is defined that divides the companies into two groups by the degree of financing problems. 1 is assigned to companies that reported serious or very serious financing problems, and 0 to those that have encountered minor financing problems or none at all. In the model, company size, the degree to which companies have been affected by the crisis as well as the sector companies belong to are used to explain these two possible situations. The variables are defined like those for chart 2; the additional variable "sector" differentiates between manufacturing on the one hand and wholesale and retail trade, financial intermediation and

Chart 2

Financing Problems by Company Size and Decline in Sales

Share of companies in %
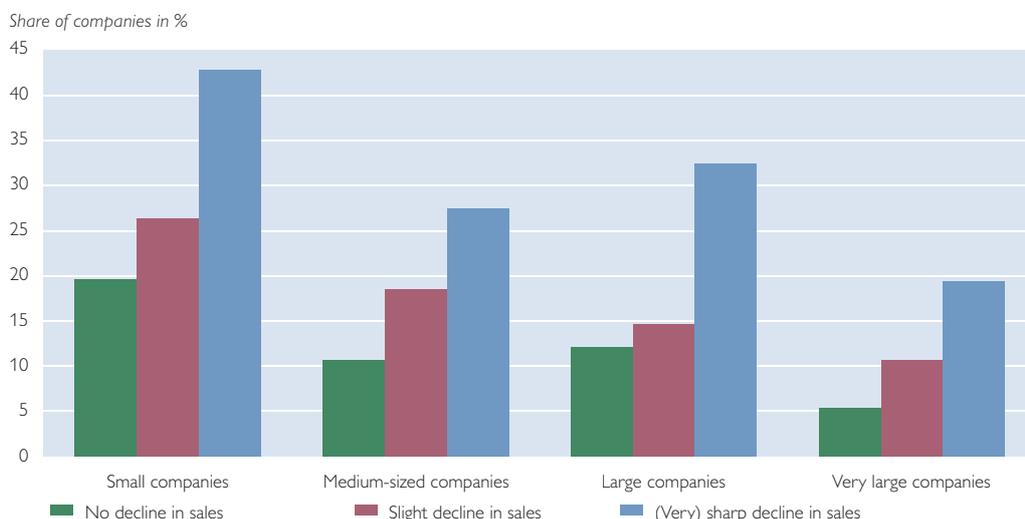
Source: OeNB, author's calculations.

Note: The vertical axis shows the proportion of those companies in the stratum that have faced serious or very serious financing problems.

other services on the other hand. This variable has been added to capture all unobserved effects that are correlated with the sector a company belongs to, e.g. a company's capital intensity. Chart 3 summarizes the results of the logit estimate and does not display coefficients but odds ratios, as the latter can be interpreted more easily. An odds ratio of 1 means that the probability of encountering financing difficulties are equally high in both groups, while an odds ratio higher than 1 indicates that the probability is higher.

The results shown in chart 3 confirm the picture described above. Both company size and the degree of the decline in sales play a statistically significant role in determining the extent to which companies encountered financing problems. Chart 3 shows that companies that have been affected more strongly by the crisis are more likely to face financing difficulties. For instance, this probability is more than three times higher for companies reporting a (very) sharp decline in sales than for companies whose sales have not de-

clined. Likewise, company size is critical: Medium-sized, large and very large enterprises have a significantly lower probability of encountering financing difficulties than small firms; for instance, given an equal decline in sales, for very large companies this probability is only about a quarter of that of small companies.

This result can be interpreted to be indicative of the existence of a credit channel in Austria, which implies that in times of crisis, there is not only a decline in loan demand, but loan supply also becomes more restrictive. The credit channel literature (Bernanke and Gertler, 1989, 1995) suggests that there is a connection between company size and financing problems, which is attributed to large companies' higher level of self-financing and collateralization. Both factors reduce creditors' monitoring costs and, consequently, the external finance premium of large enterprises. Hence, this premium should fluctuate less strongly over the economic cycle. If there is a transmission channel that works through enter-

Chart 3

Logit Estimate of Factors Explaining Financing Problems

Odds ratios plus 95% confidence interval
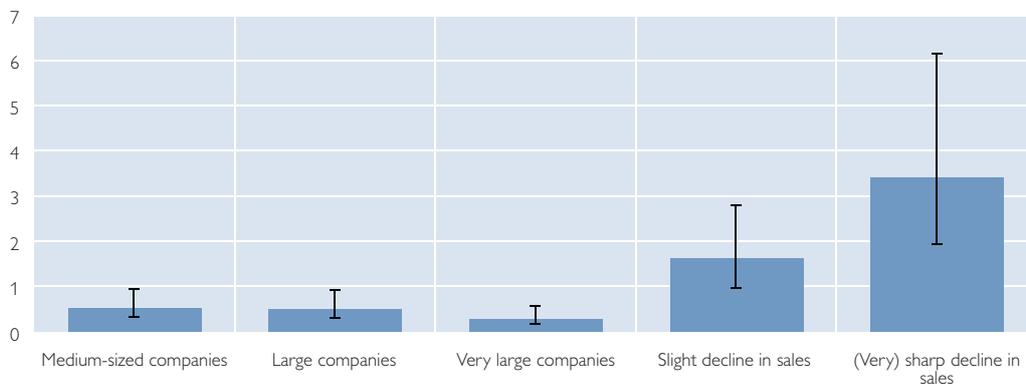
Source: OeNB, author's calculations.

Note: Reference group for company size dummy variables: small companies; reference group for the variables "crisis impact:" companies that
have not recorded a decline in sales.

prises' credit standing, cyclical fluctuations will be reinforced through the accelerator effect, which operates primarily through small companies.

Customers' payment difficulties affected companies in a similar way like financing problems. Some 20% of Austrian enterprises reported a decline in cash flow because customers failed to pay. Again, the share of companies that encountered this problem varied across sectors, from 30% in wholesale trade to a minor percentage in financial intermediation, where only some 10% reported to have been strongly or very strongly affected by customers' failure to pay.

Supply problems do not seem to be a critical factor in the current economic crisis, with only 2% of the companies surveyed reporting failures of suppliers to fulfill contracts.

3 Companies Responded to Crisis by Cutting Costs

Since most companies reported that demand had fallen due to the economic crisis, they were also asked how they had responded to this demand shock. In line with the structure of the other sur-

vey questions, five different response options were provided and the companies were asked to indicate whether these measures had been "very relevant," "relevant," "hardly relevant" or "not relevant at all." "Very relevant" or "relevant" answers were counted as approval to a specific measure, which in table 4 is given as a percentage of all valid responses.

Table 4 shows that some 83% of companies considered cost cutting a "very relevant" or "relevant" measure in their specific situation, which makes it the most widespread response of enterprises to the crisis. Significantly fewer companies – about 40% – reported that for them, leaving prices un-

Table 4

Companies' Reactions to Falling Demand

Possible strategy	Approval rate in %
Cut costs	82.95
Leave prices unchanged	43.43
Reduce profit margins	41.34
Reduce output	39.47
Cut prices	22.66

Source: OeNB, author's calculations.

changed, reducing profit margins and cutting output were key measures to cope with the crisis. Cutting prices is a measure only roughly 23% of companies considered to be relevant.

In autumn 2007, before companies started to feel the impact of the crisis, a comparable company survey was carried out, which comprised a question almost identical to this one. The only difference between the two questions was that in the 2007 survey, the decline in demand was hypothetical, whereas the 2009 survey referred to the repercussions of the current economic crisis. 322 enterprises took part in both surveys, enabling a comparison of response measures. The aggregate shows very similar patterns: Cutting costs is considered the most important measure by far, while only a minority regards cutting prices a relevant response to the crisis. Support for the other measures among the companies surveyed ranges between 40% and 50%.

3.1 Cost Cutting Focused on Wages

Those roughly 80% of firms that regard cost cuts as "highly relevant" or "relevant" in response to a demand shock were also asked in what way they would reduce costs.

Firms could choose from six responses, five of which focused on labor costs and one covered other costs (collectively termed nonlabor costs). Labor cost-related cost-cutting strategies included reducing flexible wage components (1), cutting base wages (2), reducing working hours (3), discontinuing temporary employment contracts (4) as well as laying off part of the permanent staff (5). Respondents were asked to indicate only their main cost-cutting strategy.

Table 5 comprises not only the summary of responses provided in the 2009 survey but also those of the 2007 sur-

Table 5

Cost-Cutting Strategies and their Relevance

Possible strategy	Responses	
	2007	2009
	Approval rate in %	
Reduce nonlabor costs	49.81	29.71
Shorten working hours	21.51	32.22
Reduce flexible wage components	10.94	17.15
Lay off permanent staff	12.08	11.72
Lay off temporary staff	5.66	8.37
Reduce base wages	0.00	0.84

Source: OeNB, author's calculations.

vey. The results do not refer to the entire sample of companies surveyed, but only to those that answered this question in both surveys.

Apparently, in the current situation, some 70% of companies have cut costs primarily by reducing labor costs, while 30% have driven down nonlabor costs. Those companies that have focused on cutting labor costs reported to reduce working hours (32% of companies) or flexible wage components (some 17%). The options of discontinuing temporary or permanent work contracts each accounted for 10% of replies to this question. Less than 1% of companies said they cut wage costs mainly by reducing base wages.

A comparison of the responses to this question in the two surveys reveals a visible shift toward cutting labor costs. When asked how they would respond to a hypothetical decline in demand two years ago, some 50% of companies said they would mainly reduce labor costs; in 2009, 70% replied that this was an important measure to cut costs. Likewise, shortening working hours and reducing flexible wage components are instruments that have now been used more widely than in 2007. The results of the 2007 and the

2009 surveys do not show similarly big differences as regards layoffs and cutting base wages.

The next question was whether companies affected by the crisis to a different extent respond to the crisis differently. Chart 4 shows that in fact a certain pattern has emerged. The 2009 replies of enterprises reporting a slight/ moderate decline in sales tend to match more closely the answers provided in the 2007 survey. This suggests that when asked about a hypothetical demand shock, the surveyed companies assumed a modest decline, which helps explain the differences in the two survey results.

Furthermore, chart 4 shows that reducing nonlabor costs and flexible wage components are measures taken primarily by companies that have been affected by the crisis only mildly or not at all, whereas firms that have been hit severely tend to cut costs by laying off permanent staff and reducing base wages.

The extent to which layoffs of permanent staff are used as a measure to cut costs depends most strongly on the

degree to which a company has suffered sales losses. While less than 10% of firms that reported no or only a slight drop in sales reported to cut costs by dismissing permanent staff, more than 30% of the companies affected severely by the crisis have taken this measure. In other words, layoffs – followed by shortening working hours – are the most important cost-cutting instruments applied by companies that recorded a sharp or very sharp decline in sales. When faced with substantial sales losses, enterprises give priority to reducing labor input and, as a result, dismiss employees or cut working hours.

The pattern that emerged already from the results of the 2007 survey, i.e. that wage costs are cut in various ways, including layoffs, but almost never by reducing base wages, has been confirmed by the 2009 survey, albeit not in such absolute terms. Five of the 514 enterprises providing replies to this question in the current survey have cut costs primarily by reducing base wages.

As analyzed in Kwapil (2009), enterprises' reluctance to reduce base

Chart 4

Cost-Cutting Strategies by Decline in Sales
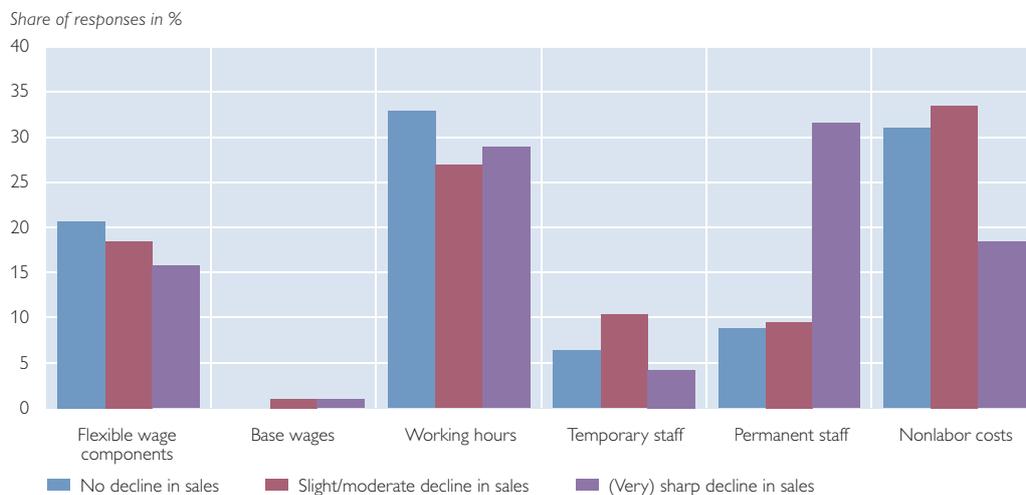
Source: OeNB, author's calculations.

wages seems to be attributable to two main reasons: employers' fear that such a move would harm staff motivation and, consequently, productivity (efficiency wage theories) on the one hand, and a labor market policy framework that makes it difficult to cut wages (e.g. collective bargaining agreements, the requirement to obtain the staff council's approval) on the other hand. Fabiani et al. (2010) confirm that these reasons are critical in all euro area countries. They also show, however, that there are marked differences between the euro area countries and those Member States that joined the EU in 2004 and 2007. Both Fabiani et al. (2010) and Babecký et al. (2009) find that the labor market policy framework contributes much less to wage rigidities in Hungary, Estonia, Latvia, the Czech Republic and Poland than in the euro area countries. Messina and Rõõm (2009) argue that in times of crisis, framework conditions like collective bargaining agreements or the role of staff councils have a larger impact on wage rigidities whereas efficiency wage considerations seem to be given less weight.

3.2 Wage Freezes and Wage Cuts More Widespread at Crisis-Ridden Companies

Chart 4 also shows that only companies reporting a drop in sales cut costs pri-

marily by reducing base wages. This behavior confirms the thesis of Blinder and Choi (1990) that fairness is given due consideration in the decision to cut wages. Whether wage cuts have a negative impact on staff motivation hinges on the degree to which they are justified. Blinder and Choi (1990) maintain that wage cuts that contribute to safeguarding a company's existence are more likely to be regarded as justified, whereas wage cuts to increase profits are considered unfair. It is therefore conceivable that fairness has in fact played a role in employers' decisions on how to cope with the current crisis.

Since the responses summarized in chart 4 only reflect companies' most important cost-cutting measure and for this reason do not cover possible wage cuts or wage freezes that represent the second most important cost-saving measure, the survey included another, more detailed question on this issue. Each responding company was asked whether it planned or had already been forced to cut or freeze wages due to the crisis. The replies to this question as well as those provided on this issue in the 2007 survey (though of a more general nature) are summarized in table 6.

Some 87% of companies said they were not planning or had not implemented wage freezes due to the current crisis. About 4% reported to have ne-

Table 6

Wage Freezes and Wage Cuts

	2007 survey		2009 survey	
	Wage freezes over the previous 5 years	Wage cuts over the previous 5 years	Wage freeze in the past year	Wage cuts in the past year
	Approval rate in %			
Implemented	9.52	1.83	4.46	2.15
Planned	×	×	9.02	2.13
Not planned	×	×	86.53	95.72

Source: OeNB, author's calculations.

Table 7

Wage Freezes and Wage Cuts Correlate Strongly with Decline in Sales

	Wage freezes planned and/or implemented	Wage cuts planned and/or implemented
	Approval rate in %	
Sales increased	0.00	0.00
Sales remained unchanged	2.50	0.62
Sales declined slightly	11.06	1.91
Sales declined moderately	17.88	6.73
Sales declined sharply	21.97	8.11
Sales declined very sharply	27.14	6.35

Source: OeNB, author's calculations.

gotiated wage freezes, 9% were planning to do so. Wage cuts were even more rare. About 96% of the companies surveyed replied that they were not planning to cut wages, and only 2% said they had already reduced wages or were planning to do so.

The data available also contain information on the share of employees affected by such a reduction in real wages. While wage freezes tend to affect the entire staff, wage cuts are often limited to certain groups of employees. About half of the 2.15% of enterprises that had cut wages had done so for the majority of their staff (more than 80%), while the remaining half had reduced the wages of a smaller group of employees (between 5% and 60%).

Again it is possible to compare these results with those of the 2007 survey. In both surveys, about 2% of companies surveyed reported to have negotiated wage cuts (only those companies that responded to the relevant questions in both surveys are included in this comparison). In the 2007 survey, however, companies were asked about wage cuts they had implemented over the previous five years, while the 2009 survey referred to the past year only. This means that some 2% of the surveyed companies reduced wages between 2002 and 2006, and an equal amount did so in 2008–09. Interest-

ingly, not a single company that reported wage cuts between 2002 and 2006 said it had reduced wages in 2009, and vice versa.

A breakdown by the extent of crisis impact shows that real wages have been cut only if the company recorded a decline in sales. Table 7 shows that only few firms think about cutting or freezing wages when sales increase or remain unchanged, whereas some 27% and 6% of the companies affected strongly by the crisis consider wage freezes and wage cuts, respectively. As manufacturing has been affected most severely by the crisis, it is primarily enterprises belonging to this sector that report wage freezes and wage cuts.

Responding to an additional survey question, 10% of the companies surveyed said that they did not reduce base wages because they were at the collectively agreed minimum level. This shows that the labor market policy framework also contributes to preventing wage cuts (as discussed in section 3.1).

4 Conclusions

Companies are reluctant to cut base wages not only under normal circumstances but also – albeit to a lesser extent – in times of crisis. Although this analysis reveals that during the current economic crisis, more companies have

reduced base wages than in non-crisis times, this measure is an exception rather than the rule also under the present circumstances. While in the 2007 survey, some 2% of companies reported to have cut base wages over the previous five years, an equal proportion of companies said they had done so – within one year – during the current crisis. This confirms that the frequency of wage cuts increases during a crisis and at the same time indicates the existence of nominal wage rigidities in Austria.

Furthermore, the survey data show that only companies that have in fact recorded a decline in sales reduce wages. This is in line with Blinder and Choi (1990), who maintain that fairness plays a crucial role in a company's decision to cut wages; employees are more inclined to accept wage cuts if the existence of the company is at stake. Next to fairness and efficiency wage considerations as discussed in Bewley (1995, 1998, 1999) or Campbell and Kamlani (1997), labor market policy frameworks also appear to contribute to wage rigidities. According to Messina and Rõõm (2009), the relative importance of these rigidities increases in times of crisis. In the survey dis-

cussed in this article, some 10% of Austrian enterprises claim that they cannot reduce wages because they are at the collectively agreed minimum level. In these cases, collective bargaining agreements effectively prevent wage cuts.

In times of crisis, nominal wage rigidities are responsible for companies responding by changing labor input rather than prices. Accordingly, the results of the 2009 survey show that most firms reduce their costs by shortening working hours. A comparison with the results of a similar survey carried out in 2007 reveals a visible shift from cutting nonlabor costs to cutting labor costs. Here, enterprises pursue different approaches, depending on the degree to which they have been affected by the crisis. Enterprises that have been hit hard by the crisis tend to focus on reducing permanent staff, shortening working hours and cutting flexible wage components.

Moreover, the results of this study are in line with the credit channel theory. 16% of Austrian companies were faced with serious or very serious financing problems, with smaller firms feeling a larger impact than large companies.

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Determinants of Crude Oil Prices: Supply, Demand, Cartel or Speculation?

Understanding the factors driving crude oil price developments is essential for assessing their effects. This paper examines four groups classifying a total of some thirty potential determinants of crude oil prices: fundamental factors, i.e. supply and demand, factors relating to the structure of the crude oil market (OPEC), and factors associated with the behavior of financial market participants (speculation). Bayesian Model Averaging (BMA) allows us to analyze a multitude of potential explanatory variables under model uncertainty and to quantify their robustness in explaining oil price inflation (price changes in percent). The results of our analysis suggest that the significance of individual factors varies over time. While no single factor dominates throughout the entire period under review (1983 to 2008), models explaining short-term movements in oil prices should always include headline inflation indicators and take into account the persistence of oil prices. In the 1990s, also the production quota of Saudi Arabia – a factor relating to the market structure – played a significant role; in the 2000s, both supply and demand (European demand for oil and refining capacities) have been highly important factors. The results of our analysis do not preclude the possibility that determinants other than those discussed here may become significant in the long run. While fundamental shortage conditions play a key role in driving up the price of crude oil, the existence of cartels and speculation can further increase price pressures.

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The recent boom in commodities prices – and even more so its abrupt end – has triggered a debate over the extent to which developments in crude oil markets are determined by the fundamental factors of supply and demand. Alternative explanations cite the market power of crude oil producers and the behavior of investors in the financial markets as drivers. Arguments have been offered both in favor and in opposition of all four theories.

— Many analysts emphasize the dynamic demand by emerging economies, most notably China. However, this growth trend is not new and has hardly changed for decades.

— Advocates of the hypothesis of a fast-approaching global production maximum *(peak oil)* cite supply shortfalls as drivers behind oil price movements. This view is challenged by skeptics who point to the poten-

tial of unconventional sources and technological advances.

— The fact that OPEC has experienced a comeback is also beeing put forward, although the production discipline of its member states is not that of a well-organized cartel.

— Another possible explanation rests on the observation that financial market participants are more actively engaging in commodity markets, thereby causing deviations from the equilibrium price. However, "speculation" makes fundamental supply shortfalls more transparent.

Hamilton (2008) and Dees et al. (2008) show that all four theories do not necessarily contradict, but rather may complement one another.

It is possible that the most recent oil price shock was an expression of a fundamental energy crisis which has had a

severe impact on the world economy. Despite the sudden drop in energy prices brought about by the economic recession, the International Energy Agency (IEA, 2008a) expects crude oil demand – mostly from emerging markets – to increase further in the long run and to rise by an estimated 45% by 2030 (IEA, 2008a). This implies a somewhat slower growth rate than that forecast prior to the financial crisis. Nevertheless, the gap between supply and demand for oil is widening and must be closed by new sources. In the IEA's baseline scenario, the tightening of supply conditions will result in a crude oil price of up to USD 200 by the year 2030, which would equate to approximately USD 120 in real terms (i.e. based on today's purchasing power).

Initially, the oil price boom between 2000 and 2008 gave reason for optimism about its comparatively moderate macroeconomic effects (Blanchard and Galí, 2007). The situation quickly deteriorated when the shock was exacerbated in early 2007 by developments in other commodity markets that are causally related to oil price hikes.[2] While inflation rose to alarming levels, this was soon followed by a dramatic economic downturn triggered by the financial crisis. Like many times before in economic history, oil prices have evidently once again significantly contributed to a recession (Hamilton, 2009).

The question of whether oil price shocks are caused on the supply or the demand side raises debate about their exogenous or endogenous treatment in macroeconomic models. The different impacts of the shocks – depending on the underlying cause – would also have consequences for determining an adequate monetary policy response (Kilian, 2009a). Therefore, it is hardly surprising that oil price determinants have become a popular area of research. The methods and models used vary considerably, which gives rise to the impression that disparate findings are in part the result of the research approach chosen.

This study approaches the subject using a statistical method that allows for an analysis of a multitude of different theories. Contrary to the conventional approach, *Bayesian Model Averaging (BMA)* not only addresses parameter uncertainty, but also accounts for the uncertainty associated with model selection. While the standard approach is limited to a single model and ignores potential findings from other models – and thus model uncertainty – the use of BMA allows us to evaluate a large number of different models and draw conclusions that explicitly quantify model uncertainty.

The Bayesian approach is particularly suited for analyzing the factors determining crude oil prices. Empirical studies that focus on a multitude of possible determinants yield no conclusive results in this regard. This lack of consensus suggests that the simultaneous application of different model approaches would be beneficial.

This study is structured as follows: Section 1 presents some stylized facts about the historical development of crude oil prices. In addition, we discuss four groups of potential determinants in light of the current theoretical and empirical literature: supply, demand, market power and investor behavior. Section 2 presents a detailed description of the determinants used in the

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[2] Put in a context with non-energy commodities, crude oil takes on the role of an input factor (energy), a substitute (biofuels), or a competitor for important investment goods (e.g. excavators). A recent World Bank study (Mitchell, 2008) attracted considerable attention with its discussion of the connection between energy and food crises.

empirical section of this paper and justifies our choice. Section 3 compares these variables using BMA and quantifies the relative importance of each factor. Finally, section 4 discusses the results and presents conclusions.

1 Fundamental and Market Factors

From the turn of the millennium until mid-2008, the price of crude oil – probably the most important price in world trade – surged fivefold[3] to an all-time high of around USD 145 per barrel. Subsequently – and equally surprisingly – it plunged by more than USD 100 within six months, only to move back up to around the USD 70 mark soon thereafter.

Four groups of explanatory factors can be identified as possible contributors to the development of crude oil prices:
1. fast-growing demand due to high global economic growth
2. declining supply or anticipated shortages in supply
3. coordinated action on the part of crude oil producers
4. the behavior of financial market participants, speculation

These determinants are not necessarily mutually exclusive, but can complement each other or take turns in chronological succession. Hamilton (2008) combines these explanations in a complex, multi-causal interpretation, which can be outlined as follows: Increasing demand encounters stagnating supply, triggering speculation about future shortfalls, which subsequently materialize as the producing countries stockpile oil reserves.

Determining the causes of an oil shock is essential if we are to assess its effects, but conversely, the effects also provide information about the causes. Kilian (2009b) decomposes oil price shocks into three components, concluding that – contrary to the prevailing view – during the last forty years, crude oil supply shocks have played a lesser part than general or oil market-specific demand shocks. The latter essentially stems from precautionary demand driven by fears about future oil supply shortfalls.
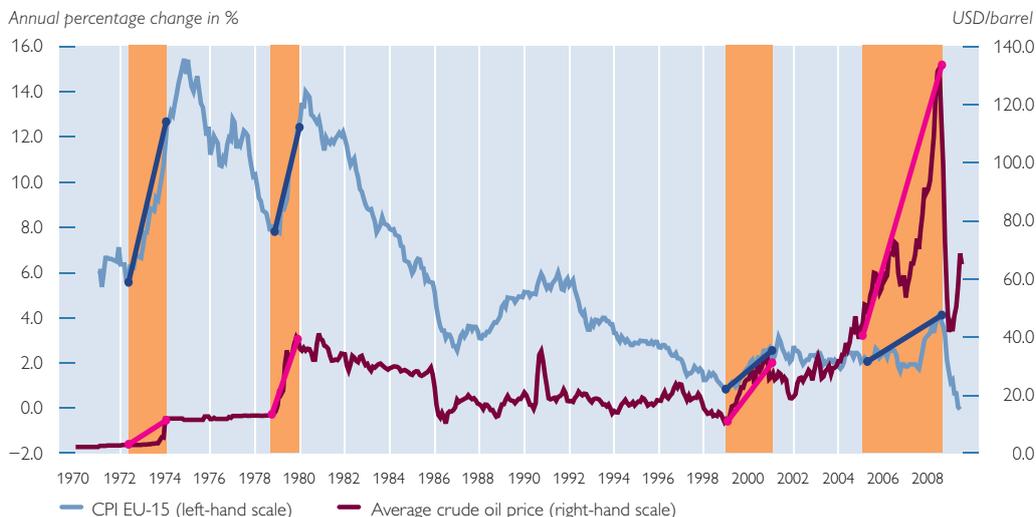
Unlike the historical oil price peaks of the last century, which were associated with stagflation crises, the macroeconomic impact of the most recent oil price upsurge was generally moderate until mid-2007. Kilian (2009b) interprets this reaction as evidence for the key role of the demand side in the recent shock.[4] If, by contrast, the shock had been triggered by supply-side effects, aggregate macroeconomic demand would have fallen, because a negative supply shock incurs the same reaction as imposing a tax on consumers (with a high propensity to consume) in favor of oil producers (with a lower propensity to consume). A supply shock also drives production costs and inflation (at least to the extent that price and wage rigidity is unavoidable), which in turn prompts central banks to raise their interest rates, thereby further dampening economic activity. Conversely, in the event of a demand-driven, endogenous oil price shock, combined with low short-term supply elasticity, inflation rises only temporarily, and there is no sudden decline in economic growth (Kilian, 2009b).

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[3] For West Texas Intermediate, although this statement basically applies to all crude oil types, as any differences in crude oil prices are mainly the result of quality-related premiums and discounts.

[4] Blanchard and Galí (2007) cite other reasons for the moderate effects: "good luck" (lack of concurrent adverse shocks), reduced oil intensity of the economy, more flexible labor markets and improvements in monetary policy.

Chart 1

Crude Oil Price and EU-15 Inflation¹

Annual percentage change in %   *USD/barrel*

— CPI EU-15 (left-hand scale)   — Average crude oil price (right-hand scale)

Source: OECD, Eurostat, IMF.
¹ *Monthly data; from 1997: euro area inflation.*

In the second half of 2007, however, signs of stagflationary tendencies emerged, which supports the conclusion that the oil shock was in part affected by supply-side factors. One year later, the global economy plunged into the deepest recession in post-war history, while inflation even turned negative at times. Accordingly, Hamilton (2009) adds the economic slump of 2007 to 2008 to the list of recessions that were significantly precipitated by oil prices.[5]

Before examining the four groups of factors in more detail, one other general aspect deserves particular attention: Crude oil is characterized by extremely low price elasticity in both supply and demand, which leads to extreme price fluctuations under market conditions of persistent scarcity (i.e. low levels of reserves held by

suppliers and consumers) (Krichene, 2006).

1.1 Demand Factors

The majority of recent studies argue that demand represents a significant — if not the major — driving force behind the latest oil price shock between 2004 and 2008 (Hamilton, 2008; Hicks and Kilian, 2009; Kilian, 2009b; Wirl, 2008). This rationale is supported by the fact that the prices of almost all other commodities skyrocketed along with oil prices. Another fact seems to contradict this view, though: From 2000 to 2004, demand grew more than twice as fast as in the subsequent period, whereas prices showed a converse tendency, increasing considerably more moderately before the shock than in the aftermath (chart 2).

[5] *The chronology of events supports this theory. Some months before the financial crisis reached its worst point (mid-September 2008), economic indicators from around the world had already fallen sharply (Fricke, 2008). The magnitude of the oil shock in comparison with the generally perceived culprit behind the crisis — real estate prices — further supports this theory (Rubin and Buchanan, 2008). Furthermore, there is a possibility that the deterioration of housing prices in the U.S.A. itself was caused by high fuel prices and the resultant negative impact on the disposable income of suburb dwellers (Cortright, 2008).*

Chart 2

Two Phases of the Crude Oil Upsurge 2000 to 2008
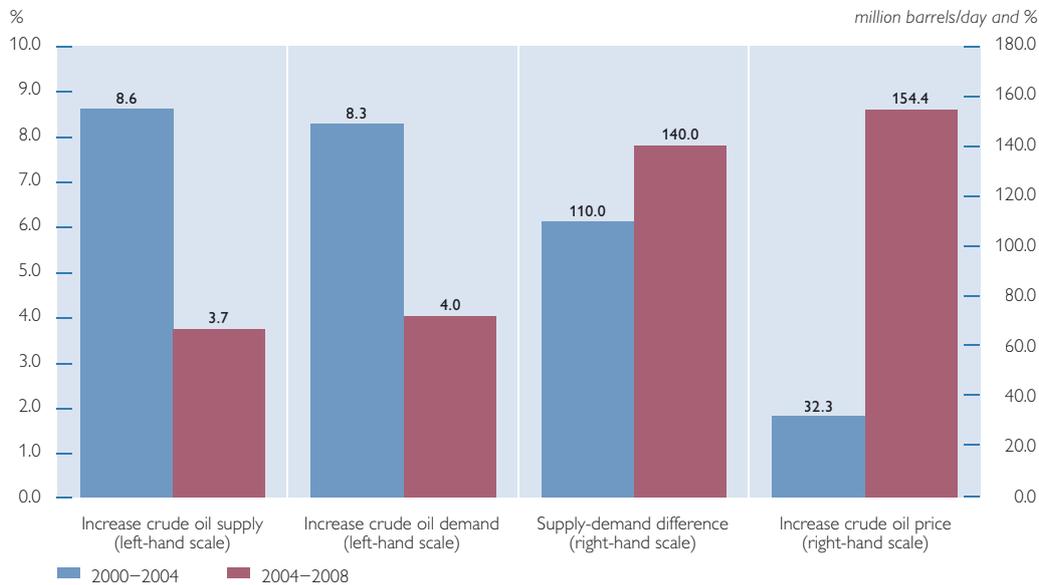
Source: IEA.

Nevertheless, the enormous hunger for commodities of emerging markets – mainly China and India, but also the Middle East and Latin America – is a frequently cited element to explain the commodities boom. The decisive factor here is growth and not the level of demand from emerging economies.[6]

The correlation between the sharp price decline in the second half of 2008 and the sudden slump in demand is even more pronounced. In industrial economies, however, concurrent movements of crude oil prices and economic growth tend to be atypical and to date have only occurred for short periods (chart 3). Hamilton (2009) observes that – with one exception – all U.S. recessions were in fact preceded by a surge in oil prices.

Several factors can be identified as exhibiting a causal or final relationship to economic growth and exercising a determining influence on crude oil prices. Frankel (2006), for example, points to the real interest rates as determined by monetary policy, which affect both the demand and supply of crude oil, thereby empirically exhibiting a negative correlation with real oil prices.
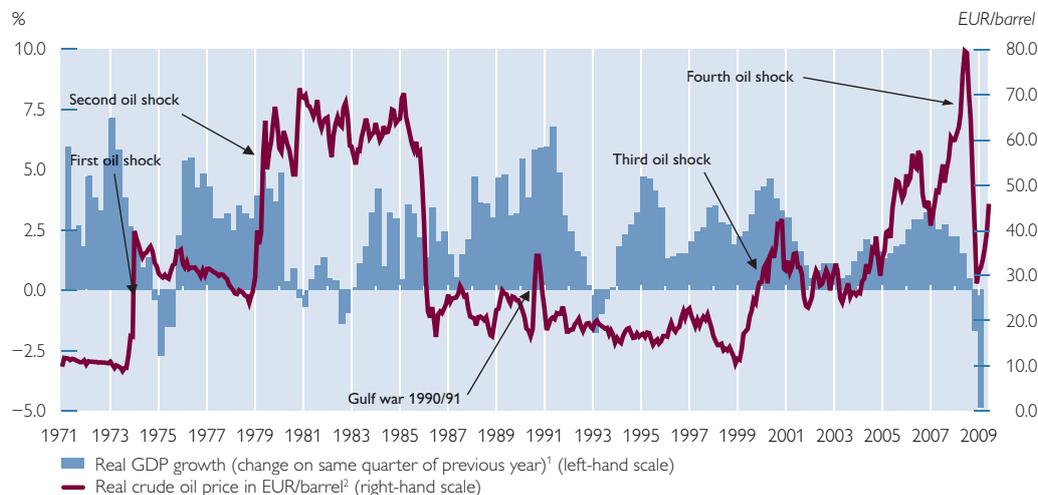
Compared with demand pull, which has exerted a dominant influence over the long term, other short-term determinants – although frequently in the headlines – take secondary importance. Comparatively low inventories in OECD countries, which are symptomatic of a general scarcity in the oil market, may account for a substantial proportion of the recent price surge. Furthermore, weather conditions often play a significant role in the short-term evolution of demand.[7]

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[6] The OECD countries still account for more than six tenths of the global demand for crude oil, although consumption already began to dwindle in 2008 as a result of cyclical developments and oil prices.

[7] Severe weather conditions (e.g. hurricanes) also have a negative impact on supply through the destruction of up- and downstream infrastructures.

Chart 3

Real Crude Oil Price and Economic Growth in the EA-15

%   EUR/barrel

Real GDP growth (change on same quarter of previous year)[1] (left-hand scale)
Real crude oil price in EUR/barrel[2] (right-hand scale)

Source: Eurostat, Thomson Reuters, OeNB.
[1] *Before 1992: GDP growth in Germany.*
[2] *Basis: December 2005; adjusted for HCPI (before 1991: Consumer Price Index Germany, EUR in DEM equivalents).*

In the medium to long term, high crude oil prices provide an incentive to invest in energy efficiency and alternative sources of energy. This phenomenon had a particularly dampening effect on demand after the first two oil price shocks in the 1980s. It is conceivable that the most recent oil price shock has also set similar processes in motion. However, in emerging economies, rapidly expanding demand can be expected to remain the key determinant of crude oil prices, given the generally high income elasticity of oil demand (Krichene, 2006).
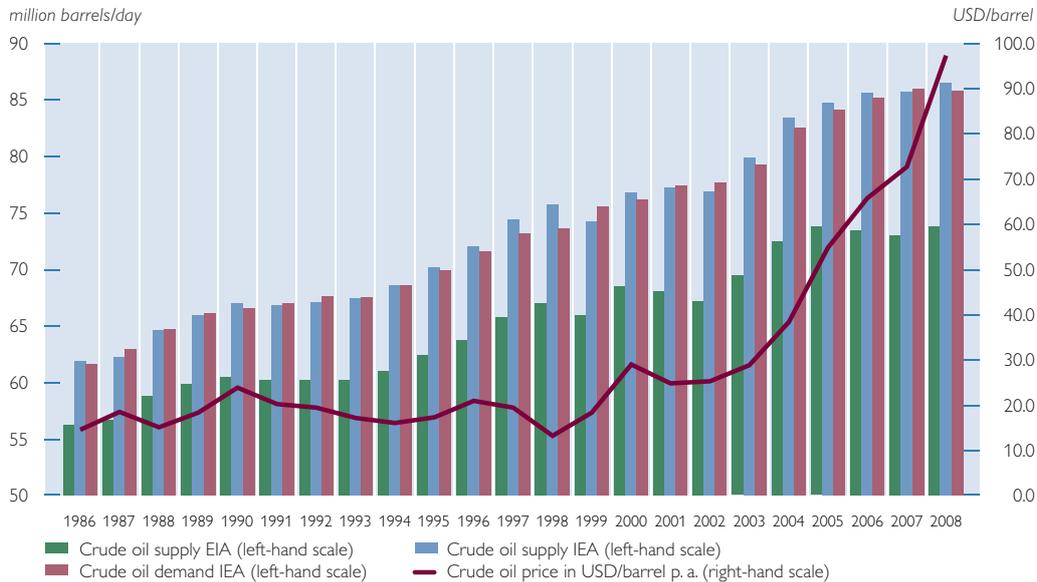
1.2 Supply Factors

There is no doubt about the fact that oil is an exhaustible resource. From an economic perspective, scarcity rents and thus continuously increasing prices are plausible for exhaustible resources.[8] According to Hotelling (1931), the price of an exhaustible resource in-

creases over time in line with the interest rate. If crude oil producers were to sell all of the resources presently at their disposal at the current market price and invest the proceeds, this amount should grow continuously at the rate of interest. Producers are indifferent to the time of sale only if oil prices rise successively in line with interest rates. Empirically, *Hotelling's rule* has neither been convincingly substantiated nor disproven, as it is difficult to separate it from other influencing factors (Livernois, 2009). This is perhaps due to the extreme volatility of oil prices, which react strongly to news without settling on a long-term path that would reflect the growing scarcity of oil and climate costs (Gronwald, 2009). Yet it may be possible that the most recent oil price shock marks the point at which the scarcity rent component of oil prices begins to gain in impact (Hamilton, 2008).

[8] *See also David Ricardo's concept of diminishing marginal returns on land (1821), according to which increasing marginal costs of development and exploitation determine the resource price.*

Chart 4

Crude Oil: Supply and Demand

million barrels/day   *USD/barrel*

Crude oil supply EIA (left-hand scale)   Crude oil supply IEA (left-hand scale)
Crude oil demand IEA (left-hand scale)   Crude oil price in USD/barrel p. a. (right-hand scale)

Source: EIA, IEA, Thomson Reuters.

During the most recent surge in crude oil prices, growing demand met what was evidently an increasingly scarce supply. The IEA's annual figures reveal that growth in the worldwide supply of crude oil halved between 2004 and 2008, compared to the preceding four-year period, just at the exact time when price hikes offered a significantly greater incentive for increased production (chart 2). According to the U.S. Energy Information Agency (EIA), global oil output actually stagnated between 2005 and 2008 (chart 4),[9] which indicates that supply factors have gained in relevance.

The relatively scarce supply situation lends credence to the *peak oil hypothesis,* which asserts that the point of global maximum production has already been passed and will now be followed by successively declining production quantities (Schindler and Zittel, 2008). According to this theory, the rate of oil production follows a bell-shaped curve named after U.S. geologist M. King Hubbert, who used this curve to accurately forecast the development of crude oil production in the U.S.A. (Hubbert, 1956). According to this curve, the peak of production is reached when approximately one-half of the known reserves have been extracted. In fact, annual discoveries of crude oil have been on a declining trend since the 1960s, despite extended efforts to locate new oil resources, while annual production started to exceed annual discoveries in the 1980s. The historical maximum of oil discoveries must be followed by a maximum of oil production. However, uncertainty exists as to the exact point in time at which peak production will be reached, given the steady increase in proven reserves and the continual improvements in technologies, which include techniques for improving oil recovery from existing fields as well as procedures that reduce the enormous costs

[9] *Unlike the EIA, the IEA also includes liquid gas production in its data on crude oil supply.*

involved in the extraction of unconventional oil resources (oil sand, oil shale, heavy oils, liquid gas, deep sea oil, Arctic oil, etc.). Unconventional production faces a number of significant environmental obstacles, though (Global Forest Watch, 2009).

Today, the theory of peak oil has been widely accepted, even by the IEA (2008), at least regarding easily exploited oil sources. If, in the wake of the financial crisis, investment in the development of new energy sources and technologies falls short of the annually required total of USD 1,000 billion, the world faces a potential supply squeeze after 2015, as the average oilfield production rate is continually increasing and production sources are therefore becoming ever more constrained.

The IEA reports that non-OPEC oil production has stagnated since 2004 and that the increase in the global supply of crude oil is attributable to OPEC countries alone, where production is primarily controlled by government-owned entities. The fact that primary fossil energy resources are concentrated in non-OECD countries amplifies the importing nations' unilateral dependency. Although in part mitigated by a greater reliance on alternative energy sources such as coal, gas and renewables, this dependency is nevertheless set to continue as crude oil will remain the predominant primary energy source for the foreseeable future.

1.3 Market Power in the Oil Market

In their long-term study, Dvir and Rogoff (2009) observe that oil prices were fundamentally high and volatile in the years from the 1970s to the present day – the last phase of the period under review. The onset of this phase coincided with oil production in the U.S.A. passing its peak, thereby facilitating the emergence of an effective oil cartel.

According to OPEC's own data, the twelve current OPEC member states account for 40% of global crude oil production, 55% of crude oil exports, and more than two-thirds of the world's crude oil reserves (OPEC, 2009). The difference between current and potential production suggests that OPEC's influence on the oil market will probably become stronger in the future. In fact, buoyed by the tight supply situation resulting from fundamental factors as outlined above, OPEC has already experienced a revival of its market power. Still, it would be too much of a stretch to cite OPEC as the main driver behind the currently high oil price. *Resource nationalism*[10] (i.e. governments asserting control over the natural resources within their territory) is already considered rational behavior for individual countries – also with a view to safeguarding national wealth for future generations. Additionally, any decrease in the interest yield on oil revenues heightens the incentive to postpone oil extraction from the ground in the hope that the future will bring either price or interest rate increases. Government intervention, which ranges from tax hikes and regulation to full-scale nationalization, directly or indirectly results in reserves being hoarded or investments for the exploration of natural resources being held back. In fact, OPEC countries' (quickly accessible) reserve capacities were below average in the high price years up to mid-2008, which may be a sign that there is less scope for further

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[10] *The counterpart of resource nationalism is an equally problematic tendency that we could call resource imperialism: importers attempting to strategically secure access to raw materials.*

production ramp-ups, but may also be a result of delayed *upstream investments.*

With oil output from the North Sea and the Gulf of Mexico shrinking, the responsibility for the world's energy supply increasingly shifts to the shoulders of the OPEC countries (and Russia), which – not surprisingly – do not rank among the world's politically most stable nations. The negative correlation between resource abundance on the one hand and democratization (Acemoglu, 2008) and development on the other is known as the *resource curse* (Sachs and Warner, 2001). This phenomenon is connected to another one labeled *Dutch disease:* Economic activities in the non-commodity sector decline to secondary importance, which in turn creates incentives for *rent seeking,* i.e. economic stakeholders expend (and waste) an ever greater effort on controlling access to their resources.

The interest of crude oil producers in forming cartels can also be linked to the major trends previously outlined. As a general rule, relatively high fixed costs and the associated decrease in average costs facilitate the emergence of oligopolies in the oil market, which – in view of the various quality segments – does not constitute a pure monopoly, however. After years of weakness (triggered, inter alia, by the non-cooperative behavior of Saudi Arabia in the mid-1980s and the development of efficient spot markets), OPEC experienced a revival of its market power driven by surging demand (particularly from Asia). In light of its profit-maximizing behavior, however, OPEC also has an interest in keeping demand stable and therefore takes into account the dampening effects of soaring oil prices.

Finally, negative news about geopolitical tensions – a term typically denoting the risks associated with short- to medium-term exogenous supply shocks resulting e.g. from wars or revolutions – also lead to greater price volatility.

1.4 Investor Behavior

Participants in the *commodity markets* speak of a *commodity cycle* that follows the economic cycle, and even (in regard to the most recent bull run in commodities) of a *commodity super cycle* driven by fundamental data. Traders are not exclusively speculators with a short-term focus on reaping instant profits by successfully anticipating price movements. It is also large energy consumers and producers trying to hedge their physical trade volumes against fluctuating prices. In times of increasing inflationary concerns and financial market turbulence, market participants also include institutional investors seeking refuge in the perceived safe haven of commodities or interested in diversifying their portfolios, as commodity assets show a negative correlation with stocks and bonds.[11]

Opinions diverge, however, on the actual significance of speculation. On the one hand, it is considered to be destabilizing and dangerous, such as in cases where large-scale transactions are used to achieve profits from price changes. On the other hand, speculation is deemed useful in that it allows for transparent and efficient liquidity-based price discovery. Even if speculation drives prices above the fundamen-

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[11] *The correlation of oil papers with other asset classes is mainly negative, with causality not being unambiguously established. Just as capital fleeing the stock markets enhances the status of commodities, climbing oil prices usually put pressure on stock prices, with the exception of oil stocks. Bonds are affected by opposed effects, with the inflationary and interest-raising impact (increasing attractiveness of commodities) outweighing the growth-dampening implications (declining crude oil demand) in most cases.*

tal trend, it can nevertheless contribute to optimum resource allocation: High crude oil prices, for example, point to potential future shortages, which in turn sends a signal to consumers to save energy and to crude oil producers to develop new sources.

According to Masters (2008), institutional traders' index speculation in the futures market (the dominant type of speculation today) is more damaging than "traditional speculation."[12] In the five years before spring 2008, the revenue from trading in crude oil derivatives increased exponentially[13] and the prices of crude oil futures[14] are considered to be the benchmark for spot markets and long-term contracts. In the case of the Rotterdam crude oil market, this is in fact explicitly the case. This view stands challenged by the contention that so-called *paper barrels* – unlike physical crude oil *(wet barrels)* – have unlimited availability. Furthermore, no major imbalances between long and short positions occurred during that period, which could have provided an indication about the likely direction of speculation-induced price trends. If the number of market participants increased greatly, it was only because they were following a trend that can be determined through the fundamental equilibrium (ITF, 2008). Models taking into account the interaction of heterogeneous participants (fundamentalists, chartists and portfolio managers) on *financialized* commodities markets allow the possibility of a per-sistent misalignment of prices away from the fundamental equilibrium (Redrado et al., 2008).

Krugman (2008) contradicts the hypothesis of a crude oil price bubble, arguing that if financial markets were in fact to generate artificial shortfalls over the long term, this would have to be reflected by large stockpiles of crude oil, thereby generating additional physical demand. He claims that the evolution of inventories prior to the oil price peak in mid-2008 did not, at first glance, indicate hoarding. Yet, inventory holdings outside of the OECD region were not at all transparent. In addition, OPEC countries' increasing reserve capacities can be interpreted as underground "stocks" (Hamilton, 2008).[15] Moreover, the findings reported by Stevans and Sessions (2008) and Acharya et al. (2009) do indeed provide evidence of precautionary hoarding on the crude oil market. According to this research, crude oil inventory holdings and futures prices do show a positive correlation and thus also influence prices on the spot market. According to Büyüksahin et al. (2009), fundamental data as well as the increased activity of *hedge funds* and other financial market participants are responsible for the stronger cointegration of futures contracts with near and far terms.

A further argument for a causal relationship between speculation and crude oil prices rests on the fact that the latest oil price upsurge coincided

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[12] Technical trading systems are gaining significance in this process (Schulmeister, 2009).

[13] Between January 2003 and March 2008, futures transactions in the American WTI crude oil variety increased sixfold; those in the North Sea Brent variety fourfold (Masters, 2008).

[14] In the case of a crude oil futures contract, two parties agree to supply (short position) or buy (long position) a certain quantity of crude oil at a certain price and at a certain time.

[15] The change of the pricing structure to contango (i.e. spot prices are lower than prices for later delivery) observed at that time points to the possibility of such "hidden stockpiles." Usually, the price structure curve is in backward-ation (i.e. contracts maturing earlier trade higher), which may reflect the fact that producers tend to hedge against their price risk more than potential customers. Storage costs or the lower volatility of futures markets in comparison with the corresponding spot markets may also play a role.

with the deregulation of futures markets. It is only since 2006 that West Texas Intermediate (WTI) products have been admitted for trade on London's ICE commodities exchange, which – unlike New York's NYMEX – is not regulated by the Commodity Futures Trading Commission (CFTC). This is also one of the reasons for the information gap over actual trade volumes, which is further compounded by the fact that approximately 80% of all derivatives trades take place – equally unregulated – over the counter (OTC).

In all probability, the weakness of the U.S. dollar also contributed to the oil price upsurge (Breitenfellner and Crespo Cuaresma, 2008), a correlation that can be ascribed to the following five channels: First, oil producers aim to regain the purchasing power of their export revenues, which are typically denominated in U.S. dollar. Second, demand increases in countries whose currencies appreciate against the U.S. dollar. Third, commodity investments gain in attractiveness over U.S. dollar investments. Fourth, monetary easing motivated by exchange rate movements stimulates greater demand. Fifth, currency markets reflect fundamental factors that are pivotal for commodity markets.

In summary, we underline that the relationship between the real economy and financial markets is complex. Futures markets help to form expectations regarding future prices, and these expectations in turn determine prices. That investors tend toward *overshooting* is a recognized phenomenon (Dornbusch, 1976). In this sense, the change in the relationship between spot and futures markets observed over a number of years suggests that the long-term uptrend in prices triggered by fundamental market developments has been exacerbated by speculation (Kaufmann and Ullman, 2009). Equally, the altered relationship between real oil prices and stock prices indicates the existence of several price bubbles since the turn of the millennium (Miller and Ratti, 2009). As a result, crude oil prices have almost certainly overshot their fundamental equilibrium values. As to whether speculation plays a role in price formation beyond this and shapes trends, judgment remains reserved.

Time Series Data for Individual Crude Oil Price Indicators

Factor group	Individual indicator	Description	Periodicity	Period covered	Source
Crude oil price	West Texas Intermediate	Nominal U.S. benchmark crude price: *Cushing, OK West Texas Intermediate Spot Price FOB* (USD per barrel).	daily	01/1983–04/2009	Energy Information Administration
Demand	Federal Funds Rate	Federal Funds Rate, U.S. base rate	monthly	01/1983–03/2009	Federal Reserve System
	10-year bonds	10-year U.S. bonds	monthly	01/1983–02/2009	Federal Reserve System
	Inflation in the U.S.A.	U.S. Consumer Price Index	monthly	01/1983–02/2009	Bureau of Labor Statistics
	M2 growth	M2 monetary growth, annual growth	monthly	02/1980–07/2009	Federal Reserve System
	EMBI spread	Difference between government bonds issued by emerging economies and U.S. bonds	daily	01/1998–04/2009	Thomson Reuters
	Energy intensity, worldwide	Worldwide energy intensity is calculated by dividing total primary energy consumption in British thermal unit quadrillions (10^{15}) by GDP. For every country and year available from Global Insight, the exchange rate (for the year 2000) in billions of U.S. dollars is applied.	annually	1980–2006	Energy Information Administration
	Energy intensity, North America	see above	annually	1980–2006	Energy Information Administration
	Temperature	Average world temperature	monthly	1983–2009	National Climatic Data Center
	GDP growth China		annually	1983–2008	Chinese Statistical Bureau
	GDP growth euro area		annually	1984–2008	OECD
	GDP growth EU		annually	1985–2008	OECD
	GDP growth G-7		annually	1986–2008	OECD
	GDP growth OECD		annually	1987–2008	OECD
	GDP growth OECD Europe		annually	1988–2008	OECD
	September 11	Dummy variable for September 11		1 for 09/2001	

(continued) Table 1

Time Series Data for Individual Crude Oil Price Indicators

Factor group	Individual indicator	Description	Periodicity	Period covered	Source
Supply	Total oil rigs[1]	Rig count, indicator of drilling activity	monthly	01/1995–04/2009	Baker Hughes BHI International Rig Count
	Total gas rigs	Rig count, indicator of drilling activity	monthly	01/1995–04/2009	Baker Hughes BHI International Rig Count
	Refining capacity[2]	Total refining capacities worldwide	annually	01/1983–03/2009	Energy Information Administration
	Capacity utilization	Rate of refining capacity utilization, could be indicator of shortfalls in the crude oil market. Denotes the rate at which the processing capacities of the available refineries are utilized.	monthly	01/1985–04/2009	Energy Information Administration
	Oil reserves, worldwide	Estimated quantities of energy sources that are recoverable under existing economic and operating conditions with reasonable certainty according to analysis of geologic and engineering data. The location, quantity, and grade of the energy sources are usually considered to be well established in such reserves.	annually	1980–2009	Energy Information Administration
	Oil supply, worldwide	Total oil supply comprises the production of crude oil, natural gas plant liquids, other condensates and products derived in the refining process.	quarterly	Q1/1994–Q4/2009	Energy Information Administration
	Oil stocks, worldwide	Worldwide oil stocks cover crude oil (including strategic reserves), natural gas plant liquids, refinery feedstocks, additives and oxygenates, other hydrocarbons and petroleum products	quarterly	Q1/1973–Q4/2008	Energy Information Administration
	Exploration costs	Real costs of crude oil, natural gas and non-productive wells (dry holes).	annually	1960–2007	Energy Information Administration
	Baltic Dry Index	Baltic Dry Index of the Baltic Exchange	monthly	05/1985–07/2009	Datastream
	Hurric 1	Dummy variable for hurricane Ivan		1 for 09/2004	
	Hurric 2	Dummy variable for hurricane Katrina		1 for 08/2005	
	Hurric 3	Dummy variable for hurricane Gustav		1 for 08/2008	
	Gulf War 1	Dummy variable for the first Gulf War		1 for 08/1990–02/1991	
	Gulf War 2	Dummy variable for the Iraq War 2003		1 for 03/2003	
Crude oil market	Share of OPEC reserves	See worldwide oil reserves, OPEC share	annually	1980–2009	Energy Information Administration
	OPEC quota	Total production quotas of OPEC member states, as agreed at OPEC meetings.	irregularly (depending on the day of the meeting)	04/1982–11/2007	OPEC
	Saudi Arabia quota	Saudi Arabia's production quota, as agreed at OPEC meetings.	irregularly (depending on the day of the meeting)	04/1982–11/2007	OPEC
	Oil supply, OPEC share	See worldwide oil supply, OPEC share	quarterly	Q1/1994–Q4/2009	Energy Information Administration
Financial market	U.S. NEER	U.S. dollar nominal effective exchange rate	monthly	01/1981–02/2009	Bank for International Settlements
	U.S. REER	U.S. dollar real effective exchange rate	monthly	01/1981–02/2010	Bank for International Settlements
	S&P Composition	S&P 500 (Standard & Poor's index of the 500 largest listed companies in the U.S.A.)	daily	01/1981–03/2009	Thomson Reuters
	Net positions	Non-commercial long positions less non-commercial short positions of the NYMEX WTI crude oil futures	biweekly (14 to 16 days)	15/01/1986–31/03/2009	U.S. Commodity Futures Trading Commission

Source: OeNB.

[1] A drilling rig works the drill pipe into the ground and creates a new borehole (or diverts an existing one) to locate, make accessible and exploit crude oil or natural gas.

[2] Capacities that could be mobilized within 30 days in addition to those that are undergoing repair and could be mobilized within 90 days. The capacity refers to the input quantity in barrels that can be processed within a 24-hour day.

2 Selection of Possible Determinants

To accommodate the multitude of factors that potentially determine oil prices, this study examines different variables relating to each of the four groups previously outlined (supply, demand, oil market and financial markets).

On the supply side, the *total oil rigs* and *total gas rigs* variables provide an indication of the current level of production. Most notably, the number of oil rigs has increased significantly over the last ten years, while the rise in the number of gas rigs has been less pronounced. A substitution relationship exists between oil and gas production (especially when it comes to electricity generation).

The worldwide *refining capacities* and their degree of *capacity utilization* describe supply-side factors that should bear a close relationship to short-term shortfalls on the oil market.

If there is a general expansion of refining capacities, bottlenecks caused by growing demand can be countered more quickly. Following this logic, a negative impact on crude oil prices would be the result. On the one hand, if the rate of actual utilization of available refining capacities gets closer to the total capacity limit, this could be interpreted as an increase in shortages on the market. Consequently, a higher rate of capacity utilization would result in rising oil prices. On the other hand, higher capacity utilization at existing capacities leads to a short-term increase in supply. Analysis of the two time series reveals a sharp rise in worldwide refining capacities, particularly between 1997 and 2001 (9.4%). A further, albeit smaller upturn can be observed between the end of 2005 and the beginning of 2007 (chart 5).

Another variable is frequently mentioned in the debate surrounding the subject: available *reserves,* which are hypothesized to contribute to oil price hikes (particularly in the last few years). As outlined in section 1, the relatively low reserve stocks in OECD countries lead to tensions that may translate into upward oil price movements. For their part, the total *reserve stocks* available worldwide represent a significant variable in the determination of oil prices. The time series included in this study are based on geological and technical estimates of existing energy sources. Chart 5 shows that the estimates of worldwide reserves have more than doubled since 1985. The OPEC countries' reserves saw a particularly sharp increase between 1978 and 1988, while the reserves of non-OPEC countries remained at around 200 to 250 billion barrels for a long period. After that, between 2002 and 2003, they experienced a strong surge to almost 400 billion barrels.

The group of supply-side variables also contains the entire *worldwide supply* as a time series, which, in addition to crude oil production, also includes liquids and other refinery products. While the global oil supply has, with some fluctuations, increased moderately since the mid-1990s, the ratio between OPEC and non-OPEC supply has barely changed at all. We expect a negative effect of overall crude oil supply on prices.

The cost of developing new oil wells is a further aspect that is critical in the group of supply-side variables. Upward movements in the costs associated with exploring new oil fields should be reflected in the oil price. Until the 1990s, the costs of exploration remained relatively stable, but increased by more than sixfold over the following 15 years. Finally, this group of factors also includes the time series of the *Baltic Dry Index,* which serves as a measure of the transport costs for commodities.

Based on the assumption that the accumulation of *crude oil reserves* permits greater flexibility in countering short-term supply shortages, we included the worldwide crude *oil inventories* variable in the group of supply-side variables. However, as changes in inventory levels simultaneously create precautionary demand, the direction of this variable on oil prices cannot *a priori* be determined conclusively.

On the demand side, which in the debate on the subject is frequently viewed as being responsible for the most recent surge in oil prices, this study uses time series for economic development (GDP) in the euro area and the EU, China, the OECD and the G-7, as well as the *J.P.Morgan EMBI spread* series. Furthermore, to account for the economic and investment environment, we used relevant monetary and macroeconomic data, such as the *U.S. Federal Funds Rate, consumer price index developments, monetary growth* (M2) in the U.S.A., and the *10-year U.S. bond rate.* Here, too, the net effect of the different variables is a priori not clearly defined. Hotelling's theory, for example, suggests a positive influence of interest rates on the oil price (the price of an exhaustible resource increases in line with the rate of interest). At the same time, however, a fall in interest rates might also lead to increasing demand and thus to a rise in oil prices.

Finally, alongside demand developments that occur as a result of short-term changes in economic activity, the economies' *energy intensity* is another relevant, structural variable. An increase in energy consumption for a given output level has an impact on the demand for oil and thus possibly on the oil price. Energy intensity witnessed a sharp decline before the turn of the millennium; since then, it has fluctuated between 12,400 and 12,600

British Thermal Units (BTU) per U.S. dollar.

We account for the possible impact of oil-market variables – especially of OPEC countries – on the oil price (section 1) by taking account of the frequently cited *OPEC production* quota and the OPEC's share in world crude oil reserves, among others. Given the important role Saudi Arabia plays in crude oil production and thus in price dynamics, this study also examines a separate time series for Saudi Arabia's OPEC quota. For both production quota time series, we expect a negative effect on the short-term development of crude oil prices, as has been empirically demonstrated by Dees et al. (2004).
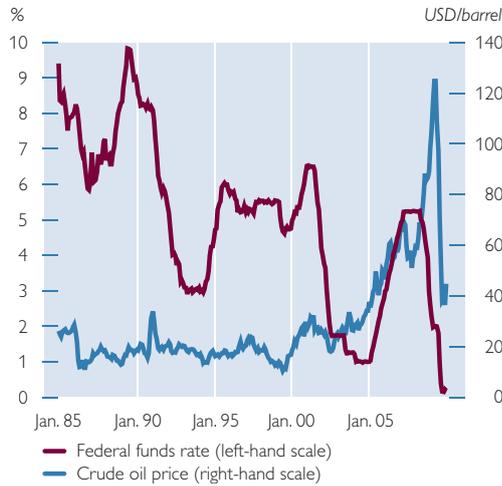
The group of financial market variables draws upon the time series of the *S&P 500 index*, which is based on the share prices of the 500 largest listed U.S. companies and should therefore be a good indicator of the U.S. financial markets, which have worldwide significance. A positive, investment-boosting atmosphere in international financial markets should also be reflected in the development of oil prices, moving them in a positive direction.

We use the time series of the Commodity Futures Trading Commission's *net positions* in the futures market (non-commercial long positions minus non-commercial short positions) as a proxy for speculative investor behavior, as suggested by Gurrib (2007) in his study on crude oil prices and speculation. Finally, the exchange rate is also included as a significant financial market variable for explaining crude oil prices (Breitenfellner and Crespo Cuaresma, 2008).
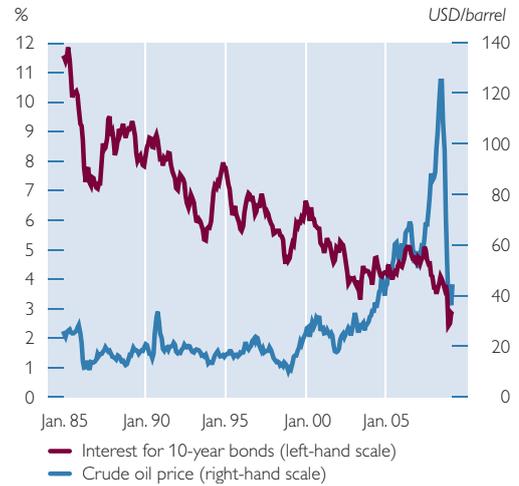
Important geopolitical and historical events (e.g. the Second Gulf War from August 1990 to February 1991 and the Iraq War in 2003) are also accounted for by using dummy variables.
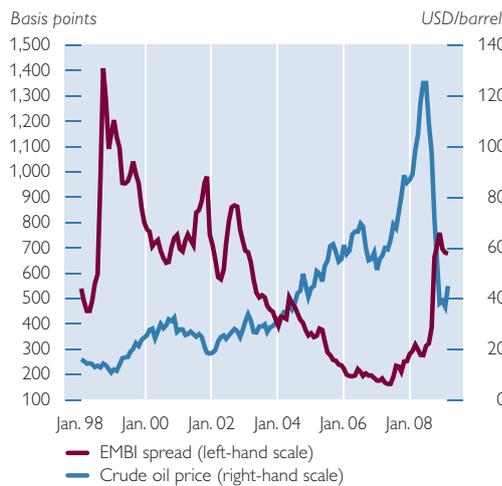
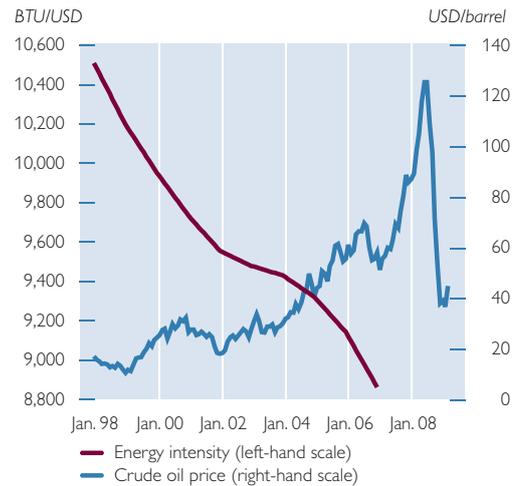Chart 5

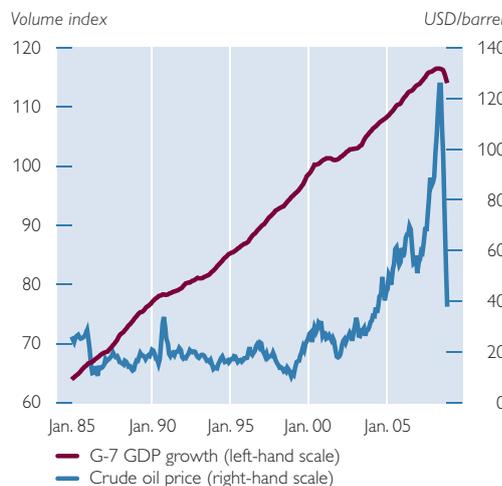## Potential Determinants of Crude Oil Prices

Federal Funds Rate

Federal funds rate (left-hand scale)
Crude oil price (right-hand scale)

Interest for 10-Year Bonds

Interest for 10-year bonds (left-hand scale)
Crude oil price (right-hand scale)

EMBI Spread

EMBI spread (left-hand scale)
Crude oil price (right-hand scale)

Energy Intensity Worldwide

Energy intensity (left-hand scale)
Crude oil price (right-hand scale)

GDP Growth, G-7

G-7 GDP growth (left-hand scale)
Crude oil price (right-hand scale)

GDP Growth, OECD Europe

OECD Europe GDP growth (left-hand scale)
Crude oil price (right-hand scale)

Source: Oil Market Report, EIA, Thomson Reuters.

Potential Determinants of Crude Oil Prices

GDP Growth, China

%   USD/barrel
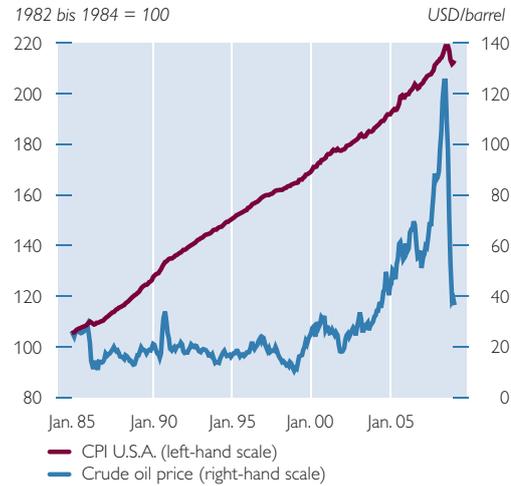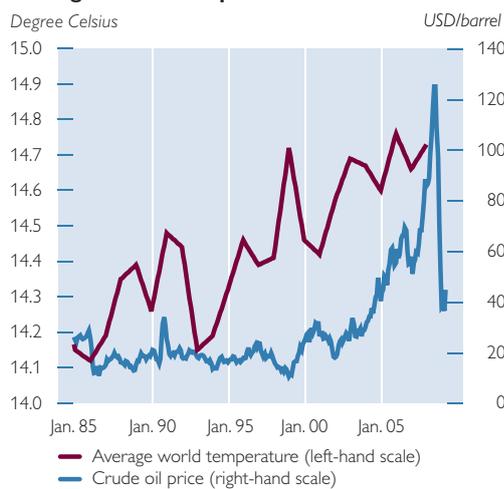
— China GDP growth (left-hand scale)
— Crude oil price (right-hand scale)

U.S. Consumer Price Index

1982 bis 1984 = 100   USD/barrel

— CPI U.S.A. (left-hand scale)
— Crude oil price (right-hand scale)

Average World Temperature

Degree Celsius   USD/barrel

— Average world temperature (left-hand scale)
— Crude oil price (right-hand scale)

Total Oil Rigs

Number   USD/barrel

— Total oil rigs (left-hand scale)
— Crude oil price (right-hand scale)

Worldwide Refinery Capacities

1,000 barrels/day   USD/barrel

— Worldwide refinery capacities (left-hand scale)
— Crude oil price (right-hand scale)

Worldwide Oil Reserves

Billion barrels   USD/barrel

— Worldwide oil reserves (left-hand scale)
— Crude oil price (right-hand scale)
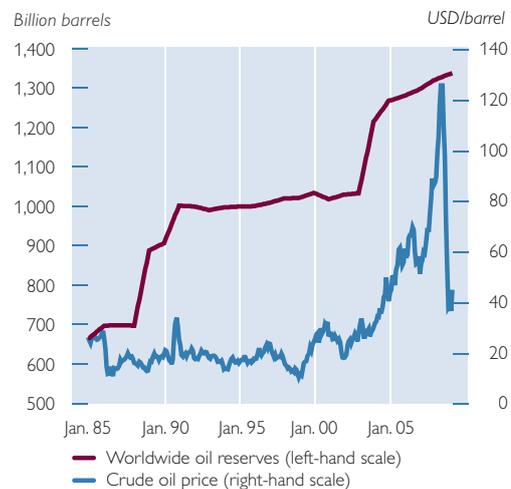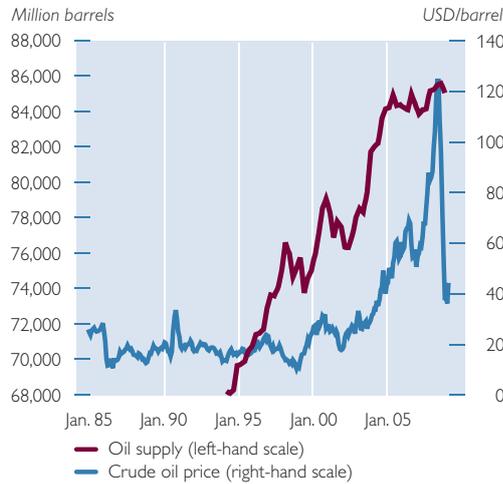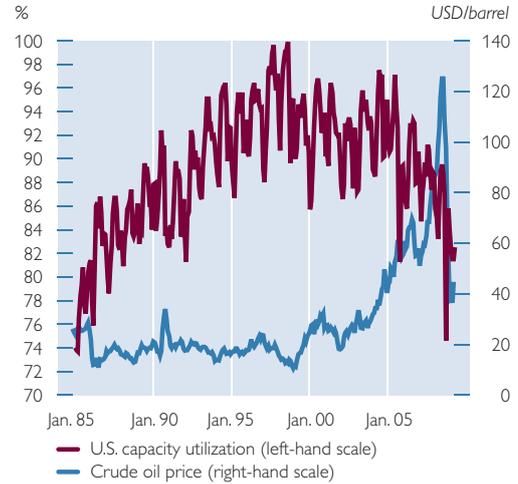
Source: Oil Market Report, EIA, Thomson Reuters.

Potential Determinants of Crude Oil Prices

Oil Supply
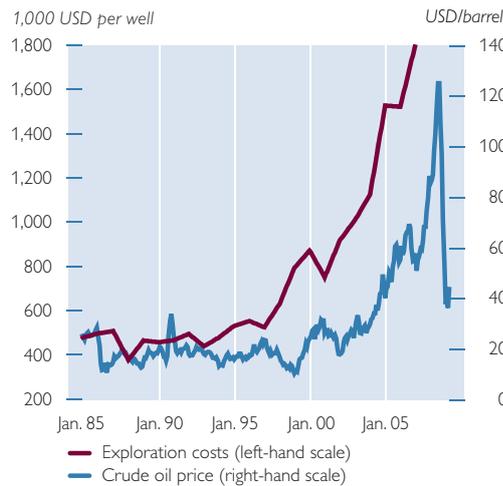
Oil supply (left-hand scale)
Crude oil price (right-hand scale)

U.S. Capacity Utilization

U.S. capacity utilization (left-hand scale)
Crude oil price (right-hand scale)

Exploration Costs

Exploration costs (left-hand scale)
Crude oil price (right-hand scale)

Worldwide Oil Stocks

Worldwide oil stocks (left-hand scale)
Crude oil price (right-hand scale)

OPEC Reserves

OPEC reserves (left-hand scale)
Crude oil price (right-hand scale)

OPEC Quota

OPEC quota (left-hand scale)
Crude oil price (right-hand scale)
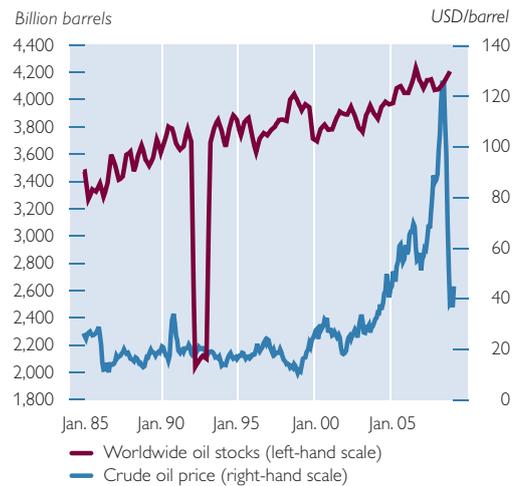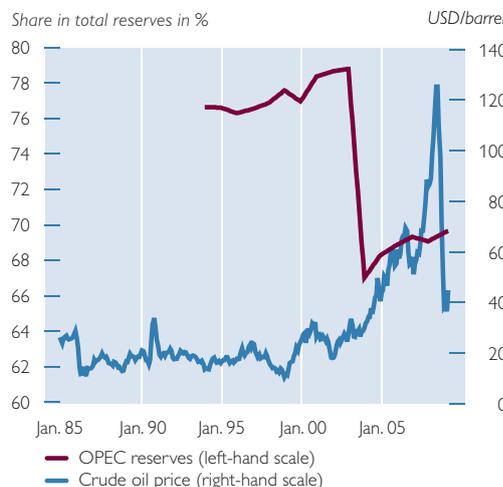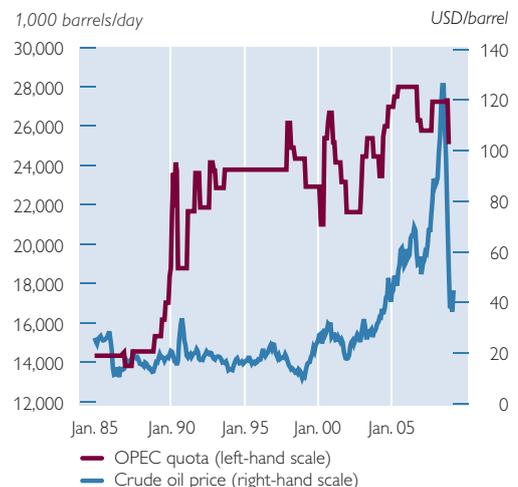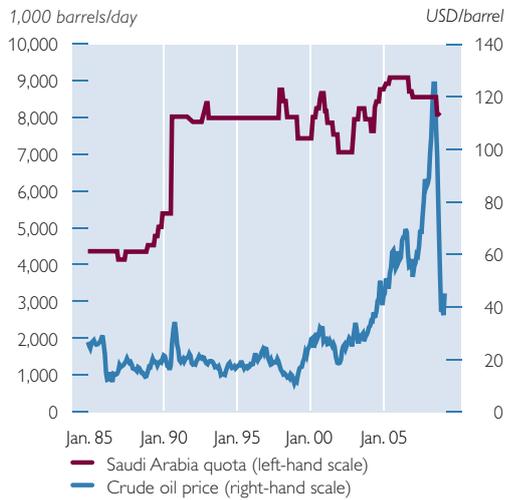
Source: Oil Market Report, EIA, Thomson Reuters.

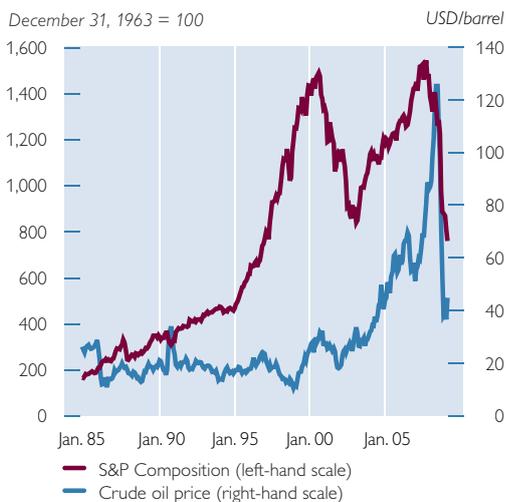(continued) Chart 5

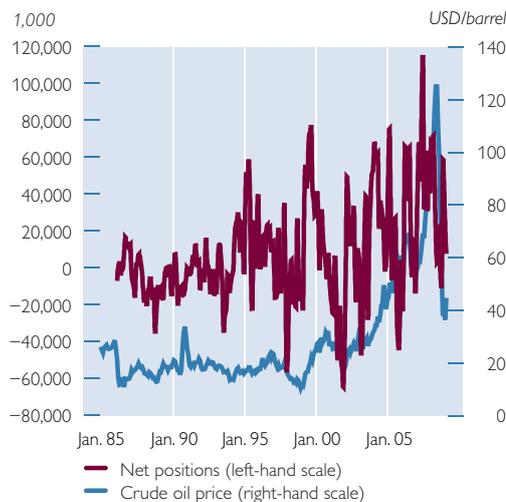## Potential Determinants of Crude Oil Prices

Saudi Arabia Quota

1,000 barrels/day   *USD/barrel*

— Saudi Arabia quota (left-hand scale)
— Crude oil price (right-hand scale)

Nominal Effective Exchange Rate of the U.S. Dollar

Index; CPI-based   *USD/barrel*

— Nominal effective exchange rate of the U.S. dollar
(left-hand scale)
— Crude oil price (right-hand scale)

S&P Composition

December 31, 1963 = 100   *USD/barrel*

— S&P Composition (left-hand scale)
— Crude oil price (right-hand scale)

Net Positions

1,000   *USD/barrel*

— Net positions (left-hand scale)
— Crude oil price (right-hand scale)
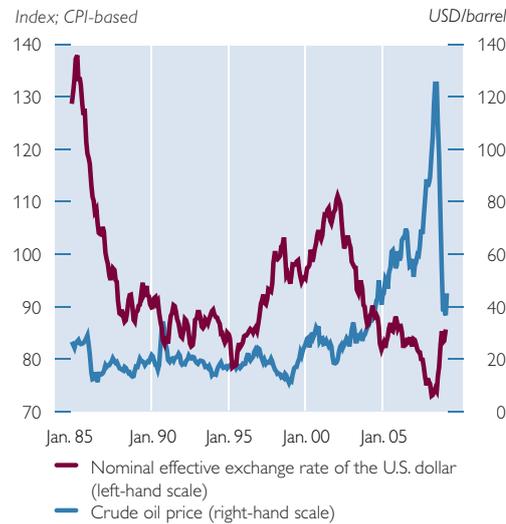
Source: Oil Market Report, EIA, Thomson Reuters.

3 Applying Bayesian Model Averaging to Oil Price Inflation

BMA is a technique designed to help account for the uncertainty inherent in the model selection process, a factor that traditional statistical analysis often neglects. By averaging over many different competing models, BMA incorporates model uncertainty into conclusions about parameters and prediction. BMA has been applied successfully to many statistical model classes, including linear regression models, generalized linear models, Cox regression models and discrete graphical models. In most cases, using BMA improved predictive performance. In economics, BMA has been applied mainly to economic growth determinants (Fernández et al. 2001; Sala-i-Martin et al., 2004; Crespo Cuaresma and Doppelhofer, 2007). Recently, however, BMA has also been applied to other economic research questions, such as deter-

minants of currency crises (Crespo Cuaresma and Slacik, 2009). A thorough account of the statistical details of BMA can be found in Raftery (1995) and Hoeting et al. (1997). Due to space constraints, we will just provide intuitive aspects of the method and their implementation.

The basic idea behind BMA is to obtain weighted average estimates of parameters of interest across potential models, using the (probabilistic) belief in each model after observing the data as a weight. In our application, the class of models considered can be parameterized as follows

$$p_t = \alpha + \sum_{j=1}^{k} \beta_j x_{j,t-1} + \varepsilon_t \qquad (1)$$

where p_t is the oil price inflation variable and x_{jt} for $j = 1, ..., K$ are variables which may have an effect on p_t.[16] There are thus 2^K possible linear models that can be considered using this set of explanatory variables. BMA estimates are obtained by weighting each estimate with the posterior probability of the model it comes from, and summing over the whole model space, which is composed by all 2^K models. The posterior model probability is, in turn, a function of the prior inclusion probability of the model and the marginal likelihood of the model, which summarizes how well the model fits the data. In BMA, Zellner's g-prior is the most common choice of prior distribution over the parameters of a given model (Fernández et al. 2001a; Liang et al., 2008; Feldkircher and Zeugner, 2009), while a flat prior probability over models is the preferred choice in the literature. Recently, Ley and Steel (2009)

proposed using a hyperprior on model size. They show that this approach leads to more robust inference when applying BMA. In our application, we use the BRIC prior over model parameters proposed by Fernández et al. (2001), and the hyperprior over the model space put forward by Ley and Steel (2009). The *BRIC prior* over the parameter space bridges the use of the Bayesian information criterion (BIC) and the risk inflation criterion (RIC) as an instrument to obtain posterior model probabilities. Using simulated data, Fernández et al. (2001) show that the BRIC prior has the best performance among the different g-priors put forward in the literature.

The lack of a single, consistent theoretical framework in which to frame the choice of explanatory variables for oil price changes makes BMA an optimal method for our application. Table 1 presents the set of variables which are used as potential covariates. The variables are measured at monthly frequency[17] and they represent different oil demand and supply factors, as well as factors related to financial markets and the structure of the market for oil. The strongly persistent nature of the time series of oil price changes implies that the lagged changes in oil price inflation should also be considered as a further determinant.

Results

The results of the BMA exercise are summarized in table 2 for the whole sample, as well as for the subperiods 1983 to 1989, 1990 to 1999 and 2000 to 2008. The breakdown by decades is useful in that it proxies phases of key oil

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[16] *All variables in our dataset which have a trending behavior are transformed by taking the annual growth rate so as to ensure stationarity of all covariates.*

[17] *If the source data are not available at monthly frequency, we aggregate the data by taking monthly averages (for higher frequencies) or interpolate the data linearly to monthly frequencies (for frequencies lower than monthly).*

price developments: dropping prices in the 1980s, low prices in the 1990s, and the oil price boom that lasted almost until the outbreak of the financial crisis. Owing to limited data availability, we use different subsets of variables as the potential set of determinants in each subperiod. The number of potential models from which BMA estimates are computed is intractable for most of the settings proposed in our study, so we use the MC-3 method *(Markov chain Monte Carlo model composite)* to compute the necessary statistics. The results in table 2 are based on 2 million Markov chain draws, computed after discarding 1 million burn-in draws. For each exercise, we present the results in terms of the posterior inclusion probability of each covariate and the mean and standard deviation of the posterior distribution of the corresponding parameter in equation (1). Bold print is used for variables with a posterior inclusion probability above 0.5, which we label

"robust" determinants. One surprising result is that practically no single explanatory variable is robust for the full sample setting (1983 to 2008). The only exception is U.S. inflation, whose lag is negatively related to oil price inflation. This result, however, cannot be directly interpreted as a causal link, and provides evidence against theories claiming that in the past, oil price shocks were always preceded by inflationary pressure (Barsky and Kilian, 2004). At the same time, the parallel dynamics of oil price inflation and the U.S. business cycle postulated by Hamilton (2009) may also give rise to this type of partial correlation between X and Y. Other than that, only the autoregressive term appears to be robust in the full-sample results. The estimate of the autoregressive parameter implies a very high persistence of oil price inflation, a feature which is also present in the different subsamples studied.

Table 2

Bayesian Model Averaging: Results

Variable	1983 to 2008			2000 to 2008			1990 to 1999			1983 to 1989		
	PIP	PM	PSD	PIP	PM	PSD	PIP	PM	PSD	PIP	PM	PSD
Demand												
Federal funds rate	0.012	0.000	0.000	0.007	0.000	0.001	0.012	0.000	0.001	0.037	0.000	0.002
10-year bonds	0.028	0.002	0.016	0.007	0.000	0.012	0.081	0.014	0.054	0.028	0.004	0.045
U.S. inflation	**0.714**	**−1.926**	**1.395**	**0.970**	**−7.182**	**2.147**	0.017	−0.014	0.290	0.306	−3.552	5.921
M2 growth	0.009	0.000	0.000	0.006	0.000	0.001	0.019	0.000	0.001	0.056	0.000	0.004
EMBI				0.009	0.002	0.028						
EMBI spread				0.247	0.000	0.000						
Energy intensity (worldwide)				0.025	−0.112	0.989						
Energy intensity (North America)	0.030	0.034	0.226	0.014	0.045	0.855	0.011	0.001	0.112	0.183	0.842	1.945
Temperature	0.009	0.000	0.003	0.022	0.004	0.034	0.011	0.000	0.004			
GDP growth China	0.026	−0.011	0.080	0.006	−0.002	0.101	0.013	−0.001	0.066	0.111	0.026	0.083
GDP growth euro area				0.099	1.216	4.398				0.174	−0.269	0.654
GDP growth EU				0.072	1.066	4.230						
GDP growth G-7	0.187	0.356	0.803	0.084	1.127	4.016	0.022	0.041	0.433	0.040	−0.089	1.290
GDP growth OECD				0.040	0.411	2.618						
GDP growth OECD Europe				**0.732**	**11.105**	**6.994**						
Dummy variable for September 11	0.019	−0.001	0.011	0.010	−0.001	0.007						
Supply												
Oil rigs				0.011	−0.002	0.027						
Gas rigs				0.006	0.000	0.008						
Refining capacity	0.015	−0.006	0.076	**0.995**	**−14.515**	**2.629**	0.019	0.016	0.153	0.049	−0.069	1.066
Oil reserves, worldwide	0.043	0.013	0.069	0.077	−0.126	0.469	0.434	1.184	1.456	0.073	0.062	0.282
Oil supply, worldwide				0.023	−0.025	0.195	0.014	0.005	0.060			
Oil stocks, worldwide	0.012	0.000	0.005	0.007	−0.003	0.070	0.029	−0.002	0.013	0.020	0.000	0.014
Capacity utilization				0.005	−0.001	0.022	0.013	0.000	0.018			
Exploration costs	0.018	0.001	0.011	0.014	0.001	0.017	0.014	0.001	0.006	0.050	0.000	0.100
Baltic Dry Index				0.058	0.004	0.016						
Dummy variable Hurric 1	0.009	0.000	0.006	0.003	0.000	0.003						
Dummy variable Hurric 2	0.007	0.000	0.004	0.004	0.000	0.003						
Dummy variable Hurric 3	0.278	−0.041	0.072	0.007	0.000	0.006						
Dummy variable Gulf War 1	0.010	0.000	0.003				0.014	0.000	0.004			
Dummy variable Gulf War 2	0.033	−0.003	0.019	0.012	−0.001	0.008						
Oil market structure												
Share of OPEC reserves				0.027	0.012	0.114						
OPEC quota	0.009	0.000	0.010	0.009	0.001	0.022	0.009	0.001	0.013	0.111	0.139	0.444
Saudi Arabia quota	0.058	0.008	0.038	0.006	0.000	0.014	**0.596**	**−0.301**	**0.298**	0.029	−0.007	0.059
Oil supply, OPEC share				0.013	0.007	0.079						
Financial market												
Nominal effective exchange rate of the U.S. dollar	0.013	0.000	0.029	0.038	0.111	0.704	0.027	−0.008	0.063	0.170	0.179	0.646
Real effective exchange rate of the U.S. dollar	0.013	−0.002	0.038	0.054	−0.170	0.950	0.030	−0.012	0.085	0.141	0.100	0.710
S&P Composite Returns	0.173	0.022	0.052	0.009	0.001	0.016	0.013	−0.001	0.016	0.026	0.004	0.041
Net positions				0.008	0.000	0.000	0.009	0.000	0.000			
Autoregression												
Lagged oil inflation	**1.000**	**0.961**	**0.030**	**1.000**	**0.865**	**0.081**	**1.000**	**0.942**	**0.046**	**1.000**	**0.955**	**0.078**
Number of observations	299			107			119			71		

Source: OeNB.

Note: Dependent variable: year-on-year oil price inflation. PIP stands for Posterior Inclusion Probability, PM for Posterior Mean, which is the mean of the posterior distribution of the parameter for the corresponding variable. PSD stands for Posterior Standard Deviation, i.e. the standard deviation of the posterior distribution of the parameter for the corresponding variable. Results are based on 2 million Markov chain Monte Carlo model composite draws. Bold values indicate PIP>0.5.

While the results of the full sample indicate that there is no single systematic explanation for oil price inflation over the 25-year period under review, the analysis of subsamples reveals that this is the case partly because the importance of the numerous channels put forward above varies over time. During the 1980s, no single mechanism can explain oil price dynamics robustly, and only *lagged oil price inflation* appears robustly related to oil price changes. The analysis of the 1990s, on the other hand, reveals that market structure, and in particular the strategic position of *Saudi Arabia* within the group of oil producing countries played a key role in explaining oil price changes in that period. Our results imply that in the 1990s, increases in the Saudi Arabian quota were systematically related to decreases in oil price inflation, even though the estimate of the quantitative effect is not very precise.

We find new robust determinants of oil price inflation if we concentrate on data for the period from 2000 to 2008. On the one hand, it is only in this period that oil demand proxies appear to be robust determinants. Our results indicate that stronger GDP growth in industrialized countries led to higher oil price inflation over the last decade. The BMA exercise highlights European GDP growth as the key variable in this channel, but we should keep in mind that, given the correlation of all economic growth variables in our dataset, this variable may be proxying global demand-driven pressure on oil prices. On the other hand, changes in refining capacity also appear robustly related to oil price changes in this subsample. The negative, very precisely estimated parameter indicates that increases in refining capacity were indeed successful in

accommodating short-run demand changes during the last decade.

The results of our analysis suggest that recent oil price changes were triggered by numerous and time-varying mechanisms. No single channel tends to dominate as an empirical determinant of oil price inflation in the full period from 1983 to 2008. The study of subsamples reveals that demand factors and short-term changes in refining capacity can robustly explain changes in the last decade, while the strategic position of the OPEC, and in particular of Saudi Arabia, seems to be the most relevant factor behind oil price changes in the 1990s.

4 Conclusions

This paper provides an overview and a ranking of numerous short-term determinants of crude oil prices. Essentially, our findings confirm the theoretical suggestions that fundamental factors trigger and dominate price trends, but we do not find evidence to support monocausal explanations. Rather, the price of oil is the outcome of complex processes occurring within the global economy.

Throughout the entire period under examination, our results suggest that of the short-term factors on the supply side, consumer price inflation plays a significant part in modeling crude oil price fluctuations. Moreover, Saudi Arabia's production quota – a factor relating to the market structure – gained increasing prominence in the 1990s, while in the 2000s, both supply and demand factors (European demand for oil and refining capacities) are most prevalent in determining crude oil prices (Wurzel et al., 2009). In addition, our results show that the pricing process is subject to a certain degree of persistence, which Dvir and Rogoff (2009) also confirm from a historical perspec-

tive. Once prices move in a certain direction, it can only be reversed with difficulty.

The results of our analysis do not preclude the possibility that in the long run other determinants discussed in this paper may become significant. Provided they coordinate themselves effectively, crude oil producers would certainly be in a position to exercise pricing power in the event of supply shortages. Furthermore, the role of speculation and financial market participants' investment strategies, although not easy to prove, can hardly be excluded. Although financial flows essentially follow fundamental market trends, they can nevertheless determine price developments over the short to medium term.

The econometric results do not necessarily contradict the view that the most recent oil price shock was caused by a chronological sequence of all four groups of determinants (demand, supply, structure of the oil market and speculation). Originally, the demand trend from emerging economies seems to have played a decisive role. This perhaps also accounts for the initially rather moderate macroeconomic effect in comparison with historical oil price shocks, which were primarily caused by (expactation of) short-term scarcity of supply.[18] Evidently, demand shocks have a less severe impact on growth than supply shocks, which incur the same reaction as imposing a tax on oil importing economies. Later on, long-term supply factors have obviously become more significant in comparison with demand factors, considering the worldwide rise in inflation from mid-2007 and the deep recession of 2008–2009. In addition, it is conceivable that interaction between crude oil producers and financial market participants in the most recent phase of the price surge exacerbated the pressure on oil prices (Hamilton, 2008).

This study marks a starting point for investigating oil price determinants by applying the Bayesian approach. It might be interesting to include the time periods surrounding the first two oil price shocks of the 1970s and 1980s in future research, although this would likely entail accepting lower frequency and quality of data. Moreover, to the extent that more frequent (at least weekly) data are available, possible structural interruptions could be analyzed. Finally, the Bayesian approach could be combined with cointegration methods in order to capture long-term determinants. These examples demonstrate promising fields for future research.

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[18] *Other explanations for this benign effect include, for example, a more credible monetary policy and/or more flexible labor markets.*

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Notes

Abbreviations

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

Legend

x = No data can be indicated for technical reasons

.. = Data not available at the reporting date

0 = The numerical value is zero or smaller than half of the unit indicated

Discrepancies may arise from rounding.

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